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10th Global Breast Cancer Conference
April 8 (Thu) - 10 (Sat), 2021
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ANNIVERSARY

Abstract Book

"Go Beyond Cure of Breast Cancer"

한국유방암학회
Korean Breast Cancer Society

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Program at a Glance

📡 Live Streaming

Date	April 8 (Thu)					
Time	Vista 1+2 B2F 📡	Vista 3 B2F 📡	Walker Hall 1 1F 📡	Walker Hall 2 1F 📡	Art Hall 4F 📡	Grand Hall B1F
07:55-08:00						eOral & ePoster
08:00-08:45	Preview of 1st day of GBCC					
08:45-09:00	Opening Ceremony	📹 Opening Ceremony				
09:00-10:15	Symposium 1 🎧	Panel Discussion 1 🎧	Education Session 1 🎧	Endoscopic and Robotic Breast Session 🎧	GBCC-JBCS Joint Meeting 1	
10:15-10:35	Break					
10:35-11:50	Symposium 2 🎧	Panel Discussion 2 🎧	Education Session 2 🎧	OPBS Session 1 🎧	GBCC-JBCS Joint Meeting 2	
11:50-12:10	Break					
12:10-12:55	Plenary Lecture 1 🎧	📹 Plenary Lecture 1				
12:55-13:10	Break					
13:10-13:55	Satellite Symposium 1-1	📹 Satellite Symposium 1-1	Satellite Symposium 1-2	📹 Satellite Symposium 1-2		
13:55-14:10	Break					
14:10-14:55	Plenary Lecture 2 🎧	📹 Plenary Lecture 2				
14:55-15:10	Break					
15:10-16:25		Panel Discussion 3 🎧	Education Session 3 🎧	OPBS Session 2 🎧	GBCC Sino-Korean Joint Meeting	
16:25-16:45	Break					
16:45-18:00		Panel Discussion 4 🎧	Education Session 4 🎧	OPBS Session 3 🎧	ABCN Business Meeting (Invited Only)	
18:00-18:20			KBCS General Assembly			
18:20-19:05	10th Anniversary Ceremony					

Date	April 9 (Fri)					
Time	Vista 1+2 B2F 📡	Vista 3 B2F 📡	Walker Hall 1 1F 📡	Walker Hall 2 1F 📡	Art Hall 4F 📡	Grand Hall B1F
07:55-08:00	Preview of 2nd day of GBCC					eOral & ePoster
08:00-08:45	Satellite Symposium 2	📹 Satellite Symposium 2				
08:45-09:00	Break					
09:00-10:15	Symposium 3 🎧	Panel Discussion 5 🎧	Education Session 5 🎧	HBOC Session 🎧	Nursing Session 1 KOR	
10:15-10:35	Break					
10:35-11:50	Symposium 4 🎧	Panel Discussion 6 🎧	Education Session 6 🎧	Survivorship Session 1 🎧	Nursing Session 2 KOR	
11:50-12:10	Break					
12:10-12:55	Plenary Lecture 3 🎧	📹 Plenary Lecture 3				
12:55-13:10	Break					
13:10-13:55	Satellite Symposium 3-1	📹 Satellite Symposium 3-1	Satellite Symposium 3-2	📹 Satellite Symposium 3-2		
13:55-14:10	Break					
14:10-14:55	Plenary Lecture 4 🎧	📹 Plenary Lecture 4				
14:55-15:10	Break					
15:10-16:25	Symposium 5 🎧	Panel Discussion 7 🎧	Education Session 7 🎧	Survivorship Session 2 🎧	Nursing Session 3 KOR	
16:25-16:45	Break					
16:45-18:00	Symposium 6 🎧	Panel Discussion 8 🎧	Education Session 8 🎧	Survivorship Session 3 🎧	Nursing Session 4 KOR	
18:00-18:20	Break					
18:20-19:05	Satellite Symposium 4	📹 Satellite Symposium 4				

Date	April 10 (Sat)					
Time	Vista 1+2 B2F 📡	Vista 3 B2F 📡	Walker Hall 1 1F 📡	Walker Hall 2 1F 📡	Art Hall 4F 📡	Grand Hall B1F
07:55-08:00	Preview of 3rd day of GBCC					eOral & ePoster
08:00-08:45	Satellite Symposium 5	📹 Satellite Symposium 5				
08:45-09:00	Break					
09:00-10:15	Symposium 7 🎧	Special Session 1 🎧	Junior Doctors Forum 🎧	Session for Breast Cancer Survivors 1 KOR-ENG	Practicing Breast Surgeons Session 1 KOR	
10:15-10:35	Break					
10:35-11:50	Symposium 8 🎧	Special Session 2 🎧	Junior Doctors Debate 🎧	Session for Breast Cancer Survivors 2 KOR-ENG	Practicing Breast Surgeons Session 2 KOR	
11:50-12:10	Break					
12:10-12:55	Plenary Lecture 5 🎧	📹 Plenary Lecture 5				
12:55-13:10	Break					
13:10-13:55	Satellite Symposium 6	📹 Satellite Symposium 6				
13:55-14:10	Break					
14:10-14:55	Plenary Lecture 6 🎧	📹 Plenary Lecture 6				
14:55-15:10	Break					
15:10-16:25	Symposium 9 🎧	Special Session 3 🎧	Session for Breast Cancer Survivors 3 KOR-ENG	Session for Breast Cancer Survivors 4 KOR-ENG	Practicing Breast Surgeons Session 3 KOR	
16:25-16:45	Break					
16:45-18:00	Symposium 10 🎧	Special Session 4 🎧	Session for Breast Cancer Survivors 5 KOR-ENG	Session for Breast Cancer Survivors 6 KOR-ENG	Practicing Breast Surgeons Session 4 KOR	
18:00-18:20	Break					
18:20-19:05	Closing Ceremony GBCC Wrap-up (Invited Only)					

🎧 현장에서만 한국어 통역이 제공 됩니다

KOR Korean Session

KOR-ENG Korean Session. English Simultaneous Interpretation to be Provided.
(한국어로 발표되는 세션입니다)

📹 Sessions marked with a video icon will be broadcast live in other meeting rooms.

Program Details

Day 1 April 8 (Thu)

08:45-09:00 Opening Ceremony Vista 1+2

09:00-10:15 Symposium 1 Vista 1+2

Current Strategies for Hormone Receptor (+) HER2 (-) Breast Cancer

Moderator	Shinji Ohno *Cancer Institute Hospital of JFCR, Japan*	
Moderator	Kyung Hae Jung *ASAN Medical Center, Korea*	
Speaker	Shinji Ohno OPTIMAL SEQUENCE OF ENDOCRINE THERAPY IN HORMONE RECEPTOR (+) MBC *Cancer Institute Hospital of JFCR, Japan*	*12*
Speaker	Karen Gelmon CDK4/6 INHIBITORS: IDEAL APPLICATION AND RESISTANCE MECHANISM *Univ. of British Columbia, Canada*	*14*
Speaker	Ingrid Mayer NEW THERAPEUTIC OPTIONS TO OVERCOME ENDOCRINE RESISTANCE *Vanderbilt Univ. Medical Center, U.S.A.*	*15*

09:00-10:15 Panel Discussion 1 Vista 3

DCIS: Low to Intermediate Grade vs. High Grade

Moderator	E. Shelley Hwang *Duke Univ. School of Medicine, U.S.A.*	
Moderator	Gyungyub Gong *ASAN Medical Center, Korea*	
Speaker	Gary Tse PATHOLOGIC RISK STRATIFICATION OF DCIS *The Chinese Univ. of Hong Kong, Hong Kong*	*48*
Speaker	E. Shelley Hwang PERSONALIZING TREATMENT STRATEGIES FOR LOW RISK DCIS *Duke Univ. School of Medicine, U.S.A.*	*49*
Speaker	Icro Meattini DE-ESCALATION OF RADIOTHERAPY IN DCIS *Univ. of Florence, Italy*	*50*

09:00-10:15 Education Session 1 Walker Hall 1

In-depth Discussion for Breast Cancer Screening

Moderator	Boo-Kyung Han *Samsung Medical Center, Korea*	
Moderator	Vivian Youngjean Park *Yonsei Univ. College of Medicine, Korea*	
Speaker	Vivian Youngjean Park RISK-BASED BREAST CANCER SCREENING: AGE TO BEGIN AND INTERVAL *Yonsei Univ. College of Medicine, Korea*	*78*
Speaker	Jin Chung SCREENING MAMMOGRAPHY: RISK AND SAFETY *Ewha Womans Univ. Mokdong Hospital, Korea*	*80*

Day 1 April 8 (Thu)

Speaker Constance Lehman 82
AI AND THE FUTURE OF BREAST CANCER DETECTION AND RISK PREDICTION
Harvard Medical School, U.S.A.

09:00-10:15 Endoscopic and Robotic Breast Session Walker Hall 2

Moderator Hyukjai Shin
Myongji Hospital, Korea

Moderator Hyung Seok Park
Severance Hospital, Korea

Speaker Jesse C. Selber 153
ROBOTIC LD FLAP AND DIEP
MD Anderson Cancer Center, U.S.A.

Speaker Dong Won Lee 154
BREAST RECONSTRUCTION WITH ROBOT-ASSISTED SURGERY
Yonsei Univ. College of Medicine, Korea

Speaker Hyung Seok Park 155
ROBOTIC MASTECTOMY IN KOREA
Severance Hospital, Korea

09:00-10:15 GBCC-JBCS Joint Meeting 1 Art Hall

Clinical Trials in JBCS and KBCS

Moderator Shigehira Saji
Fukushima Medical Univ., Japan

Moderator Joon Jeong
Gangnam Severance Hospital, Korea

Speaker Naoki Niikura 157
CURRENT SITUATION OF CLINICAL TRIALS IN THE JAPANESE BREAST CANCER SOCIETY
Tokai Univ. School of Medicine, Japan

Speaker Joon Jeong 158
CURRENT SITUATION OF CLINICAL TRIALS IN THE KOREAN BREAST CANCER SOCIETY
Gangnam Severance Hospital, Korea

Discussion: Searching for the Opportunities for Future Collaboration for Clinical Trials in Two Countries

Discussion Naoki Niikura
Tokai Univ. School of Medicine, Japan
Shigehira Saji
Fukushima Medical Univ., Japan
Jong Han Yu
Samsung Medical Center, Korea
Joohyuk Sohn
Yonsei Cancer Center, Korea

10:15-10:35 Break

Day 1 April 8 (Thu)

10:35-11:50 Symposium 2 Vista 1+2

How to Target HER2 in Breast Cancer Better?

Moderator	Yoon-Sim Yap *National Cancer Centre Singapore, Singapore*	
Moderator	Yeon Hee Park *Samsung Medical Center, Korea*	
Speaker	Yoon-Sim Yap MOVING TOWARDS "CURE" OF HER2 (+) METASTATIC BREAST CANCER? *National Cancer Centre Singapore, Singapore*	*17*
Speaker	Yeon Hee Park FINE TUNING OF PERIOPERATIVE HER2 TARGETING IN EARLY STAGE HER2 (+) BREAST CANCER *Samsung Medical Center, Korea*	*18*
Speaker	Otto Metzger BEST COMBINATION STRATEGY OF IMMUNOTHERAPY WITH CONVENTIONAL HER2 TARGETED THERAPY *Dana-Farber Cancer Institute, U.S.A.*	*19*

10:35-11:50 Panel Discussion 2 Vista 3

Overcoming Limitations of Resources in Developing Asian Countries

Moderator	Kong Wee Ong *K W Ong Breast & General Surgery, Singapore*	
Moderator	In Hae Park *Korea Univ. Guro Hospital, Korea*	
Speaker	In Hae Park OPTIMAL APPLICATION OF STANDARD OF CARE IN SYSTEMIC THERAPY: GENERIC, BIOSIMILAR, COST-EFFECTIVENESS? *Korea Univ. Guro Hospital, Korea*	*52*
Speaker	Kong Wee Ong CAN WE INCREASE THE RATE OF ACCEPTING BREAST CONSERVING SURGERIES IN COUNTRIES WITH LIMITED RESOURCES? *K W Ong Breast & General Surgery, Singapore*	*53*
Speaker	Thi Tuyet Anh Cung BREAST CANCER RADIOTHERAPY IN HO CHI MINH CITY CANCER HOSPITAL *Ho Chi Minh City Univ. of Medicine and Pharmacy, Viet Nam*	*54*

10:35-11:50 Education Session 2 Walker Hall 1

Advances in Image-guided Breast Intervention

Moderator	Eun-Kyung Kim *Yongin Severance Hospital, Korea*	
Moderator	Eun Young Ko *Samsung Medical Center, Korea*	
Speaker	Jessica Leung PERCUTANEOUS INTERVENTION (NEEDED) FOR TARGETED AXILLARY DISSECTION *MD Anderson Cancer Center, U.S.A.*	*84*

Speaker Eun Young Ko *86*
PREOPERATIVE IMAGE-GUIDED BREAST INTERVENTION (WIRE, TATOOING, MARKER)
Samsung Medical Center, Korea

Speaker Woo Jung Choi *89*
STRATEGY OF IMAGE-GUIDED INTERVENTION IN THE DIAGNOSIS OF SUSPICIOUS MICROCALCIFICATION
ASAN Medical Center, Korea

10:35-11:50 OPBS Session 1 Walker Hall 2

How to Train Oncoplastic Breast Surgery in Asia

Moderator Jung Han Yoon
Chonnam National Univ. Hwasun Hospital, Korea

Moderator Tae Hyun Kim
Inje Univ. Busan Paik Hospital, Korea

Speaker Benjamin Sarfati *130*
HOW TO ESTABLISH A TRAINING CENTER FOR ONCOPLASTIC AND ENDO-ROBOTIC BREAST SURGERY
Institut Gustave Roussy, France

Speaker Jeeyeon Lee *131*
VISITING AND TRAINING SYSTEM FOR ONCOPLASTIC AND ENDO-ROBOTIC BREAST SURGERY
Kyungpook National Univ. Chilgok Hospital, Korea

Speaker So-Youn Jung *132*
EXPERIENCE OF CLINICAL ONCOPLASTIC FELLOWSHIP IN VARIOUS COUNTRIES
National Cancer Center, Korea

10:35-11:50 GBCC-JBCS Joint Meeting 2 Art Hall

Education Program for Young Doctors in Two Countries

Moderator Naoto Ueno
MD Anderson Cancer Center, U.S.A.

Moderator Han-Byoel Lee
Seoul National Univ. Hospital, Korea

Speaker Han-Byoel Lee *159*
PROGRAM FOR YOUNG DOCTORS IN KBCS AND THE FUTURE DIRECTION OF JUNIOR DOCTORS FORUM IN GBCC (KBCS)
Seoul National Univ. Hospital, Korea

Speaker Norikazu Masuda *160*
PROGRAM FOR YOUNG DOCTORS IN JBCS
National Hospital Organization Osaka National Hospital, Japan

Speaker Naoto Ueno *162*
EXPERIENCE OF EDUCATION PROGRAM IN ASIA (JAPAN TEAM ONCOLOGY PROGRAM)
MD Anderson Cancer Center, U.S.A.

11:50-12:10 Break

Day 1 April 8 (Thu)

12:10-12:55 Plenary Lecture 1 Vista 1+2

Moderator Young-Hyuck Im
Samsung Medical Center, Korea

Speaker Matthew Ellis *2*
THE MOLECULAR ETIOLOGY OF ER+ BREAST CANCER
Baylor College of Medicine, U.S.A.

12:55-13:10 Break

13:10-13:55 Satellite Symposium 1-1 Vista 1+2

Moderator Kyong Hwa Park
Korea Univ. Anam Hospital, Korea

Speaker Giuseppe Curigliano *220*
OPTIMAL TREATMENT FOR HR+/HER2- METASTATIC BREAST CANCER PATIENTS: CDK 4/6 INHIBITORS BASED ON REAL-WORLD PRACTICE
Univ. of Milan / European Institute of Oncology, Italy

13:10-13:55 Satellite Symposium 1-2 Walker Hall 1

Moderator Changwan Jeon
Kosin Univ. Gospel Hospital, Korea

Speaker Karen Gelmon *222*
OPTIMIZING TREATMENT SEQUENCE WITH OLAPARIB IN GBRCAM METASTATIC BREAST CANCER
Univ. of British Columbia, Canada

13:55-14:10 Break

14:10-14:55 Plenary Lecture 2 Vista 1+2

Moderator Woochul Noh
Korea Cancer Center Hospital, Korea

Speaker Seock-Ah Im *3*
CHANGING THE TRAJECTORY FOR PREMENOPAUSAL HR(+) METASTATIC BREAST CANCER PATIENTS THROUGH CLINICAL TRIALS: BRIDGING THE GAP BETWEEN GUIDELINES AND CLINICAL PRACTICE
Seoul National Univ. Hospital, Korea

14:55-15:10 Break

15:10-16:25 Panel Discussion 3 Vista 3

The Role of Locoregional Therapy in Advanced Breast Cancer Patients

Moderator Kyung Hwan Shin
Seoul National Univ. Hospital, Korea

Moderator Yeon Joo Kim
ASAN Medical Center, Korea

Speaker Junping Shiau *55*
MANAGEMENT OF SKIN METASTASIS AND MALIGNANT WOUNDS
Kaohsiung Medical Univ. Hospital, Taiwan

Speaker Yeon Joo Kim *56*
RADIATION THERAPY TO PRIMARY TUMOR IN STAGE IV BREAST CANCER
ASAN Medical Center, Korea

Speaker Shigeru Imoto *57*
LOCOREGIONAL TREATMENT MODALITIES IN BREAST CANCER PATIENTS WITH OLIGOMETASTASES
Kyorin Univ. School of Medicine, Japan

15:10-16:25 Education Session 3 Walker Hall 1

Biology of Breast Cancer

Moderator Giuseppe Viale
Univ. of Milan / European Institute of Oncology, Italy

Moderator So Yeon Park
Seoul National Univ. Bundang Hospital, Korea

Speaker Han Suk Ryu *91*
CLINICAL PROTEOMICS FOR BREAST CANCER
Seoul National Univ. Hospital, Korea

Speaker Giuseppe Viale *92*
TRADITIONAL YET IMPORTANT BIOMARKERS IN BREAST CANCER
: ER, PR, HER2 AND KI-67
Univ. of Milan / European Institute of Oncology, Italy

Speaker Naoto Ueno *94*
CLINICAL MOLECULAR TESTING FOR BREAST CANCER MANAGEMENT
MD Anderson Cancer Center, U.S.A.

15:10-16:25 OPBS Session 2 Walker Hall 2

Combined Approach for Oncoplastic & Reconstructive Surgery

Moderator Ho Yong Park
Kyungpook National Univ. Chilgok Hospital, Korea

Moderator Hyun Jo Youn
Jeonbuk National Univ. Hospital, Korea

Speaker Eisuke Fukuma *133*
WHAT IS KEY POINT IN TRAINING OF ONCOPLASTIC AND ENDO-ROBOTIC BREAST SURGERY
Kameda Medical Center, Japan

Speaker Visnu Lohsiriwat *134*
DIFFERENCES BETWEEN SURGICAL ONCOLOGIST AND ONCOPLASTIC SURGEON
Siriraj Hospital, Mahidol Univ., Thailand

Speaker Hung-Wen Lai *135*
EXPERIENCE OF ONCOPLASTIC AND ENDO-ROBOTIC BREAST SURGERY & INTERNATIONAL FELLOWSHIP TRAINING
Changhua Christian Hospital, Taiwan

Day 1 April 8 (Thu)

15:10-16:25 GBCC Sino-Korean Joint Meeting Art Hall

Medical Treatment and Clinical Trials in Korea and China

Moderator Peng Yuan
National Cancer Center, Cancer Hospital, Chinese Academy of Medical Sciences, China

Moderator Nam Sun Paik
Ewha Womans Univ. Cancer Center for Women, Korea

Speaker Qiang Liu *164*
THE NEW PROGRESS OF MEDICAL THERAPEUTIC TREATMENT AND CLINICAL TRIALS IN BREAST CANCER IN CHINA
Sun Yat-sen Memorial Hospital, China

Speaker Hee Kyung Ahn *165*
THE NEW PROGRESS OF MEDICAL THERAPEUTIC TREATMENT AND CLINICAL TRIALS IN BREAST CANCER IN KOREA
Gachon Univ. Gil Medical Center, Korea

Multidisciplinary Case Discussion

Discussion Hee Kyung Ahn
Gachon Univ. Gil Medical Center, Korea

Woo Young Sun
The Catholic Univ. of Korea, Daejeon St. Mary's Hospital, Korea

Hyun-Ah Kim
Korea Cancer Center Hospital, Korea

Eun Young Kim
Kangbuk Samsung Hospital, Korea

Yixin Qi
The Fourth Hospital of Hebei Medical Univ., China

Dong Song
The First Hospital of Jilin Univ., China

Jin Yang
The First Affiliated Hospital of Xi'an Jiaotong Univ., China

Jian Zhang
Fudan Univ. Shanghai Cancer Center, China

16:25-16:45 Break

16:45-18:00 Panel Discussion 4 Vista 3

Genomic Testing with NGS Panels

Moderator Chanheun Park
Kangbuk Samsung Hospital, Korea

Moderator Woong-Yang Park
Samsung Medical Center, Korea

Speaker Giuseppe Curigliano *59*
APPLICATION OF GENOMIC ANALYSIS IN CLINIC: ESMO RECOMMENDATION
Univ. of Milan / European Institute of Oncology, Italy

Speaker Woong-Yang Park *60*
ISSUES IN TISSUE BASED NGS ANALYSIS
Samsung Medical Center, Korea

Day 1 April 8 (Thu)

Speaker Sarat Chandarlapaty *61*
CLINICAL IMPLEMENTATION OF LIQUID BIOPSY PANELS
Memorial Sloan Kettering Cancer Center, U.S.A.

16:45-18:00 Education Session 4 Walker Hall 1

Toxicity Management for Breast Cancer Patients

Moderator Ava Kwong
The Univ. of Hong Kong, Hong Kong

Moderator Seung Ah Lee
CHA Bundang Medical Center, Korea

Speaker Ava Kwong *95*
MANAGEMENT OF CLIMACTERIC SYMPTOMS FROM HORMONE TREATMENT
The Univ. of Hong Kong, Hong Kong

Speaker Su-Jin Koh *96*
ASSESSMENT AND MANAGEMENT OF ACUTE TOXICITY OF CHEMOTHERAPY
Ulsan Univ. Hospital, Korea

Speaker Po-Han Lin *97*
DETECTION AND MANAGEMENT OF LONG-TERM TOXICITY OF SYSTEMIC TREATMENT: CARDIAC TOXICITY, IMMUNOTHERAPY-INDUCED ENDOCRINOPATHY, ETC.
National Taiwan Univ. Hospital, Taiwan

16:45-18:00 OPBS Session 3 Walker Hall 2

Recent Updates for Surgery and Reconstruction

Moderator Sang Gue Kang
Soonchunhyang Univ. Hospital Seoul, Korea

Moderator Jung Ho Lee
The Catholic Univ. of Korea, Bucheon St. Mary's Hospital, Korea

Speaker Eisuke Fukuma *133*
A TO Z OF ENDOSCOPIC MASTECTOMY
Kameda Medical Center, Japan

Speaker Jung Ho Lee *134*
RECENT UPDATE OF AUTOLOGOUS RECONSTRUCTION
The Catholic Univ. of Korea, Bucheon St. Mary's Hospital, Korea

Speaker Ung-sik Jin *135*
RECENT UPDATE OF IMPLANT-BASED BREAST RECONSTRUCTION
Seoul National Univ. Hospital, Korea

16:45-18:00 ABCN Business Meeting (Invited Only) Art Hall

Moderator Sung-Bae Kim
ASAN Medical Center, Korea

Speaker Seock-Ah Im
IDENTIFYING THE UNMET NEED: ONE STEP FORWARD TO PRACTICE-CHANGING TRIAL
Seoul National Univ. Hospital, Korea

Speaker Giuseppe Curigliano
MENTORSHIP AND INTERNATIONAL COLLABORATION
Univ. of Milan / European Institute of Oncology, Italy

18:20-19:05 10th Anniversary Ceremony Vista 1+2

Day 2 April 9 (Fri)

08:00-08:45 Satellite Symposium 2 Vista 1+2

Moderator	Seung Il Kim *Yonsei Univ. College of Medicine, Korea*	
Speaker	Stanley SeungSuh Hong QUALITY ATTRIBUTE OF MONOCLONAL ANTIBODY BIOSIMILARS: CONSISTENCY AND VARIATION *Celltrion Healthcare, Korea*	*224*

08:45-09:00 Break

09:00-10:15 Symposium 3 Vista 1+2

Application of Radiomics and Radiogenomics in Breast Cancer

Moderator	Woo Kyung Moon *Seoul National Univ. Hospital, Korea*	
Moderator	Sung Hun Kim *The Catholic Univ. of Korea, Seoul St. Mary's Hospital, Korea*	
Speaker	Katja Pinker-Domenig RADIOMICS AND RADIOGENOMICS WITH MRI FOR DETECTION, PREDICTION AND PROGNOSIS *Memorial Sloan Kettering Cancer Center, U.S.A.*	*20*
Speaker	Bo Kyoung Seo RADIOGENOMICS IN BREAST CANCER USING US AND CT *Korea Univ. Ansan Hospital, Korea*	*21*
Speaker	Ho-Young Lee NEW APPROACH USING PET-CT OF RADIOMICS AND RADIOGENOMICS IN BREAST CANCER *Seoul National Univ. Bundang Hospital, Korea*	*22*

09:00-10:15 Panel Discussion 5 Vista 3

Biologic Differences between Asian and Western Breast Cancer Patients in Genomic Era

Moderator	Shigehira Saji *Fukushima Medical Univ., Japan*	
Moderator	Wonshik Han *Seoul National Univ. Hospital, Korea*	
Speaker	Wonshik Han GENOMIC DIFFERENCES BETWEEN ASIAN AND WESTERN BREAST CANCER PATIENTS *Seoul National Univ. Hospital, Korea*	*62*
Speaker	Louis Wing Cheong Chow PHARMACOKINETIC AND/OR PHARMACODYNAMIC DIFFERENCES BETWEEN ASIAN AND WESTERN BREAST CANCER PATIENTS *Organization for Oncology and Translational Research, Hong Kong*	*63*
Speaker	Shigehira Saji ETHNIC DIFFERENCES OF ASIAN BREAST CANCER PATIENTS FROM WESTERN PATIENTS: LESSONS FROM JAPANESE CLINICAL TRIALS *Fukushima Medical Univ., Japan*	*64*

Day 2 April 9 (Fri)

09:00-10:15 Education Session 5 Walker Hall 1

Current Trends in Breast Cancer Surgery

Moderator	Henry Kuerer *MD Anderson Cancer Center, U.S.A.*	
Moderator	Sang Uk Woo *Korea Univ. Guro Hospital, Korea*	
Speaker	Henry Kuerer DE-ESCALATION OF BREAST SURGERY *MD Anderson Cancer Center, U.S.A.*	*98*
Speaker	Alastair Thompson INDIVIDUALIZED MANAGEMENT OF THE AXILLA *Baylor College of Medicine, U.S.A.*	*99*
Speaker	Jiong Wu DILEMMA OF LOCAL THERAPY FOR METASTATIC BREAST CANCER *Fudan Univ. Shanghai Cancer Center, China*	*100*

09:00-10:15 HBOC Session Walker Hall 2

HBOC

Moderator	Sung-Won Kim *Daerim St. Mary's Hospital, Korea*	
Moderator	Myong Cheol Lim *National Cancer Center, Korea*	
Speaker	Monica Morrow CURRENT STATUS OF RISK-REDUCING MASTECTOMY *Memorial Sloan Kettering Cancer Center, U.S.A.*	*167*
Speaker	Melissa Southey POPULATION GENETIC TESTING FOR BREAST CANCER *Monash Univ., Australia*	*168*
Speaker	Myong Cheol Lim PROPORTION AND CLINICAL APPLICATION OF HEREDITARY PREDISPOSITION OF GYNECOLOGIC CANCER *National Cancer Center, Korea*	*170*

09:00-10:15 Nursing Session 1 Art Hall

The Professional Role of a Breast Cancer Nurse: Acute Stage

Moderator	Mi Young Kang *Daerim St. Mary's Hospital, Korea*	
Moderator	Ok-Hee Cho *Kongju National Univ., Korea*	
Speaker	Hye Jeong Kim POSTOPERATIVE EDUCATION FOR BREAST CANCER PATIENTS *Dankook Univ. Hospital, Korea*	*176*
Speaker	Sim-kyung Yuk ROLE OF NURSE IN BREAST CANCER CHEMOTHERAPY *Daerim St. Mary's Hospital, Korea*	*178*
	Hye Sung Moon CARE FOR BREAST CANCER PATIENTS WITH RADIATION THERAPY *Ewha Womans Univ. Mokdong Hospital, Korea*	*179*

Day 2 April 9 (Fri)

10:15-10:35 **Break**

10:35-11:50 **Symposium 4** **Vista 1+2**

Adaptive Strategy for Locoregional Therapy after Neoadjuvant Chemotherapy

Moderator Tari King
Dana-Farber/Brigham and Women's Cancer Center, U.S.A.

Moderator Woo-Chan Park
The Catholic Univ. of Korea, Seoul St. Mary's Hospital, Korea

Speaker Jung Min Chang *23*
MULTIMODAL IMAGING ASSESSMENT OF THE RESPONSE MONITORING TO NEOADJUVANT CHEMOTHERAPY
Seoul National Univ. Hospital, Korea

Speaker Tari King *25*
PLANNING FOR SURGERY ACCORDING TO THE RESPONSIVENESS OF NEOADJUVANT CHEMOTHERAPY
Dana-Farber/Brigham and Women's Cancer Center, U.S.A.

Speaker Alice Y. Ho *26*
OPTIMAL REGIONAL NODAL IRRADIATION IN YPN0 AFTER NEOADJUVANT CHEMOTHERAPY
Massachusetts General Hospital, U.S.A.

10:35-11:50 **Panel Discussion 6** **Vista 3**

Multidisciplinary Care for Breast Cancer Patients

Moderator Akihiko Shimomura
National Center for Global Health and Medicine, Japan

Moderator Jun-Won Min
Dankook Univ. Hospital, Korea

Speaker Akihiko Shimomura *65*
FORMING A MULTIDISCIPLINARY TEAM FOR BREAST CANCER TREATMENT
National Center for Global Health and Medicine, Japan

Speaker Linda Vahdat *66*
ROLE OF MULTIDISCIPLINARY TEAM IN EARLY BREAST CANCER PATIENTS
Memorial Sloan Kettering Cancer Center, U.S.A.

Speaker Naoto Ueno *67*
MULTIDISCIPLINARY TEAM MANAGEMENT OF METASTATIC BREAST CANCER
MD Anderson Cancer Center, U.S.A.

10:35-11:50 **Education Session 6** **Walker Hall 1**

Issues in Older Patients with Breast Cancer

Moderator Sung Hoo Jung
Jeonbuk National Univ. Hospital, Korea

Moderator Jee Hyun Kim
Seoul National Univ. Bundang Hospital, Korea

Speaker Luke Dogyun Kim *101*
USEFULNESS OF COMPREHENSIVE GERIATRIC ASSESSMENT
Cleveland Clinic Foundation, U.S.A.

Speaker	Hideko Yamauchi OPTIMAL MANAGEMENT OF EARLY STAGE GERIATRIC PATIENTS: COST VS. BENEFIT *St. Luke's International Hospital, Japan*	*102*
Speaker	Jee Hyun Kim SPECIAL ASPECTS OF MANAGEMENT OF OLDER PATIENTS WITH MBC *Seoul National Univ. Bundang Hospital, Korea*	*103*

10:35-11:50 **Survivorship Session 1** **Walker Hall 2**

Building Up Breast Cancer Survivor Cohort

Moderator	Byung Ho Son *ASAN Medical Center, Korea*	
Moderator	Yong Bae Kim *Yonsei Cancer Center, Korea*	
Speaker	Ann H. Partridge RESEARCH FOR YOUNG BREAST CANCER SURVIVORS (HOHO TRIAL) *Dana-Farber Cancer Institute, U.S.A.*	*140*
Speaker	Jung Eun Lee EXPERIENCE OF KOREAN BREAST CANCER SURVIVOR STUDY *Seoul National Univ., Korea*	*141*
Speaker	Heather Eliassen EXPERIENCE OF COHORT STUDY *Brigham and Women's Hospital, Harvard Univ., U.S.A.*	*142*

10:35-11:50 **Nursing Session 2** **Art Hall**

Hospice and Palliative Care: Morality and Ethics

Moderator	Hye-Ah Yeom *The Catholic Univ. of Korea, Korea*	
Moderator	Keonsuk Lee *National Cancer Center, Korea*	
Speaker	Jiyeon Lee SYMPTOM MANAGEMENT FOR ADVANCED CANCER PATIENTS: SYMPTOM CLUSTER APPROACH *Yonsei Univ., Korea*	*180*
Speaker	Kyung-Ah Kang DIGNITY IN CARING PATIENTS WITH LIFE THREATENING ILLNESS *Sahmyook Univ., Korea*	*182*
Speaker	Mihyun Park ETHICAL ISSUES IN END OF LIFE CARE *The Catholic Univ. of Korea, Korea*	*184*

11:50-12:10 **Break**

12:10-12:55 **Plenary Lecture 3** **Vista 1+2**

Moderator	Se Jeong Oh *The Catholic Univ. of Korea, Incheon St. Mary's Hospital, Korea*

Day 2 April 9 (Fri)

Speaker Monica Morrow 6
WILL BREAST SURGERY BE OBSOLETE IN THE FUTURE?
Memorial Sloan Kettering Cancer Center, U.S.A.

12:55-13:10 Break

13:10-13:55 Satellite Symposium 3-1 Vista 1+2

Moderator Keun Seok Lee
National Cancer Center, Korea

Speaker Yen-Shen Lu 226
ARE ALL CDK 4/6 INHIBITORS CREATED EQUALLY?
National Taiwan Univ. Hospital, Taiwan

13:10-13:55 Satellite Symposium 3-2 Walker Hall 1

Moderator Heung Kyu Park
Gachon Univ. Gil Medical Center, Korea

Speaker Nadia Harbeck 228
CONTINUING ADVANCE IN METASTATIC BREAST CANCER: ROLE OF THE NEW CDK 4/6 INHIBITORS IN METASTATIC BREAST CANCER TREATMENT
Univ. of Munich, Germany

13:55-14:10 Break

14:10-14:55 Plenary Lecture 4 Vista 1+2

Moderator Dong-Young Noh
CHA Medical Center, Korea

Speaker Emiel Rutgers 7
BREAST CANCER TREATMENT: ESCALATION IS GOOD, DE-ESCALATION MAY BE BETTER
Netherlands Cancer Institute, Netherlands

14:55-15:10 Break

15:10-16:25 Symposium 5 Vista 1+2

Immunotherapy in Breast Cancer: Current and Future

Moderator Roberto Salgado
Peter MacCallum Cancer Centre, Belgium

Moderator Joohyuk Sohn
Yonsei Cancer Center, Korea

Speaker Carsten Denkert 27
IMMUNE TUMOR MICROENVIRONMENT IN BREAST CANCER
Philipps Univ. Marburg and Univ. Hospital Marburg, Germany

Day 2 April 9 (Fri)

Speaker Harold J. Burstein 28
UP-TO-DATE STATUS OF IMMUNOTHERAPY IN BREAST CANCER: HOPE AND LIMITATION
Dana-Farber Cancer Institute, U.S.A.

Speaker Roberto Salgado 29
PREDICTIVE BIOMARKERS FOR IMMUNOTHERAPY: CURRENT STATUS AND FUTURE DIRECTIONS
Peter MacCallum Cancer Centre, Belgium

15:10-16:25 Panel Discussion 7 Vista 3

Hot Issues in Breast Cancer Surgery 1

Moderator Douglas Macmillan
Nottingham Breast Institute, United Kingdom

Moderator Jin Sup Eom
ASAN Medical Center, Korea

Speaker Douglas Macmillan 68
VOLUME DISPLACEMENT AFTER BREAST CONSERVING SURGERY
Nottingham Breast Institute, United Kingdom

Speaker Jung Dug Yang 70
VOLUME REPLACEMENT AFTER BREAST CONSERVING SURGERY
Kyungpook National Univ. Chilgok Hospital, Korea

Speaker Jin Sup Eom 71
BREAST RECONSTRUCTION WITH MINIMAL STIGMATA
ASAN Medical Center, Korea

15:10-16:25 Education Session 7 Walker Hall 1

HBOC

Moderator Peter C. Dubsky
Klinik St. Anna, Switzerland

Moderator Sang Ah Han
Kyung Hee Univ. Hospital at Gangdong, Korea

Speaker Sang Ah Han 105
BASICS OF HEREDITARY BREAST CANCER
Kyung Hee Univ. Hospital at Gangdong, Korea

Speaker Peter C. Dubsky 106
PREVENTIVE OPTIONS IN WOMEN WITH GERMLINE MUTATIONS PREDISPOSING FOR BREAST CANCER
Klinik St. Anna, Switzerland

Speaker Jai Min Ryu 107
TREATMENT OPTIONS IN BRCA 1/2 BREAST CANCER PATIENTS
Samsung Medical Center, Korea

15:10-16:25 Survivorship Session 2 Walker Hall 2

Smart Survivorship Care

Moderator Ling-Min Tseng
Taipei-Veterans General Hospital, Taiwan

Moderator Jong Won Lee
ASAN Medical Center, Korea

Day 2 April 9 (Fri)

Speaker	Seungjae Song APPLICATION-BASED LIFE STYLE MODIFICATION FOR BREAST CANCER SURVIVORS *LifeSemantics, Corp., Korea*	*144*
Speaker	Il Yong Chung DISTRESS MANAGEMENT USING MOBILE DEVICE-BASED PLATFORM *ASAN Medical Center, Korea*	*146*
Speaker	Ji Sung Yoo EXPERIENCE OF CLINICAL TRIAL USING MOBILE APPLICATIONS (SMART AFTER CARE) *National Cancer Center, Korea*	*147*

15:10-16:25 Nursing Session 3 Art Hall

The Professional Role of Nurse in Breast Cancer Care: Chronic Stage

Moderator	Bomnae Choi *Ewha Womans Univ. Mokdong Hospital, Korea*	
Moderator	Ju-Young Lee *The Catholic Univ. of Korea, Korea*	
Speaker	Ji-Hyeon Hwang INTRACTABLE WOUND CARE OF ADVANCED BREAST CANCER *ASAN Medical Center, Korea*	*186*
Speaker	Boo Yeon Jung BREAST CANCER RELATED LYMPHEDEMA AND PRECAUTIONARY BEHAVIORS *Samsung Medical Center, Korea*	*187*
Speaker	Nayeon Kim FOLLOW-UP EXAMINATION FOR RECURRENCE OF BREAST CANCER PATIENTS *Samsung Medical Center, Korea*	*188*

16:25-16:45 Break

16:45-18:00 Symposium 6 Vista 1+2

New Tools for Translational Research in Breast Cancer

Moderator	Sung Yong Kim *Soonchunhyang Univ. Hospital Cheonan, Korea*	
Moderator	Hyeong-Gon Moon *Seoul National Univ. Hospital, Korea*	
Speaker	Amos Lee ADVANCES IN PRECISE TUMOR SAMPLING AND SEQUENCING IN BREAST CANCER *Seoul National Univ., Korea*	*30*
Speaker	Hwiyoung Kim ARTIFICIAL INTELLIGENCE BASED MEDICAL DATA ANALYSIS FOR PRECISION MEDICINE *Yonsei Univ. College of Medicine, Korea*	*31*
Speaker	Hyeong-Gon Moon DECIPHERING TUMOR MICROENVIRONMENT USING THE PATIENT-DERIVED XENOGRAFT MODELS *Seoul National Univ. Hospital, Korea*	*32*

Day 2 April 9 (Fri)

16:45-18:00 Panel Discussion 8 Vista 3

Hot Issues in Breast Cancer Surgery 2

Moderator Chan Yeong Heo
Seoul National Univ. Bundang Hospital, Korea

Moderator Eun-Kyu Kim
Seoul National Univ. Bundang Hospital, Korea

Speaker Eun-Kyu Kim *72*
HOW TO REDUCE POSTOPERATIVE COMPLICATION AFTER ONCOPLASTIC BREAST SURGERY
Seoul National Univ. Bundang Hospital, Korea

Speaker Yong-Sheng Wang *73*
INDIVIDUALIZED MANAGEMENT OF INTERNAL MAMMARY LYMPH NODES
Shandong Cancer Hospital, China

Speaker Jee Suk Chang *75*
CONSIDERATIONS FOR RADIOTHERAPY AFTER BREAST RECONSTRUCTION
Yonsei Univ. College of Medicine, Korea

16:45-18:00 Education Session 8 Walker Hall 1

Issues in Very Young Breast Cancer Patients

Moderator Matteo Lambertini
IRCCS Policlinico San Martino Hospital - Univ. of Genova, Italy

Moderator Hee Jeong Kim
ASAN Medical Center, Korea

Speaker Olivia Pagani *109*
HOW TO HANDLE ISSUES ON FERTILITY PRESERVATION AND PREGNANCY
Geneva Univ. Hospital, Switzerland

Speaker Hee Jeong Kim *110*
MULTIDISCIPLINARY COUNSELING FOR VERY YOUNG PATIENTS UPON DIAGNOSIS
ASAN Medical Center, Korea

Speaker Matteo Lambertini *111*
TREATMENT STRATEGIES FOR PREGNANT BREAST CANCER PATIENTS
IRCCS Policlinico San Martino Hospital - Univ. of Genova, Italy

16:45-18:00 Survivorship Session 3 Walker Hall 2

Management of Long-term/Late Effect for Breast Cancer Survivors

Moderator Louis Wing Cheong Chow
Organization for Oncology and Translational Research, Hong Kong

Moderator Sun Kyung Baek
Kyung Hee Univ. Medical Center, Korea

Speaker Sun Kyung Baek *148*
MANAGEMENT OF CIPN
Kyung Hee Univ. Medical Center, Korea

Speaker Hak Jin Kim *149*
PREVENTION AND MANAGEMENT OF CARDIOTOXICITY
National Cancer Center, Korea

Day 2 April 9 (Fri)

	Speaker	Tae-Suk Kim MANAGEMENT OF PSYCHIATRIC PROBLEMS FOR BREAST CANCER SURVIVORS *The Catholic Univ. of Korea, Seoul St. Mary's Hospital, Korea*	*150*
16:45-18:00	**Nursing Session 4**	**Art Hall**	
	Breast Cancer Survivorship: Life Beyond Treatment		
	Moderator	Eun-Young Jun *Daejeon Univ., Korea*	
	Moderator	Kum Ock Kwon *Daerim St. Mary's Hospital, Korea*	
	Speaker	Insook Lee CHANGES WITHIN FAMILY LIFE 1: DISTRESS AND QUALITY OF LIFE OF SPOUSES OF WOMEN WITH BREAST CANCER *Changwon National Univ., Korea*	*189*
	Speaker	Se Yeon Lee CHANGES WITHIN FAMILY LIFE 2: EXPERIENCES OF MOTHERS WITH BREAST CANCER AND THEIR CHILDREN *Sookmyung Women's Univ., Korea*	*191*
	Speaker	Jung Hee Yoon SURVIVORSHIP CARE PLANNING: SELF-MANAGEMENT SUPPORT INTERVENTION FOR BREAST CANCER SURVIVORS *Samsung Advanced Institute for Health Sciences & Technology, Korea*	*193*
18:00-18:20	**Break**		
18:20-19:05	**Satellite Symposium 4**	**Vista 1+2**	
	Moderator	Sang Seol Jung *Kyung Hee Univ. Medical Center, Korea*	
	Speaker	Il Yong Chung ROLE OF OVARIAN FUNCTION SUPPRESSION IN PREMENOPAUSAL BREAST CANCER PATIENTS *ASAN Medical Center, Korea*	*231*

Day 3 April 10 (Sat)

08:00-08:45 Satellite Symposium 5 Vista 1+2

Moderator Jin-Hee Ahn
ASAN Medical Center, Korea

Speaker Ji-Yeon Kim *234*
THE ARRIVAL OF BIOSIMILAR MONOCLONAL ANTIBODY IN MEDICAL ONCOLOGY : THE TRUTH OF TRASTUZUMAB BIOSIMILAR
Samsung Medical Center, Korea

09:00-10:15 Symposium 7 Vista 1+2

New Drug Development

Moderator Hiroji Iwata
Aichi Cancer Center Hospital, Japan

Moderator Jae Hong Seo
Korea Univ. Guro Hospital, Korea

Speaker Jae Hong Seo *33*
TARGETING CANCER STEM CELL
Korea Univ. Guro Hospital, Korea

Speaker Erica Mayer *34*
NOVEL HER2 TARGETED THERAPIES: ADCS AND TKIS
Dana-Farber Cancer Institute, U.S.A.

Speaker Hiroji Iwata *35*
BEST COMBINATION OF NEW THERAPEUTICS IN PRECISION MEDICINE ERA
Aichi Cancer Center Hospital, Japan

09:00-10:15 Special Session 1 Vista 3

Breast Cancer and COVID-19

Moderator Masakazu Toi
Kyoto Univ. Hospital, Japan

Moderator Hong Bin Kim
Seoul National Univ. Bundang Hospital, Korea

Speaker Hong Bin Kim *113*
UP-TO-DATE KNOWLEDGE OF COVID-19
Seoul National Univ. Bundang Hospital, Korea

Speaker Young-Joon Kang *114*
BEFORE AND AFTER THE OUTBREAK OF COVID-19 IN THE DIAGNOSIS OF BREAST CANCER
The Catholic Univ. of Korea, Incheon St. Mary's Hospital, Korea

Speaker Masakazu Toi *116*
GUIDELINES IN THE MANAGEMENT OF BREAST CANCER PATIENTS DURING COVID-19 PANDEMIC
Kyoto Univ. Hospital, Japan

Day 3 April 10 (Sat)

09:00-10:15 Junior Doctors Forum Walker Hall 1

Moderator Byung Joo Chae
Samsung Medical Center, Korea

Speaker Monica Morrow *172*
DEVELOPING AN ACADEMIC CAREER
Memorial Sloan Kettering Cancer Center, U.S.A.

Speaker Emiel Rutgers *173*
THE YOUNG SURGEON AND A SCIENTIFIC CAREER: A COMIC OPERA?
Netherlands Cancer Institute, Netherlands

09:00-10:15 Session for Breast Cancer Survivors 1 Walker Hall 2

Diagnosis of Breast Cancer

Moderator Okhee Woo
Korea Univ. Guro Hospital, Korea

Moderator Seung Ah Lee
CHA Bundang Medical Center, Korea

Speaker Seung Ah Lee *195*
CAUSES AND INCIDENCES OF BREAST CANCER
CHA Bundang Medical Center, Korea

Speaker Okhee Woo *197*
IMAGING DIAGNOSIS OF BREAST CANCER
Korea Univ. Guro Hospital, Korea

Speaker So Yeon Park *199*
PATHOLOGIC DIAGNOSIS AND SUBTYPES OF BREAST CANCER
Seoul National Univ. Bundang Hospital, Korea

09:00-10:15 Practicing Breast Surgeons Session 1 Art Hall

Regulations and Guidelines of the Korean Health Insurance System

Moderator Sangdal Lee
MD Clinic, Korea

Moderator Beom Seok Kwak
Dongguk Univ. Ilsan Hospital, Korea

Speaker Beom Seok Kwak
NEOADJUVANT THERAPY AND FOLLOWING SURGERY ACCORDING TO THE BREAST CANCER SUBTYPES
Dongguk Univ. Ilsan Hospital, Korea

Speaker Young Ju Jeong
ADJUVANT ENDOCRINE THERAPY: OPTIMAL DURATION AND MANAGEMENT DURING MEDICATIONS
Daegu Catholic Univ. Medical Center, Korea

Speaker Kyoung Eun Lee
PALLIATIVE ENDOCRINE THERAPY: NAVIGATION TO AVOID VARIOUS TRAPS IN REGULATIONS
Ewha Womans Univ. Mokdong Hospital, Korea

10:15-10:35 Break

Day 3 April 10 (Sat)

10:35-11:50 Symposium 8 Vista 1+2

Recent Issues in Breast Cancer Surgery

Moderator Takashi Ishikawa
Tokyo Medical Univ., Japan

Moderator Jeong Eon Lee
Samsung Medical Center, Korea

Speaker Takashi Ishikawa *36*
RETROSPECTIVE AND PROSPECTIVE STUDIES ON EARLY BREAST CANCER PATIENTS FOR TREATMENT WITHOUT SURGERY
Tokyo Medical Univ., Japan

Speaker Kandace McGuire *37*
SENTINEL NODES FROM ABERRANT LYMPHATIC DRAINAGE IN RECURRENT BREAST CANCER
Virginia Commonwealth Univ., Massey Cancer Center, U.S.A.

Speaker Tae-Kyung Robyn Yoo *38*
INTRAOPERATIVE TECHNIQUES FOR MARGIN ASSESSMENT IN BREAST CANCER SURGERY: IS IT MANDATORY?
The Catholic Univ. of Korea, Seoul St. Mary's Hospital, Korea

10:35-11:50 Special Session 2 Vista 3

AI Technologies for Breast Cancer

Moderator Bong Joo Kang
The Catholic Univ. of Korea, Seoul St. Mary's Hospital, Korea

Moderator Woo Young Sun
The Catholic Univ. of Korea, Daejeon St. Mary's Hospital, Korea

Speaker Eun-Kyung Kim *117*
APPLICATION OF AI FOR BREAST IMAGING & DIAGNOSIS
Yongin Severance Hospital, Korea

Speaker Kyoungbun Lee *118*
APPLICATION OF AI FOR BREAST PATHOLOGY
Seoul National Univ. Hospital, Korea

Speaker Seonguk Kwon *120*
APPLICATION OF AI FOR MANAGEMENT OF BREAST CANCER
Konyang Univ. Hospital, Korea

10:35-11:50 Junior Doctors Debate Walker Hall 1

Moderator Han-Byoel Lee
Seoul National Univ. Hospital, Korea

Moderator Jai Min Ryu
Samsung Medical Center, Korea

Discussion

- Systemic Therapy: Can Patients Age ≤ 50 with Oncotype DX RS 21~25 Be Spared Chemotherapy with Ovarian Function Suppression?
- Local Therapy: Is Minimally Invasive Biopsy Accurate Enough to Predict Pathologic Complete Response to Neoadjuvant Chemotherapy?

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10:35-11:50 Session for Breast Cancer Survivors 2 Walker Hall 2

Surgery

Moderator Yoo Seok Kim
Chosun Univ. Hospital, Korea

Moderator Seung Pil Jung
Korea Univ. Anam Hospital, Korea

Speaker Yoo Seok Kim *200*
BREAST CONSERVING SURGERY
Chosun Univ. Hospital, Korea

Speaker Seung Pil Jung *201*
MASTECTOMY AND RECONSTRUCTION
Korea Univ. Anam Hospital, Korea

Speaker Sung Gwe Ahn *203*
SURGERY FOR AXILLARY LYMPH NODES
Gangnam Severance Hospital, Korea

10:35-11:50 Practicing Breast Surgeons Session 2 Art Hall

Up-to-date Evidence-based Approach

Moderator Jae Ho Jeong
ASAN Medical Center, Korea

Moderator Sangwon Kim
Mother's Breast Hospital, Korea

Speaker Jae Ho Jeong
IMMUNE CELL THERAPY FOR BREAST CANCER TREATMENT
ASAN Medical Center, Korea

Speaker Won Sup Yoon
HYPERTHERMIA FOR BREAST CANCER TREATMENT
Korea Univ. Ansan Hospital, Korea

Speaker Seung-Kwon Myung
EFFICACY OF VITAMIN AND ANTIOXIDANT SUPPLEMENTS IN CANCER PREVENTION
National Cancer Center Graduate School of Cancer Science and Policy, Korea

11:50-12:10 Break

12:10-12:55 Plenary Lecture 5 Venue: Vista 1+2

Moderator Kyong Hwa Park
Korea Univ. Anam Hospital, Korea

Speaker Ann H. Partridge *9*
BREAST CANCER SURVIVORSHIP: CHALLENGES AND OPPORTUNITIES
Dana-Farber Cancer Institute, U.S.A.

12:55-13:10 Break

Day 3 April 10 (Sat)

13:10-13:55 **Satellite Symposium 6** **Vista 1+2**

Moderator Jung-Hyun Yang
Konkuk Univ. Medical Center, Korea

Speaker Kyung-Hun Lee *237*
PROPHYLACTIC FEBRILE NEUTROPENIA MANAGEMENT OF BREAST CANCER PATIENTS
Seoul National Univ. Hospital, Korea

13:55-14:10 **Break**

14:10-14:55 **Plenary Lecture 6** **Vista 1+2**

Moderator Joon Jeong
Gangnam Severance Hospital, Korea

Speaker Hiroji Iwata *10*
THE RESPONSE GUIDED THERAPY AFTER NEOADJUVANT TREATMENT
Aichi Cancer Center Hospital, Japan

14:55-15:10 **Break**

15:10-16:25 **Symposium 9** **Vista 1+2**

New Targets, New Options in Triple Negative Breast Cancer

Moderator Nadia Harbeck
Univ. of Munich, Germany

Moderator Sung-Bae Kim
ASAN Medical Center, Korea

Speaker Sung-Bae Kim *40*
ROLE OF IMMUNOTHERAPY IN TNBC: CUTTING EDGE OF EVIDENCES AND FUTURE CHALLENGES
ASAN Medical Center, Korea

Speaker Melinda Telli *41*
PARP INHIBITORS: OPTIMAL APPLICATION AND RESISTANCE MECHANISMS
Stanford Univ. School of Medicine, U.S.A.

Speaker Nadia Harbeck *42*
ALLEGED TARGETS, INNOVATIVE APPLICATIONS: PIK3CA PATHWAY
Univ. of Munich, Germany

15:10-16:25 **Special Session 3** **Vista 3**

Advanced Decision Making in Palliative Care

Moderator Janice Tsang
The Univ. of Hong Kong, Hong Kong

Moderator Yong Wha Moon
CHA Bundang Medical Center, Korea

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Speaker	Janice Tsang CURRENT GLOBAL STATUS OF ADVANCED CARE DECISION *The Univ. of Hong Kong, Hong Kong*	*121*
Speaker	Hyun Jung Jho PALLIATIVE AND SUPPORTIVE CARE FOR BREAST CANCER PATIENTS IN KOREA *National Cancer Center, Korea*	*122*
Speaker	Masanori Mori PALLIATIVE AND SUPPORTIVE CARE FOR BREAST CANCER PATIENTS IN JAPAN *Seirei Mikatahara General Hospital, Japan*	*123*

15:10-16:25 Session for Breast Cancer Survivors 3 Walker Hall 1

Systemic Therapy

Moderator	Yee Soo Chae *Kyungpook National Univ. Chilgok Hospital, Korea*	
Moderator	Yongseok Kim *The Catholic Univ. of Korea, Uijeongbu St. Mary's Hospital, Korea*	
Speaker	Kyung-Hun Lee CHEMOTHERAPY *Seoul National Univ. Hospital, Korea*	*204*
Speaker	Yongseok Kim HORMONE THERAPY (ENDOCRINE THERAPY) *The Catholic Univ. of Korea, Uijeongbu St. Mary's Hospital, Korea*	*205*
Speaker	Yee Soo Chae TARGETED THERAPY *Kyungpook National Univ. Chilgok Hospital, Korea*	*206*

15:10-16:25 Session for Breast Cancer Survivors 4 Walker Hall 2

Rehabilitation

Moderator	Eun Joo Yang *Seoul National Univ. Bundang Hospital, Korea*	
Moderator	Zisun Kim *Soonchunhyang Univ. Hospital Bucheon, Korea*	
Speaker	Eun Joo Yang DIAGNOSIS AND MANAGEMENT OF LYMPHEDEMA *Seoul National Univ. Bundang Hospital, Korea*	*207*
Speaker	Seung Hyun Chung EXERCISE *National Cancer Center, Korea*	*208*
Speaker	Jung Eun Lee DIET AND NUTRITION *Seoul National Univ., Korea*	*209*

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15:10-16:25 Practicing Breast Surgeons Session 3 Art Hall

Imaging and Biopsy

Moderator Dong-Seok Lee
Bunhongbitzro Hospital, Korea

Moderator Bobae Choi
Chungnam National Univ. Hospital, Korea

Speaker Heeboong Park
ROLE OF AUTOMATED ULTRASONOGRAPHY FOR BREAST SCREENING
Park Surgical Clinic, Medical Park Ltd., Korea

Speaker Bonyong Koo
USEFUL TIPS OF VACUUM ASSISTED BIOPSY IN LOCAL CLINIC
U & U Surgery Clinic, Korea

Speaker Ji Soo Choi
PITFALL OF ULTRASONOGRAPHY SURVEILLANCE AFTER BREAST CANCER SURGERY
Samsung Medical Center, Korea

16:25-16:45 Break

16:45-18:00 Symposium 10 Vista 1+2

Biosimilars: Facts and Challenges

Moderator Yasuo Miyoshi
Hyogo College of Medicine, Japan

Moderator Tae-Yong Kim
Seoul National Univ. Hospital, Korea

Speaker Daehyun Baek *43*
STANDPOINT FROM REGULATORY AUTHORITY: GUIDELINES AND APPROVAL
Ministry of Food and Drug Safety, Korea

Speaker Donghoon Shin *44*
BUILDING CONFIDENCE IN BIOSIMILARS: FROM DATA TO PATIENT
Samsung Bioepis, Korea

Speaker Fumikata Hara *46*
OUTLOOK FROM CLINICIAN: CLINICAL EVIDENCES AND APPLICATION
Cancer Institute Hospital of JFCR, Japan

16:45-18:00 Special Session 4 Vista 3

Interprofessional Application of Cancer Predisposition Cascade Genetic Testing

Moderator Maria C. Katapodi
Univ. of Basel, Switzerland

Moderator Mi Sook Jung
Chungnam National Univ., Korea

Speaker Olivia Pagani *124*
THE MANDATE OF CANCER PREDISPOSITION CASCADE GENETIC TESTING:
LEGAL AND HEALTHCARE SYSTEM BARRIERS & FACILITATORS IN SWITZERLAND
Geneva Univ. Hospital, Switzerland

Speaker Sue Kim *126*
PSYCHOSOCIAL BARRIERS AND FACILITATORS OF CASCADE GENETIC TESTING
Yonsei Univ., Korea

Speaker Maria C. Katapodi *127*
THE SWISS CASCADE: A SPRINGBOARD FOR INTERNATIONAL COLLABORATION
Univ. of Basel, Switzerland

16:45-18:00 Session for Breast Cancer Survivors 5 Walker Hall 1

Radiation Therapy

Moderator Kyubo Kim
Ewha Womans Univ. Mokdong Hospital, Korea

Moderator Haeyoung Kim
Samsung Medical Center, Korea

Speaker Haeyoung Kim *210*
RADIATION AFTER BREAST CONSERVING SURGERY
Samsung Medical Center, Korea

Speaker Kyubo Kim *212*
RADIATION AFTER MASTECTOMY
Ewha Womans Univ. Mokdong Hospital, Korea

Speaker Su Ssan Kim *213*
MANAGEMENT OF COMPLICATIONS IN RADIATION TREATMENT
ASAN Medical Center, Korea

16:45-18:00 Session for Breast Cancer Survivors 6 Walker Hall 2

Peaceful Mind

Moderator Hyun-Ah Kim
Korea Cancer Center Hospital, Korea

Moderator Sang Ah Han
Kyung Hee Univ. Hospital at Gangdong, Korea

Speaker Hyun-Ah Kim *214*
MANAGEMENT OF MENOPAUSAL SYMPTOMS
Korea Cancer Center Hospital, Korea

Speaker Hye Yoon Park *216*
MANAGEMENT OF MOOD AND COGNITIVE FUNCTION
Seoul National Univ. Hospital, Korea

Speaker Sang Ah Han *217*
UNDERSTANDING OF BREAST CANCER FAMILY HISTORY
Kyung Hee Univ. Hospital at Gangdong, Korea

16:45-18:00 Practicing Breast Surgeons Session 4 Art Hall

KABTS (Korean Association of Breast and Thyroid Surgeon) Report

Moderator Jeong Kyeung Kim
Maria Breast Clinic, Korea

Moderator Tae Ik Eom
Hiu Breast & Thyroid Clinic, Korea

Day 3 April 10 (Sat)

	Speaker	Hyewon Ro ANNUAL REPORT OF BREAST CLINICS IN KABTS *Honest U Surgery Clinic, Korea*
	Speaker	Young San Jeon SURVEILLANCE DATA OF BENIGN PHYLLODES TUMOR AND ATYPICAL DUCTAL HYPERPLASIA AFTER VAB *Goo Hospital, Korea*
	Speaker	Tae Ik Eom THERAPEUTIC RESULTS OF TRIAMCINOLONE INJECTION FOR GRANULOMATOUS MASTITIS *Hiu Breast & Thyroid Clinic, Korea*
18:00-18:20	**Break**	
18:20-18:40	**Closing Ceremony**	

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LN, lymph node. eBC, early breast cancer

Study design. APHINITY was conducted as a prospective, two-group, randomized, multicenter, multinational, double-blind, placebo-controlled trial. A total of 4805 patients with node-positive or high-risk node-negative HER2-positive, operable breast cancer were randomly assigned to receive chemotherapy and trastuzumab plus either pertuzumab (2400 patients) or placebo (2405 patients). The primary end point, invasive-disease -free survival, was defined as the time from randomization until the date of the first occurrence of one of the following events (hereafter referred to as invasive-disease events): recurrence of ipsilateral invasive breast tumor, recurrence of ipsilateral locoregional invasive disease, a distant disease recurrence, contralateral invasive breast cancer, or death from any cause.

Reference. 1. Piccart M, Procter M, Fumagalli D, et al. Interim Overall Survival Analysis of APHINITY: a randomised multicenter, double-blind, placebo-controlled trial comparing chemotherapy plus trastuzumab plus pertuzumab versus chemotherapy plus trastuzumab plus placebo as adjuvant therapy in patients with operable HER2-positive early breast cancer. Presented at SABCS, 2019 Dec 10-14; San Antonio, Texas. Abstract #GS1-04.

PERJETA inj. (Pertuzumab) prescription medicine **[INDICATIONS]** • Metastatic breast cancer: Perjeta is indicated for use in combination with trastuzumab and docetaxel in adult patients with HER2-positive metastatic or locally recurrent unresectable breast cancer, who have not received previous anti-HER2 therapy or chemotherapy for their metastatic disease. • Early breast cancer: Perjeta is indicated for use in combination with trastuzumab and chemotherapy in: • the neoadjuvant treatment of adult patients with HER2-positive, locally advanced, inflammatory, or early stage breast cancer (greater than 2cm)• the adjuvant treatment of adult patients with HER2-positive early breast cancer at high risk of recurrence. **[DOSAGE AND ADMINISTRATION]** Perjeta is subject to restricted medical prescription and therapy should only be initiated under the supervision of a physician experienced in the administration of anti-cancer agents. Perjeta should be administered by a healthcare professional prepared to manage anaphylaxis and in an environment where full resuscitation facilities are immediately available. Patients treated with Perjeta must have HER2-positive tumour status, defined as a score of 3+ by immunohistochemistry (IHC) and/or a ratio of ≥ 2.0 by in situ hybridisation (ISH) assessed by a validated test. • Metastatic and early breast cancer: The recommended initial loading dose of pertuzumab is 840 mg administered as a 60 minute intravenous infusion, followed every 3 weeks thereafter by a maintenance dose of 420 mg administered over a period of 30 to 60 minutes. When administered with Perjeta the recommendation is to follow a 3 weekly schedule for trastuzumab administered as either:• an IV infusion with an initial loading dose of trastuzumab 8 mg/kg body weight followed every 3 weeks thereafter by a maintenance dose of 6 mg/kg body weight or • a fixed subcutaneous dose of trastuzumab by injection (600 mg) every 3 weeks irrespective of the patient’s body weight. In patients receiving a taxane, Perjeta and trastuzumab should be administered prior to the taxane. When administered with pertuzumab the recommended initial dose of docetaxel is 75 mg/m^2, administered thereafter on a 3 weekly schedule. In patients receiving an anthracycline-based regimen, Perjeta and trastuzumab should be administered following completion of the entire anthracycline regimen. • Metastatic breast cancer: Perjeta should be administered in combination with trastuzumab and docetaxel. Treatment with Perjeta and trastuzumab may continue until disease progression or unmanageable toxicity even if treatment with docetaxel is discontinued. • Early breast cancer: In the neoadjuvant setting, Perjeta should be administered for 3 to 6 cycles in combination with trastuzumab and chemotherapy, as part of a complete treatment regimen for early breast cancer Four preoperative cycles of Perjeta in combination with trastuzumab and docetaxel followed by 3 postoperative cycles of fluorouracil, epirubicin, and cyclophosphamide (FEC). Three or four preoperative cycles of FEC alone followed by 3 or 4 preoperative cycles of Perjeta in combination with docetaxel and trastuzumab . Six preoperative cycles of Perjeta in combination with docetaxel, carboplatin, and trastuzumab (TCH) (escalation of docetaxel above 75 mg/m^2 is not recommended). Four preoperative cycles of ddAC(dose dense doxorubicin and cyclophosphamide followed by 4 preoperative cycles of Perjeta in combination with docetaxel and trastuzumab. Following surgery, patients should continue to receive trastuzumab to complete 1 year of treatment.(max 18cycle). In the adjuvant setting, Perjeta should be administered in combination with trastuzumab for a total of one year (up to 18 cycles or until disease recurrence, or unmanageable toxicity, whichever occurs first) as part of a complete regimen for early breast cancer and regardless of the timing of surgery. Treatment should include standard anthracycline- and/or taxane-based chemotherapy. Perjeta and trastuzumab should start on Day 1 of the first taxane-containing cycle and should continue even if chemotherapy is discontinued. • For delayed or missed doses, if the time between two sequential infusions is less than 6 weeks, the 420 mg dose of PERJETA should be administered. Do not wait until the next planned dose. 6mg/kg of trastuzumab intravenous infusion should be administered as soon as possible without regard to the next planned dose. Trastuzumab 600mg SC should be administered as soon as possible without regard to the next planned dose. If the time between two sequential infusions is equal or more than 6 weeks, the loading dose of 840 mg Perjeta IV should be re-administered as a 60 minute infusion, followed by a maintenance dose of 420 mg IV administered over a period of 30 to 60 minutes every 3 weeks thereafter. The loading dose of 8 mg/kg of Herceptin IV should be re-administered over approximately 90 minutes, followed by a maintenance dose of 6 mg/kg IV administered over a period of 30 or 90 minutes every 3 weeks thereafter.• Dose modification: If trastuzumab treatment is discontinued, treatment with Perjeta should be discontinued. Dose reductions are not recommended for Perjeta or trastuzumab. For details regarding trastuzumab, please refer to the product information. Patients may continue therapy during periods of reversible chemotherapy-induced myelosuppression but they should be monitored carefully for complications of neutropenia during this time. For docetaxel and other chemotherapy dose modifications, see relevant product information. • Hypersensitivity reactions/anaphylaxis: Perjeta must be permanently discontinued in case of severe hypersensitivity. • Left Ventricular dysfunction: The recommendations on dose modifications in the event of LVEF dysfunction refer to 1. Warnings. • Infusion-Related Reactions: The infusion rate of PERJETA may be slowed or interrupted if the patient develops an infusion-related reaction. The infusion may be resumed when symptoms abate. Treatment including oxygen, beta agonists, antihistamines, rapid i.v. fluids and antipyretics may also help alleviate symptoms. Perjeta must be permanently discontinued in case of NCI-CTCAE Grade 4 hypersensitivity reactions(anaphylaxis), bronchospasm or acute respiratory distress syndrome. • Method of administration: It should not be administered as an intravenous push or bolus. For the initial dose, the recommended infusion period is 60 minutes. If the first infusion is well tolerated, subsequent infusions may be administered over a period of 30 minutes to 60 minutes. **[SPECIAL WARNINGS AND PRECAUTIONS FOR USE]** *Warnings 1) Left ventricular dysfunction • Decreases in LVEF have been reported with medicinal products that block HER2 activity, including Perjeta. Patients who have received prior anthracyclines or prior radiotherapy to the chest area may be at higher risk of LVEF declines. The majority of cases of symptomatic heart failure reported in the adjuvant setting were in patients who received anthracycline based chemotherapy • Perjeta has not been studied in patients with: a pre-treatment LVEF value of < 50%; a prior history of congestive heart failure (CHF); LVEF declines to < 50% during prior trastuzumab adjuvant therapy; or conditions that could impair left ventricular function such as uncontrolled hypertension, recent myocardial infarction, serious cardiac arrhythmia requiring treatment or a cumulative prior anthracycline exposure to > 360 mg/m^2 of doxorubicin or its equivalent. • Assess LVEF prior to initiation of Perjeta and at regular intervals during treatment with Perjeta (e.g. once during neoadjuvant treatment and every 12 weeks in the adjuvant or metastatic setting) to ensure that LVEF is within normal limits. Patients with metastatic breast cancer should have a pre-treatment left ventricular ejection fraction (LVEF) of ≥ 50%. Perjeta and trastuzumab should be withheld for at least 3 weeks for: • a drop in LVEF to less than 40% • a LVEF of 40%-45% associated with a fall of ≥ 10% points below pre-treatment value. Perjeta and trastuzumab may be resumed if the LVEF has recovered to > 45%, or to 40-45% associated with a difference of < 10% points below pre-treatment values. Patients with early breast cancer should have a pre-treatment LVEF of ≥ 55% (≥ 50% after completion of the anthracycline component of chemotherapy, if given). Perjeta and trastuzumab should be withheld for at least 3 weeks for: • a drop in LVEF to less than 50% associated with a fall of ≥ 10% points below pre-treatment values. Perjeta and trastuzumab may be resumed if the LVEF has recovered to ≥50% or to a difference of < 10% points below pre-treatment values. If the LVEF has declined as indicated above and has not improved, or has declined further at the subsequent assessment, discontinuation of Perjeta and trastuzumab should be strongly considered, unless the benefits for the individual patient are deemed to outweigh the risks. 2) Infusion reactions • Perjeta has been associated with infusion reactions including fatal outcomes. Close observation of the patient during and for 60 minutes after the first infusion and during and for 30 minutes after subsequent infusions of Perjeta is recommended. If a significant infusion reaction occurs, the infusion should be slowed down or interrupted and appropriate medical therapies should be administered. Patients should be evaluated and carefully monitored until complete resolution of signs and symptoms. Permanent discontinuation should be considered in patients with severe infusion reactions. This clinical assessment should be based on the severity of the preceding reaction and response to administered treatment for the adverse reaction. 3) Febrile neutropenia • In the CLEOPATRA trial in metastatic breast cancer, Patients treated with Perjeta, trastuzumab and docetaxel are at increased risk of febrile neutropenia compared with patients treated with placebo, trastuzumab and docetaxel, especially during the first 3 cycles of treatment. nadir neutrophil counts were similar in Perjeta-treated and placebo-treated patients. The higher incidence of febrile neutropenia in Perjeta-treated patients was associated with the higher incidence of mucositis and diarrhoea in these patients. Symptomatic treatment for mucositis and diarrhoea should be considered. No events of febrile neutropenia were reported after cessation of docetaxel. 4) Hypersensitivity reactions/anaphylaxis • Patients should be observed closely for hypersensitivity reactions. Severe hypersensitivity, including anaphylaxis and fatal outcomes, has been observed in clinical trials with Perjeta. Medicinal products to treat such reactions, as well as emergency equipment, should be available for immediate use. Perjeta is contraindicated in patients with known hypersensitivity to pertuzumab or to any of its excipients.* **Precautions for use** 1. Fertility, pregnancy and lactation 1) Women of childbearing potential and her partner should use effective contraception while receiving Perjeta and for 7 months following the last dose of pertuzumab. 2) There is limited amount of data from the use of pertuzumab in pregnant women. Studies in animals have shown reproductive toxicity. Administration of pertuzumab to pregnant cynomolgus monkeys during the period of organogenesis resulted in oligohydramnios, delayed fetal kidney development, and embryo-fetal death. 3) Perjeta is not recommended during pregnancy and in women of childbearing potential not using contraception. Considering these animal studies and the mechanism of action of Perjeta, it is believed that this drug may cause harm to the fetus when administered to pregnant women. The safe use of Perjeta during labor and delivery has not been established. 4) Because human IgG is secreted in human milk and the potential for absorption and harm to the infant is unknown, a decision should be made to discontinue breast-feeding or to discontinue treatment, taking into account the benefit of breast-feeding for the child and the benefit of Perjeta therapy for the woman. 5) No specific fertility studies in animals have been performed to evaluate the effect of pertuzumab. Only very limited data are available from repeat-dose toxicity studies with respect to the risk for adverse reactions on the male reproductive system. No adverse reactions were observed in sexually mature female cynomolgus monkeys exposed to pertuzumab. Perjeta® 2020-05-06-1.0

- Please report to Roche Korea (02-3451-3600) straight away, if you get pregnant during treatment with Perjeta or during the 7 months after stopping treatment.
- Additional information may be requested from pregnancy to 1yr after birth for your infant. This information will help Roche to better understand the safety of Perjeta and to provide appropriate information to health authorities, health care professionals and patients.
- If you want to get detailed product information and report adverse events, please contact Roche Korea (02-3451-3600).
- You can find latest product information on the Roche Korea website (www.roche.co.kr).

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·TEL: 02-3451-3600 ·FAX: 02-561-7200

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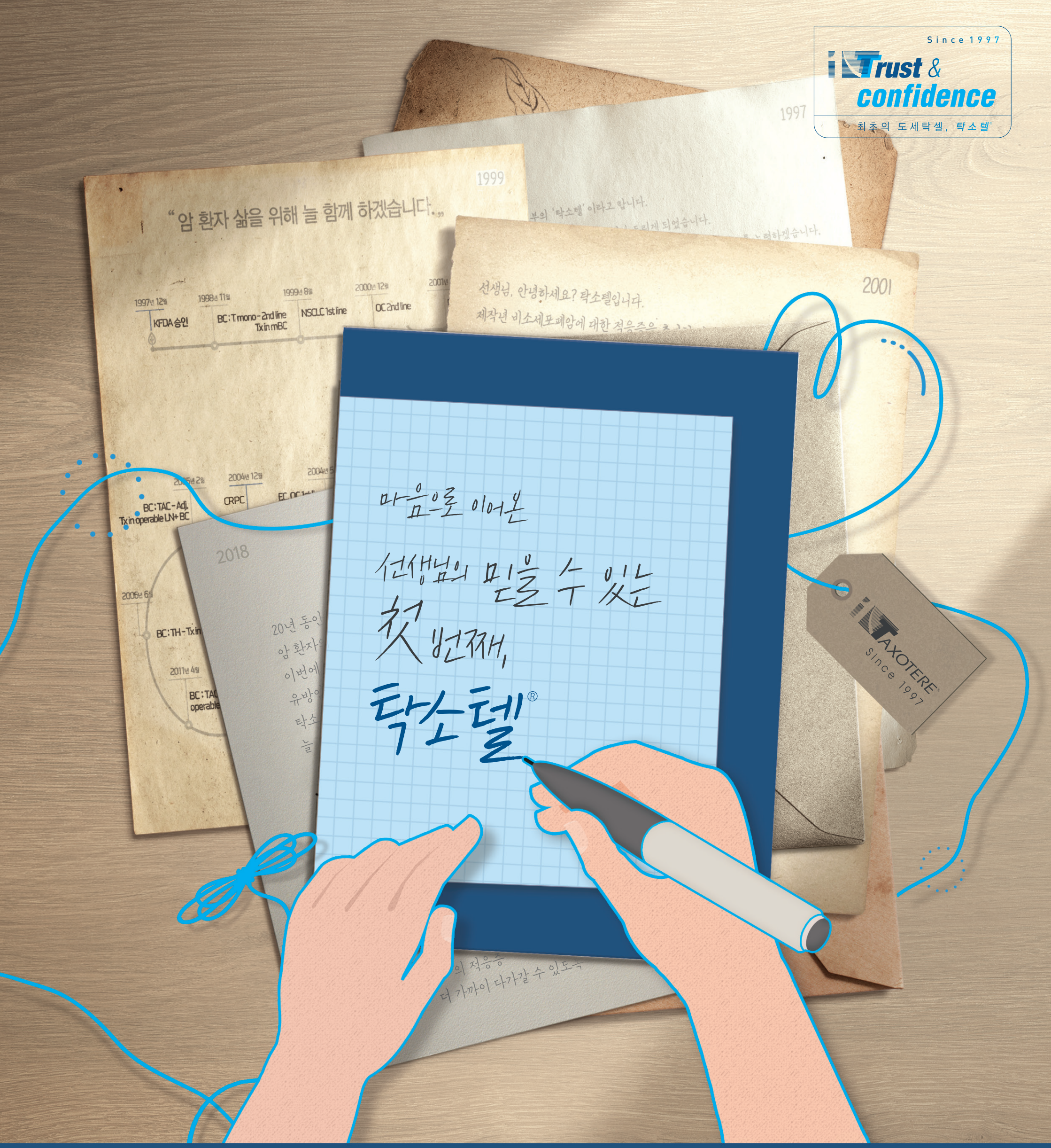

References 1. 탁소텔®1-바이알주제품설명서(개정년월일 2020년 9월 22일). **2.** 탁소텔®품목허가증(1997.12.05).

탁소텔®1-바이알주(도세탁셀수화물) [효능·효과] 1. 유방암 • 국소적으로 진행된 또는 전이성 유방암 1) 독소루비신과 병용하여 국소적으로 진행된 또는 전이된 유방암의 1차 치료 2) HER2가 과발현(IHC 3+ 또는 FISH 양성)되고 화학요법 치료를 받은 경험이 없는 전이성 유방암에 트라스투주맙과 병용요법 3) 이전의 화학요법에 실패한 국소적으로 진행된 유방암 또는 전이성 유방암 4) 카페시타빈과 병용하여 안트라사이클린계 약물을 포함한 화학요법에 실패한 국소적으로 진행된 유방암 또는 전이성 유방암 • 수술 후 보조요법 1) 독소루비신과 시클로포스파미드와 병용하여 다음 환자의 수술 후 보조요법 (TAC regimen) (1)림프절 양성의 수술 가능한 유방암 (2)림프절 음성의 수술 가능한 유방암(고위험인자가 하나 이상 있는 환자(종양크기>2cm, 연령<35세, 호르몬수용체음성, 종양분화도2~3)) 2) 독소루비신과 시클로포스파미드 사용 후, 트라스투주맙과 병용하여, HER2가 과발현된 수술 가능한 유방암 환자의 수술 후 보조요법 (AC-TH regimen) 3) 카보플라틴과 트라스투주맙과 병용하여, HER2가 과발현된 수술 가능한 유방암 환자의 수술 후 보조요법 (TCH regimen) 4) 시클로포스파미드와 병용하여 수술가능한 유방암 환자의 수술 후 보조요법 (1cm≤원발종양크기<7cm) (TC regimen) 2. 비소세포폐암: 백금화학요법제로 치료효과를 얻지 못한 환자들을 포함한 국소적으로 진행된 비소세포폐암 또는 전이성 비소세포폐암 3. 전립샘암: 프레드니솔론과 병용하여 안드로겐 비의존성(호르몬불응성) 전이성 전립샘암 4. 난소암: 카보플라틴과 병용하는 1차요법제로서 진행된 또는 전이된 상피성 난소암 5. 두경부암: 시스플라틴 및 플루오로우라실과 병용하여 국소 진행성 두경부 편평세포암의 유도화학요법 6. 위암 1) 진행성 및 전이성 또는 국소재발성 위암의 단독요법 2) 시스플라틴 및 플루오로우라실과 병용하여 전이성 또는 국소재발성 위암의 1차 치료 7. 식도암: 진행성 또는 재발성 식도 편평세포암 **[용법·용량]** 1. 유방암 • 국소적으로 진행된 또는 전이성 유방암 1) 유방암에 대한 일차적 요법에서 독소루비신(50 mg/m²)과 병용시 도세탁셀로서 75 mg/m²을 투여. 2) 화학요법 치료를 받은 적이 없는 HER2 과발현 전이성 유방암에 트라스투주맙과 병용요법제로 사용하는 경우, 이 약으로서 100 mg/m²를 매 3주마다 60분에 걸쳐 점적정맥주사. 3) 이전 화학요법에 실패한 유방암에서는 도세탁셀 75~100 mg/m²을 매 3주마다 1시간 동안 정맥 투여. 4) 카페시타빈과 병용하여 안트라사이클린계 약물을 포함한 화학요법에 실패한 국소적으로 진행된 유방암 또는 전이성 유방암에서는 3주마다 이 약 75 mg/m² 투여하면서 카페시타빈을 2주간 1일 2회, 1회 1,250 mg/m² 투여하고(식후 30분 이내) 1주간 휴약하는 것(3주를 주기로 함)이 권장. **•수술 후 보조요법** 1) TAC regimen: 매 3주마다 독소루비신 50 mg/m²과 시클로포스파미드 500 mg/m² 투여 1시간 후 이 약 75 mg/m²를 6주기 투여. 2) AC-TH regimen: (1) AC: 1~4 주기(3주/1주기)동안 매 3주마다, 독소루비신 (A) 60 mg/m² 투여하고, 시클로포스파미드 (C) 600 mg/m² 투여. (2) TH: 5~8 주기(3주/1주기)동안 매 3주마다 도세탁셀 (T) 100 mg/m²를 1시간 동안 투여하고, 트라스투주맙 (H)은 매주 5주기의 1일차에 초기부하용량으로 트라스투주맙 4 mg/kg을 90분간 투여한 이후 1주마다 유지용량으로 2 mg/kg를 30분간 투여. (5주기의 8일차부터, 8주기까지) 도세탁셀은 5주기의 2일차에 투여하고 6~8주기에는 1일차에 투여. (3) 보조화학요법이 완료된 후에 트라스투주맙 6 mg/kg를 단독요법으로 3주마다 30분간 투여. 트라스투주맙은 총 1년간 투여. 3) TCH regimen(1-6주기) (1) 도세탁셀 및 카보플라틴: 3주마다 도세탁셀 (T) 75 mg/m²를 1시간 동안 투여 및 카보플라틴 (C) AUC 6 mg/mL/min를 30~60분간 투여하며, 1주기에는 2일차에 투여, 2~6주기에는 1일차에 투여. (2) 트라스투주맙: 1일차에 초기부하용량으로 트라스투주맙 4 mg/kg을 90분간 투여한 이후 1주마다 유지용량으로 2 mg/kg를 30분간 투여. (3) 보조화학요법이 완료된 후에 트라스투주맙 6 mg/kg를 3주마다 30분간 투여. 트라스투주맙은 총 1년간 투여. 4) TC regimen: 3주를 1주기로 하여 4주기 동안, 매 주기의 1일차에 도세탁셀 75 mg/m²을 1시간 이상 주입하고, 시클로포스파미드 600mg/m²을 30~60분간 정맥 주입. 도세탁셀 투여 1일 전, 전처치로 경구용 덱사메타손 8mg, 1일 2회 투여를 시작하며, 총 5회 동안 계속 복용. 2. 비소세포 폐암: 이 약 75 mg/m²을 매 3주마다 1시간동안 정맥 주사. 백금 유도체와 복합화학요법으로 치료시 최대 75 mg/m²으로 정맥 투여. 3. 전립샘암: 프레드니솔론과 병용시 이 약 75 mg/m²을 매 3주마다 1시간동안 정맥주사. 프레드니솔론은 1일 2회, 1회 5mg을 지속적으로 경구투여. 4. 난소암: 진행된 또는 전이된 상피성 난소암에 대한 1차 요법으로 카보플라틴과 병용하여 3주마다 이 약 75 mg/m² 1시간동안 정맥주사 후 즉시 카보플라틴 AUC 6.0 mg/mL·min 을 30~60분간 정맥주사. 5. 두경부암 1) 방사선요법 전의 유도화학요법: 수술이 불가능한 국소 진행성 두경부 편평세포암의 유도화학요법시 이 약75mg/m²을 1시간동안 정맥주사한 후, 시스플라틴 75mg/m²을 1시간 이상 정맥주사(제 1일). 그 후 플루오로우라실을 750mg/m²/day로 5일동안 연속 정맥주사. 3주를 1주기로 하여 4주기 동안 투여. 2)화학방사선요법 전의 유도화학요법: 국소 진행성(절제 불가능한, 낮은 외과적 치료 및 장기 보존) 두경부 편평세포암의 유도화학요법시 이 약75mg/m²을 1시간동안 정맥주사한 후, 시스플라틴 100mg/m²을 30분~3시간 동안 정맥주사(제 1 일). 그 후 플루오로우라실을 1,000mg/m²/day로 연속 정맥주사(제1일~제4일). 3주를 1주기로 하여 3주기 동안 투여. 6. 위암 1) 단독요법: 이 약 75 mg/m² 3주마다 1시간동안 정맥 주사. 2) 시스플라틴 및 플루오로우라실과 병용투여: 이 약 75 mg/m²을 1시간 동안 정맥주사 후, 시스플라틴 75 mg/m²을 1~3시간 동안 정맥주사. 시스플라틴 정맥주사가 끝난 후부터 플루오로우라실을 750 mg/m²/day 용량으로 5일동안 연속주입(1주기). 3주마다 같은 방법으로 투여. 7. 식도암: 상용량은 성인에게 1일 1회 이 약 70 mg/m²을 1시간 이상 3~4주 간격으로 정맥 주사하며, 환자의 상태에 따라 적절히 감량. **[사용상의 주의사항]** 경고 1) 간기능의 이상이 있고, 고용량을 받는 경우, 이전 백금을 기본으로 한 치료경험이 있는 비소세포폐암 환자 중 단독으로 100mg/m²을 투여 받는 경우 이 약과 관련된 사망 건수가 증가하였다. 2) 간장애 환자: 이 약 100mg/m²을 단독으로 투여받은 환자 중에서 혈청 아미노전달효소(ALT 또는/그리고 AST)가 ULN보다 1.5배 이상 높고, 혈청 ALP가 ULN보다 2.5배 이상 높은 경우에는 사망으로 이어질 수 있는 치명적인 패혈증, 위장관 출혈과 열성 호중구감소증, 감염, 혈소판감소증, 구내염, 무력증과 같은 중증의 이상반응이 나타날 위험이 높다. 3) 과민반응 4) 중증의 체액저류 5) 이차성 원발 악성종양 (급성 골수성 백혈병, 골수형성이상 증후군, 비호지킨 림프종 및 신장암 포함) 6) 소장결장염 및 호중구감소성 장염(맹장염) 7) 종양용해증후군 **금기** 1) 이 약 및 이 약의 구성성분, 폴리소르베이트 80에 대해 중증의 과민반응의 병력이 있는 환자 2) 호중구수가 1,500 /mm³ 미만인 환자 3) 임부, 가임부 및 수유부 4) 중증 간기능장애 환자 5) 병용투여시, 병용약물에 금기인 환자(중증 신기능장애 환자, 파라플라틴, 백금화합물, 만니톨에 과민반응이 있는 환자 등) 6) 감염증의 합병증이 있는 환자 7) 감염성 발열이 의심되는 환자 8) 중증의 골수 억제가 있는 환자 **신중투여** 1) 골수억제가 있는 환자 2) 간기능장애 환자 3) 신기능장애 환자 4) 간질성 폐렴 또는 폐섬유증이 있는 환자 5) 부종이 있는 환자 6) 임신할 가능성이 있는 환자(남성 및 여성)(효과적인 피임법을 사용하여야 한다.) **※ 기타 자세한 내용은 제품설명서 또는 홈페이지를 참조하십시오.** 최종문안개정년월일: 2020.09.22

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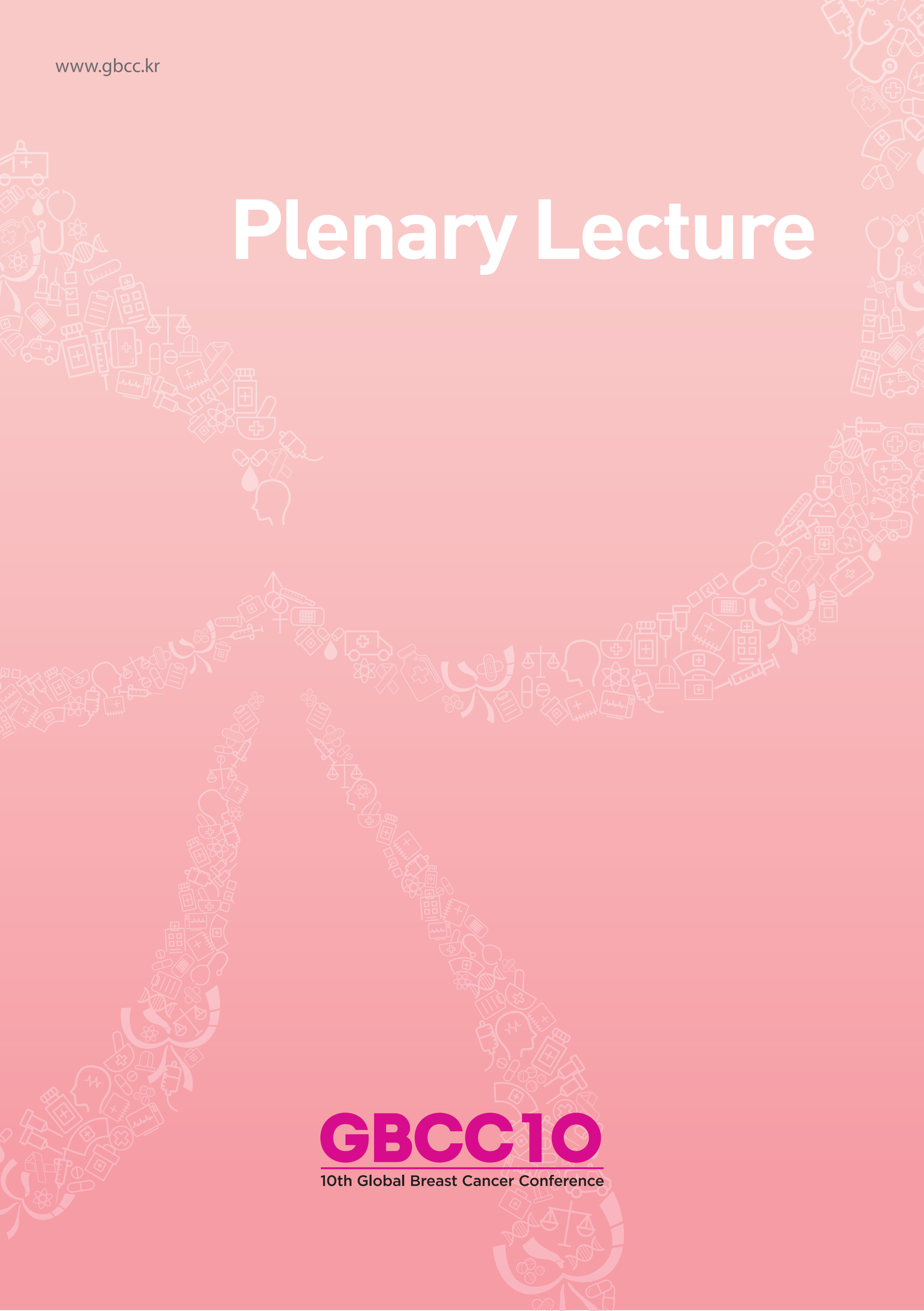

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10th Global Breast Cancer Conference

THE MOLECULAR ETIOLOGY OF ER+ BREAST CANCER

Matthew Ellis

Baylor College of Medicine, U.S.A.

Background: The heterogeneity of breast cancer deeply challenges the drive for treatment precision. Contemporary therapies target defects in DNA repair, activated protein kinases and the immune tumor microenvironment, often in combination. The accurate application of these approaches depends on our ability to accurately profile tumors to identify individual therapeutic vulnerabilities, but current methods in early stage breast cancer are inadequate. While deeper genomic techniques are used in the advanced disease setting, the interpretation of the data has proved challenging, with many recurrent mutations currently undruggable. Finally more recently introduced treatments, such as CDK4/6 inhibitors, or immune checkpoint inhibitors, do not have robust predictive biomarkers, which leads to either missed therapeutic opportunities or over-treatment.

Methods: The lecture will discuss proteogenomic methods to integrate NGS of DNA and RNA with MS-based proteomics as an approach to define the molecular basis for ER+ breast cancer.

Result: New data analysis approaches were developed to focus on kinase activity, the immune microenvironment, DNA repair defects and cell cycle regulation to generate insights into the biological basis for breast cancer subtypes and also to annotate therapeutic vulnerabilities using proteogenomic principles.

Conclusions: The best approach to the definition of ER+ breast cancer is likely to be one that does not look at DNA, RNA or protein-based readouts in isolation but through an integrated cancer connectome that provides more complete information for diagnosis and treatment.

CHANGING THE TRAJECTORY FOR PREMENOPAUSAL HR(+) METASTATIC BREAST CANCER PATIENTS THROUGH CLINICAL TRIALS: BRIDGING THE GAP BETWEEN GUIDELINES AND CLINICAL PRACTICE

Seock-Ah Im

Cancer Research Institute, Seoul National Univ. College of Medicine, Korea

Traditionally, breast cancer (BC) is divided into subtypes defined by immunohistochemistry (IHC) according to the expression of hormone receptors (HR) and overexpression/amplification of human epidermal growth factor receptor 2 (HER2), with crucial therapeutic implications. In the last ten years, the definition of different BC molecular subgroups within the IHC-defined subtypes and the identification of the important role that molecular heterogeneity can play in tumor progression and treatment resistance have inspired the search for personalized therapeutic approaches. In this sense, clinical trials incorporating translational research represent a key strategy to apply knowledge from cancer biology to the clinical practice setting. Through this talk, recent development of targeted agents with standard of care (SoC) which showed clinical benefit through the clinical trial for HR+ breast cancer will be presented especially for premenopausal metastatic breast cancer. For the proper management of mBC, re-biopsy of metastatic site which might be different with primary tumor is very important. It is really important to incorporate our knowledge into our clinical practice.

The addition of a cyclin-dependent kinase 4 and 6 (CDK4/6) inhibitors (palbociclib, ribociclib, abemaciblib) to endocrine therapy provided a greater benefit with regard to progression-free survival (PFS) than endocrine therapy alone in advanced HR+ HER2- breast cancer. In PALOMA-2, palbociclib plus letrozole significantly improved PFS as initial treatment of ER+ HER2- advanced breast cancer. Median PFS was significantly longer in Asian patients who received palbociclib plus letrozole versus placebo plus letrozole (25.7 months [95% CI, 19.2 months to not estimable] v 13.9 months [95% CI, 7.4 to 22.0 months]; hazard ratio, 0.49; 95% CI, 0.27 to 0.87; $P = .007$). The most common toxicities with palbociclib were hematologic and more frequent among Asians versus non-Asians: neutropenia (any grade, 95.4% v 76.8%; grade 3/4, 89.2% v 62.5%), leukopenia (43.1% v 38.3%; 32.3% v 23.5%), and thrombocytopenia (27.7% v 13.5%; 4.6% v 1.1%). No Asians had febrile neutropenia. Within-patient mean steady-state trough concentration (Ctrough) of palbociclib was examined in 38 Asian and 142 non-Asian patients. Geometric mean palbociclib Ctrough values were higher in Asians relative to non-Asians (93.8 v 61.7 ng/mL), which indicated greater palbociclib exposure in Asians. There was no apparent relationship between Ctrough and body dimensions in Asian and non-Asian populations (1).

Recently, the addition of ribociclib to endocrine therapy showed significantly longer overall survival (OS) in premenopausal or perimenopausal patients through Monaleesa-7 trial. The estimated OS at 42 months was 70.2% (95% confidence interval [CI], 63.5 to 76.0) in the ribociclib group and 46.0% (95% CI, 32.0 to 58.9) in the placebo group (hazard ratio for death, 0.71; 95% CI, 0.54 to 0.95; P = 0.00973 by log-rank test). The survival benefit seen in the subgroup of 495 patients who received an aromatase inhibitor (AI) was consistent with that in the overall intention-to-treat population (hazard ratio for death, 0.70; 95% CI, 0.50 to 0.98). The percentage of patients who received subsequent antineoplastic therapy was balanced between the groups (68.9% in the ribociclib group and 73.2% in the placebo group). The time from randomization to disease progression during receipt of second-line therapy or to death was also longer in the ribociclib group than in the placebo group (hazard ratio for disease progression or death, 0.69; 95% CI, 0.55 to 0.87) (2). Recently updated data cutoff for the OS analysis was reported at SABCS, 2020 with median follow-up of 53.5 mo. These updated results with extended follow-up demonstrated an OS benefit with RIB+ET vs PBO+ET (median, 58.7 vs 48.0 mo; HR, 0.763 [95% CI, 0.608-0.956]). In patients receiving an NSAI, a similar OS benefit was observed with RIB+NSAI vs PBO+NSAI (median, 58.7 vs 47.7 mo; HR, 0.798 [95% CI, 0.615-1.035]).(3)

Furthermore, exemestane plus palbociclib with ovarian suppression showed clinical benefit in terms of PFS compared with capecitabine in premenopausal patients with HR+ metastatic breast cancer (4). Available palbociclib and abemaciclib data will be also presented. PIK3CA mutations occur in approximately 40% of patients with HR+HER2-breast cancer. Treatment with PI3Kα-specific inhibitor alpelisib–fulvestrant prolonged PFS among patients with PIK3CA-mutated, HR+, HER2- advanced breast cancer who had received endocrine therapy previously (5).

Olaparib and talazoparib are oral poly(adenosine diphosphate-ribose) polymerase inhibitors that has promising antitumor activity in patients with metastatic breast cancer and a germline BRCA mutation. Randomized, open-label, phase 3 trial in which olaparib or talazoparib monotherapy were compared with SoC in patients with a germline BRCA mutation and HER2-negative mBC who had received no more than two previous chemotherapy regimens for metastatic disease. Patients were randomly assigned, in a 2:1 ratio, to receive olaparib tablets (300 mg twice daily) or standard therapy with single-agent chemotherapy of the physician's choice (capecitabine, eribulin, or vinorelbine in 21-day cycles) (TPC) in OlympiAD trial and to received talazoparib (1 mg once daily) or TPC in EMBRACA trial. Among patients with HER2-negative HR+ mBC with gBRCAmt, olaparib or talazoparib monotherapy provided a significant benefit over standard therapy (6-8). Asian Patients data for the gBRCAmt will be presented.

References

1. Im SA, Mukai H, Park IH, Masuda N, Shimizu C, Kim SB, Im YH, Ohtani S, Huang Bartlett C, Lu DR, Iyer S, Mori Y, Mori A, Gauthier E, Finn RS, Toi M. Palbociclib Plus Letrozole as First-Line Therapy in Postmenopausal Asian Women With Metastatic Breast Cancer: Results From the Phase III, Randomized PALOMA-2 Study. J Glob Oncol. 2019 May;5:1-19.
2. Im SA, Lu YS, Bardia A, Harbeck N, Colleoni M, Franke F, Chow L, Sohn J, Lee KS, Campos-Gomez S, Villanueva-Vazquez R, Jung KH, Chakravartty A, Hughes G, Gounaris I, Rodriguez-Lorenc K, Taran T, Hurvitz S, Tripathy D. Overall Survival with Ribociclib plus Endocrine Therapy in Breast Cancer. N Engl J Med. 2019 Jul 25;381(4):307-316.
3. Tripathy D, Im SA, Colleoni M, Franke F, Bardia A, Hargeck N et al. Updated overall survival (OS) results from the phase III MONALEESA-7 trial of pre- or perimenopausal patients with hormone receptor positive/human epidermal growth factor receptor 2 negative (HR+/HER2–) advanced breast cancer (ABC) treated with endocrine therapy (ET) ± ribociclib. SABCS # PD 2-04, 2020
4. A randomized phase II study of palbociclib plus exemestane with GNRH agonist versus capecitabine in premenopausal women with hormone receptor-positive metastatic breast cancer (KCSG-BR 15-10, NCT02592746). Park YH, Kim TY, Kim GM, Jung KH, Kang SY, Park IH, Kim JH, Lee KE, Ahn HK, Lee MH, Kim HJ, Kim HJ, Lee JI, Koh SJ, Kim JY, Lee KH, Sohn JH, Kim SB, Im YH, Im SA. J Clin Oncol 37, 2019 (suppl; abstr 1007)
5. André F, Ciruelos E, Rubovszky G, Campone M, Loibl S, Rugo HS, Iwata H, Conte P, Mayer IA, Kaufman B, Yamashita T, Lu YS, Inoue K, Takahashi M, Pápai Z, Longin AS, Mills D, Wilke C, Hirawat S, Juric D; SOLAR-1 Study Group. Alpelisib for PIK3CA-Mutated, Hormone Receptor-Positive Advanced Breast Cancer. N Engl J Med. 2019 May 16;380(20):1929-1940.
6. Robson ME, Tung N, Conte P, Im SA, Senkus E, Xu B, Masuda N, Delaloge S, Li W, Armstrong A, Wu W, Goessl C, Runswick S, Domchek SM. OlympiAD final overall survival and tolerability results: Olaparib versus chemotherapy treatment of physician's choice in patients with a germline BRCA mutation and HER2-negative metastatic breast cancer. Ann Oncol. 2019 Apr 1;30(4):558-566.
7. Litton JK, Rugo HS, Ettl J, Hurvitz SA, Gonçalves A, Lee KH, Fehrenbacher L, Yerushalmi R, Mina LA, Martin M, Roché H, Im YH, Quek RGW, Markova D, Tudor IC, Hannah AL, Eiermann W, Blum JL.
   Talazoparib in Patients with Advanced Breast Cancer and a Germline BRCA Mutation. N Engl J Med. 2018 Aug 23;379(8):753-763.
8. Im SA, Xu B, Li W, Robson M, Ouyang Q, Yeh DC, Iwata H, Park YH, Sohn JH, Tseng LM, Goessl C, Wu W, Masuda N. Olaparib monotherapy for Asian patients with a germline BRCA mutation and HER2-negative metastatic breast cancer: OlympiAD randomized trial subgroup analysis. Sci Rep. 2020 May 29;10(1):8753.

WILL BREAST SURGERY BE OBSOLETE IN THE FUTURE?

Monica Morrow

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Remarkable progress has been made in de-escalating the extent of breast surgery over the past 2 decades due to the detection of smaller tumors through screening mammography, the widespread use of adjuvant systemic therapy coupled with the development of targeted therapies, and changes in our understanding of the biology of breast cancer. A majority of women can be treated with breast conserving surgery and sentinel node biopsy, particularly when neoadjuvant chemotherapy (NAC) is used to decrease tumor size and downstage the axilla. The success of NAC in producing pathologic complete response (pCR) in approximately 40% of triple negative cancer patients and 70% of ER- HER2+ patients has led to enthusiasm for attempting to identify pCR with imaging and needle biopsies, avoiding surgery altogether.

In considering whether this is worthwhile it is important to remember that lumpectomy and sentinel node biopsy in someone with a radiographic complete response is a low morbidity, low cost, highly effective method of determining if there is residual tumor. Accurate determination of pCR is important in determining the need for additional therapy after NAC and may alter radiotherapy fields in the near future. Recent prospective studies demonstrate false negative rates of 18-37% for non-surgical determination of pCR and hematoma rates comparable to those seen after surgery. Since even surgery and radiotherapy are not a guarantee of freedom from local recurrence in patients who achieve pCR, and RT alone post NAC did not result in local control equivalent to surgery and RT post NAC in the EBCTCG. Overview, there are multiple reasons to be concerned that this will not be an equivalent approach to the current standard. In addition, it is not clear that patients will be willing to undergo repeated imaging studies and biopsies, with their associated anxiety, to avoid a small outpatient surgical procedure. For these reasons, surgery is unlikely to become obsolete until our ability to detect small amounts of residual tumor improves substantially.

BREAST CANCER TREATMENT: ESCALATION IS GOOD, DE-ESCALATION MAY BE BETTER

Emiel Rutgers

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The number of treatment tools to optimize management of Breast Cancer is increasing every day. This is a good thing, since it will allow us to personalize treatment more and more. The danger lies in that the management overall me become too complicated. As a result caregivers tend to follow protocols and guidelines only, and that for the sake of simplicity and safety every possible treatment is given. The consequence is overtreatment for many patients, with its side effect on quality of life and costs for the society. Personalized medicine in breast cancer is a real challenge and complicated.

So where can we do more to really improve and where we could do less without jeopardizing our patients? During the lecture I will explain some -to me relevant- examples.

Were to improve ('escalate')?

- Screening. Let's go for risk stratification. Adjust screening according to risk profile of an individual women: from no screening, through MG every 3 years, 2 years, annually, MRI for high risk and very dense breasts or dedicated ultrasound
- The Diagnostic process. Dedicated imaging, incl MRI. Particularly adequate tissue sampling for optimal assessment of the biology of the primary, allowing for dedicated Neo-adjuvant Systemic Treatments (NST).
- The Treatment. More breast conservation. Use NST to reduce mastectomy rates. Careful indication for RadioTherapy (RT). Optimal RT planning image guided.
- Adjuvant systemic therapies on the right indication with the best schemes
- Follow up: particularly to improve balance and return to normal life, and lifestyle to improve physical condition.

Were to reduce ('de-escalate')?

- Screening: Reduce overdiagnosis and treatments of screen detected lesions
- Diagnosis: be sensible with MRI indication. Do not overinterpret MRI findings (no mastectomy on additional MRI findings only: always prove malignancy)
- Treatment
  - ○ Surgery: are we sometimes overdoing with oncoplastics? We can do with less surgery after NST. No ALND if SN is positive. Take care of axilla conserving surgery after NST. Is SN always indicated?

- ○ RT: consider no RT (elderly, very early BC). Use Partial Breast RT. Hypofractionation is frequently the right way.
- ○ Chemotherapy: not for clinical low risk luminal cancers (< 2 cm, grade 1-2, N0). In clinical high risk only if MammaPrint high risk or Oncotype RS > 25: particularly in women over 50. Less chemo in low risk HER2 pos. cancers, no anthracyclines in higher risk Her2.
- ○ Follow up: focus on reintegration. Do not focus on oncological reasons other then annual screening of remaining breast tissue with imaging. No other routine tests. Patients with low risk cancer: refer back to GP.

BREAST CANCER SURVIVORSHIP: CHALLENGES AND OPPORTUNITIES

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As a growing number of people live for many years after their cancer diagnosis, especially breast cancer, cancer survivorship has emerged as an important part of the cancer care continuum. The life-changing consequences of cancer for patients and their loved ones pose unique medical and psychosocial challenges in the aftermath of initial treatment. There are 4 overarching components of breast cancer survivorship care and research: (1) surveillance for recurrence and screening for second primary cancers including personalized assessment of risk; (2) identification and management of the long-term medical and psychosocial effects of cancer and cancer treatments; (3) promotion of improvements of modifiable health behaviors; and (4) coordination of care and communication among providers and with survivors to ensure that their individual needs are met. While great strides have been made in each of these areas, there is much work to be done. We need to continue to improve our understanding of risks faced by breast cancer survivors and identify how to best intervene when indicated. Ongoing research is focusing on the identification of biomarkers of risk for secondary cancers as well as complications from treatment. Improved treatments to reduce long-term symptoms or late effects are also a critical research focus. Integrative therapy, psychotherapeutic cognitive behavioral techniques, and energy balance interventions have demonstrated particular promise for a wide range of symptoms and have great potential for long-term risk reduction. At the same time, we need to optimize breast cancer survivorship care delivery so that all survivors can benefit from state-of-the-art care and work to decrease disparities in care that exist. Harnessing the potential of electronic health record and internet-based tools can facilitate the implementation of evidence-based guidelines to inform appropriate follow-up, while enhancing the uptake of resources to support survivors. Providers can endeavor to incorporate these tools routinely into clinical care, enabling individual patients to communicate their symptoms and concerns effectively, ensuring that the diverse needs of breast survivors are met.

THE RESPONSE GUIDED THERAPY AFTER NEOADJUVANT TREATMENT

Hiroji Iwata

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The neoadjuvant chemotherapy is one of standard treatment for early breast cancer based on several clinical trials. We learn the outcome is similar between adjuvant and neoadjuvant chemotherapy, partial dissection rate is increased by neoadjuvant chemotherapy pCR rate is the difference by each subtype. The benefit of neoadjuvant chemotherapy is unclear according to total mastectomy+Immediate reconstruction have been developed in practice. CREATE-X trial (2017) and KATHERINE trial (2019) demonstrated the survival is prolonged according to add new drug in early breast cancer patients with residual disease after neoadjuvant chemotherapy. Therefore, the response guide therapy after neoadjuvant chemotherapy is standard strategy for early BC with TN and HER2 positive. Furthermore, new clinical trial which improve outcome than standard therapy using response guide strategy is ongoing.

pCR is a prognostic marker and predictive marker whether to add another drug after neoadjuvant chemotherapy. Currently, we learn molecular residual disease (MRD) is new prognostic marker as defined by ctDNA detection.

In ER positive BC, neoadjuvant chemotherapy is not standard treatment because of no evidence about response guide strategy and no correlation between pCR and DFS. Contrary, neoadjuvant endocrine therapy is option of standard treatment for early breast cancer (EBC) with post menopause in practice. However, it is unclear whether to use neoadjuvant endocrine therapy as response guide therapy for luminal type BC by previous study (JFMC, STAGE, P024, IMPACT et al). Multigene assay is a beneficial tool due to determine the systemic therapy for postmenopausal luminal type BC (TAILORx and RxPONDER studies).

We conducted clinical trial due to confirm response guide strategy using neoadjuvant endocrine study 13 years ago. Already we presented data of secondary endpoint and have plan to present the primary endpoint in this year. We hope the response guild therapy due to select adjuvant chemotherapy using neoadjuvant endocrine therapy is option of standard treatment for EBC with ER positive.

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OPTIMAL SEQUENCE OF ENDOCRINE THERAPY IN HORMONE RECEPTOR (+) MBC

Shinji Ohno

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In recent years, remarkable progress has been achieved in treatment of patients with breast cancer. A certain number of drugs have been approved for metastatic breast cancer (MBC) and the optimal drugs, optimal timing for optimal patients are very important issues. Hormone receptor-positive (HR+) breast cancer accounts for approximately 75% of all breast cancer patients, and effective treatment options for HR+ MBC control the metastatic disease. In this presentation, current optimal sequence of treatment would be discussed.

For patients with hormone receptor-positive advanced breast cancer, endocrine therapies, including the selective estrogen receptor modulator (tamoxifen), the aromatase inhibitors (anastrozole, letrozole, and exemestane), and the selective estrogen receptor degrader (fulvestrant), are recommended in clinical guidelines. The addition of targeted agents such as m-TOR inhibitor (everolimus) or CDK4/6 inhibitors (palbociclib, abemaciclib, and ribociclib) to endocrine therapeutic agents are also recommended as treatment options.

In 90, Dr Hortobagy described the treatment algorism for ER+ ABC (NEJM 339; 974, 1998). For women with limited and nonlife-threatening ER+ disease, hormonal therapy is the initial treatment of choice. Eventually, in most women, metastatic breast cancer becomes refractory to hormonal treatment, at which time the women should receive chemotherapy. But recently, target therapeutic drugs mentioned above have been produced.

Aiming at providing clinically oriented guidelines on how to best manage ABC, the International Consensus Conference for Advanced Breast Cancer have been taken place in Lisbon, every 2 year since 2011. At the 4th Advanced Breast Cancer Conference, the statements for ER+ and HER2- patients were as follows (Ann Oncol 29:1634-1657, 2018);

Endocrine therapy is the preferred option for HR+ disease, even in the presence of visceral disease, unless there is visceral crisis or concern/proof of endocrine resistance. The preferred 1st line endocrine therapy for postmenopausal patients depends on type and duration of adjuvant endocrine therapy as well as time elapsed from the end of adjuvant endocrine therapy; it can be an aromatase inhibitor, tamoxifen or fulvestrant.

A CDK4/6 inhibitor combined with endocrine therapy is the standard of care for patients with ER+/HER-2 neg ABC, since it achieves substantial PFS benefit, significantly increases OS and either maintains or improves QoL.

At the 5th Advanced Breast Cancer Conference (ABC5) in 2019, topics of endocrine therapy were parts of the most important issues. The CDK4/6 inhibitor can be combined with an AI or with Fulvestrant, in de novo or recurrent ABC, in 1st or 2nd line, and in cases of primary or secondary resistance. This recommendation applies to post-menopausal women, to premenopausal women in combination with an LHRH agonist, and to men preferably in combination with an LHRH agonist. It remains unclear if CDK4/6 inhibitors should be preferably administered in the 1st line or in the 2nd line setting. However, the majority of panelists preferred giving a CDK4/6 inhibitor in the 1st line setting for the majority of their patients.

The optimal sequence of endocrine-based therapy is uncertain. It depends on which agents were previously used (in the (neo)adjuvant or advanced settings), duration of response to those agents, burden of the disease, patients preference and availability. Available options for 1st and 2nd line include AI/fulvestrant+CDK4/6 inhibitor, AI/tamoxifen/fulvestrant+everolimus, fulvestrant+alpelisib (for Pi3CA mut), AI, tamoxifen, fulvestrant.

In ER+ gBRCA-associated ABC, the optimal sequence between PARPi and ET with or without CDK4/6i is unknown. Given the OS benefit seen with CDK4/6i, the panel recommends their use before a PARPi. Single agent PARP inhibitors (olaparib or talozaparib) are associated with a PFS benefit, improvement in QoL and a favorable toxicity profile. Patients with low (1-10%) ER (and PR) positive, HER2 negative ABC should not be considered for endocrine therapy exclusively.

CDK4/6 INHIBITORS: IDEAL APPLICATION AND RESISTANCE MECHANISM

Karen Gelmon

Univ. of British Columbia, Canada

Over the last decade there have been numerous studies that show the benefit of CDK4/6 inhibitors in the treatment of hormone positive, HER2 negative cancers. The initial studies in advanced breast cancer reported a doubling of the progression free survival (PFS) with very good tolerance. Palbociclib was initially reported to show benefit in an open label phase 2 study, PALOMA 1, which led to an early approval in the US. PALOMA 3 in multiply pretreated pre and postmenopausal women, combined Palbociclib and fulvestrant and showed a PFS benefit. Other studies quickly followed with the MONALESSA studies using ribociblb and MONARCH studies with abemaciclib reporting similar PFS improvements. More recently, studies have also shown an increase in overall survival in both pre and postmenopausal patients, although some studies have not yet reported. All three CDK 4/6 inhibitors, palbociclib, ribociclib and abemaciclib in combination with an aromatase inhibitor or fulvestrant have also been studies in the first and second line therapy. Consistent findings in postmenopausal women, premenopausal women and in men have established these drugs as the standard treatment in advanced cancer. Recently abemaciclib has shown benefit in an adjuvant study at the time of the first report. The PALLAS study in adjuvant therapy and the PENELOPE study in postneoadjuvant study, both using palboclib did not report benefit for the experimental arm raising questions about patient population, duration of therapy, other markers for response and differences in CDK 4/6 agents. The relative potency against CDK4 specifically compared to the potency against CDK6 has been studied as the rationale for different toxicities and potential potencies Questions remain in ABC about whether CDK4/6 inhibitors should always be used in first line or whether they can sometimes be given in the second line for specific patients and the sequencing of hormonal drugs. There is also discussion about the best endocrine partner, whether all three agents are the same or whether they differ in the advanced setting and what are the causes of resistance. What is important is how the oncologist sifts through the data to provide the best care for the patient and apply the most recent and relevant data. A discussion about the current knowledge, areas of uncertainty, and how to address these in the clinic will be presented.

NEW THERAPEUTIC OPTIONS TO OVERCOME ENDOCRINE RESISTANCE

Ingrid Mayer

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About 70% of all diagnosed breast cancers express hormone receptors (estrogen [ER+], progesterone [PR+] or both [HR+]). Despite an overall good prognosis, the clinicopathological and molecular heterogeneity of these tumors account for a diverse natural history of disease, with several patients still developing distant metastatic recurrence at virtually any point during the disease trajectory, regardless of endocrine therapy. Improved risk stratification and treatment individualization accounts for longer disease-free and overall survival, but distant metastatic recurrences still occur and about half of these occur beyond 6 years from the original diagnosis. A better understanding of breast cancer biology and mechanisms of endocrine therapy resistance has resulted in the approval of novel therapeutic strategies for patients with HR+ metastatic breast cancer (MBC), which now often include addition of targeted treatment, such as CDK4/6 or PI3K pathway inhibitors, to first, second or third line endocrine therapy. Improvement in progression-free survival and sometimes even overall survival, as well as a delay in chemotherapy use in the metastatic setting and maintenance of a good quality of life have been important achievements with these targeted therapies. However, more refined clinical and molecular biomarkers are lacking to determine which patients truly need (or not) the (early or at all) addition of these targeted treatments to conventional endocrine therapy, the timing and order of targeted therapy addition and even the timing to introduce chemotherapy. Currently, the amount of ER/PR expression in the tumor, presence of tumor actionable genomic alterations (such as PIK3CA, ESR1, BRCA mutations to name a few), the patient's disease-free interval between original (early) and metastatic breast cancer diagnosis, metastatic burden and sites of metastasis, absence or presence of symptoms or visceral crisis, previous treatments, among others, are some of the main variables that clinicians take into account to customize HR+ MBC treatment. Several research efforts are under way, focusing on important questions addressing the optimal sequence and administration of drugs to circumvent current endocrine therapy with or without CDK4/6 inhibition strategies, such as (a) timing and order of CDK4/6 inhibitor addition to endocrine therapy, (b) if CDK4/6 inhibitors should be continued with a different endocrine therapy partners beyond progression of disease on endocrine therapy and CDK4/6 inhibitors, (c) novel combination of endocrine therapy with or without CDK4/6 inhibitors with targeted treatments (FGFR inhibitors, AR blockers/ agonists, HER2 TKIs, etc) or immunotherapy, (d) new endocrine therapy agents such as novel selective ER downregulators

(SERDs) and selective ER covalent agonists (SERCAs), (e) serial collection of tumor tissue and blood for profiling at different timepoints during the metastatic setting treatment in an effort to identify new mechanisms of resistance, and (f) novel chemotherapy combinations with targeted treatment or immunotherapy. In conclusion: many therapeutic and diagnostic advances have contributed to better outcomes in HR+ MBC, but recognition of differences between clinicopathological and molecular characteristics of patients and their tumors is key in promoting optimization of treatment choices that would maximize survival, palliation of symptoms and quality of life for patients with HR+ MBC in the years to come.

MOVING TOWARDS "CURE" OF HER2 (+) METASTATIC BREAST CANCER?

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HER2-positive breast cancer was traditionally regarded as an aggressive form of breast cancer with inferior survival outcomes. However the advent of HER2-targeted therapy has improved the outcomes significantly over the past 2 decades. The landmark registration trials which led to the approval of these treatments in HER2+ metastatic breast cancer (MBC) will be reviewed briefly, along with data from real-world studies. We will discuss the possibility of whether HER2+ MBC can be "cured" - with inverted commas, as more long-term follow-up data will be required to challenge the existing dogma that metastatic cancer cannot be cured.

FINE TUNING OF PERIOPERATIVE HER2 TARGETING IN EARLY STAGE HER2 (+) BREAST CANCER

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Breast cancer (BC) is a heterogeneous disease, with human epidermal growth factor receptor 2 (HER2) gene overexpression and/or amplification observed in 20–30% of the cases. This BC subtype has been traditionally considered a more aggressive phenotype with a poor prognosis, a higher risk of relapse and a greater resistance to therapy. Since the development of trastuzumab, several drugs, antibodies, antibody–drug conjugates (ADCs) and tyrosine kinase inhibitors (TKIs) have become available in clinical practice this has had a tremendous impact on patients' survival.

Preoperative systemic neoadjuvant chemotherapy can offer a rapid assessment of efficacy of a given therapeutic approach using pathologic complete response (pCR) as a surrogate endpoint for long-term clinical outcomes, which therapeutic strategies mainly used for patients with triple-negative (TNBC) and HER2-positive breast cancers. Recently, this approach resulted in accelerated new drug approval of pertuzumab for HER2-positive cancers with pCR, and subsequently reached a final approval using adjuvant long-term favorable outcomes (disease free survival; DFS). This is the case that neoadjuvant chemotherapy provided us remarkable quicker timeline than would have been possible with its assessment in the adjuvant setting.

Many advances have been achieved in the treatment of HER2+ early breast cancer. The use of preoperative systemic therapy should be the preferred approach for stage II or III HER2+ breast cancer. Neoadjuvant chemotherapy plus anti-HER2 treatment with trastuzumab and possibly pertuzumab –based on the positive results of the Neosphere trial- is currently the recommended option. The recently published KATHERINE study, showed that Trastuzumab emtansine (T-DM1) given for 14 cycles provided a significant benefit in invasive disease-free survival (iDFS) for patients with residual disease after neoadjuvant therapy. The pillar of adjuvant treatment is still represented by trastuzumab given for a total of 1 year; however, in recent years, many studies investigated either possible de-escalation strategies with shorter duration of treatment and less toxic regimens, or escalation approaches using dual HER2 inhibition or extension of treatment duration.

In this lecture, clinical developments of neoadjuvant and adjuvant (perioperative-) chemotherapy regimens focused on HER2-BC subtypes would be discussed.

BEST COMBINATION STRATEGY OF IMMUNOTHERAPY WITH CONVENTIONAL HER2 TARGETED THERAPY

Otto Metzger

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Over the past ten years, we witnessed a revolution in oncology with the approval of drugs to modulate the immune system. In breast oncology, checkpoint inhibitors are now approved for a subset of patients diagnosed with advanced triple-negative breast cancer. More recently, we noticed an "explosion" in the number of clinical trials investigating immune-oncology (IO) combined with traditional chemotherapy and targeted agents. Of relevance, there are still many challenges in identifying patients most likely to benefit from IO agents, risking many clinical trials' success. In the subset of HER2+ breast cancer, we have a more robust rationale for exploring IO drugs' efficacy. Trastuzumab, for instance, exerts its action in part by stimulating the immune system. In vivo studies have demonstrated that trastuzumab and PD-1/L1 inhibitors are synergistic, forming the basis for its clinical trial evaluation. In this presentation, we reviewed the rationale for the addition of IO agents in HER2+ breast cancer, reviewed results from clinical trials, and proposed alternative strategies to activate the immune system in addition to using classic IO drugs.

RADIOMICS AND RADIOGENOMICS WITH MRI FOR DETECTION, PREDICTION AND PROGNOSIS

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With the genomic revolution in the early 1990s medical research has been driven to study the basis of human disease on a genomic level and to devise precise cancer therapies tailored to the specific genetic makeup of a tumor. Breast cancer is a diverse collection of diseases with varying clinical presentations, subtypes, and treatment responses. Gene-expression profiling has revolutionized breast cancer classifications, and the traditional classifications based on IHC have been replaced by molecular subtype profiles. Breast cancer has four distinct molecular subtypes: luminal A; luminal B; HER2-enriched; and basal-like., which are unevenly distributed among women with breast cancers. Breast cancer subtypes demonstrate a distinct heterogeneity both in phenotypic presentations and biology as well as a varying risk for progression, response to treatment, and survival outcomes. As medical research and therapy have entered the genomic era in which personalized approaches toward treatment are being explored, diagnostic tests need to be equally multilayered and complex to identify the relevant genetic alterations that render cancers susceptible to treatment. Medical imaging has always been an integral part of disease diagnosis and treatment decisions. With significant advances in medical imaging techniques, image analysis and the development of high-throughput methods to extract and correlate multiple imaging parameters with genomic data has heralded a new direction in medical research. Radio/-genomics is a novel approach, which aims to correlate imaging characteristics (i.e., the imaging phenotype) with patient characteristics, outcomes and/or gene expression patterns, such as molecular subtypes, gene mutations, and other genome-related characteristics. Radiogenomics is designed to facilitate a deeper understanding of molecular tumor biology through the extraction of parameters derived from image processing and analyses of medical images that are linked to the geno- and phenotypic characteristics of the tissue. Due to the non-invasive nature of medical imaging and its ubiquitous use in clinical practice, the field of radiogenomics is rapidly evolving and initial results are encouraging. This presentation aims to provide an overview of the phenotypic presentation and tumoral heterogeneity of breast cancer, the background and methodology of breast MR radio/-genomics, and then summarize the current role for radiogenomics, as well as its potential.

RADIOGENOMICS IN BREAST CANCER USING US AND CT

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Recent radiogenomic approaches to breast cancer allow us to understand tumor characteristics at a genetic level and discover image phenotypes of genetic variation. However, most radiogenomic investigations have described associations between MRI features of breast cancer and genetic alterations, but few have used ultrasonography (US) and computed tomography (CT). Advances in vascular US techniques with or without US contrast agents provide microflow information regarding breast cancer and predict tumor angiogenesis. B-mode US phenotypes show differences according to molecular subtypes of breast cancer. Triple-negative breast cancer, an aggressive subtype, tends to have benign US features, such as an oval or round shape, circumscribed margins, and posterior acoustic enhancement. The differences in US phenotype may reflect differences in gene expression. In CT, low-dose acquisition technology and quantitative image analysis tools were developed to improve image quality, radiation safety, and data extraction. We hypothesized that US and CT imaging phenotypes may be associated with specific gene expression that reflects tumor growth, hormone receptor status, or angiogenesis. We investigated the relationship between US imaging features and genetic alteration of breast cancers by comparing B-mode and vascular US image of tumor with its RNA sequencing results. We found that differentially expressed genes were associated with US imaging phenotypes in breast cancers and some genes were relevant to breast cancer tumor growth, metastasis, hormone receptor status, and drug resistance. In CT, we investigated the feasibility of using low-dose perfusion CT in breast cancers for quantification of tumor vascularity and to correlate perfusion indexes with prognostic biomarkers. We also evaluated that machine learning approaches to radiogenomics using low-dose perfusion breast CT to predict prognostic biomarkers and molecular subtypes of invasive breast cancer.

In conclusion, our radiogenomic investigations using US and CT demonstrate that the imaging phenotypes of breast cancer are associated with the breast-cancer-related genes that may be predictors of hormone receptor status, angiogenesis, or prognosis. Additional investigations in a larger population with heterogeneous ethnicity are needed to validate the results and determine whether the radiogenomic data of US and CT imaging can predict actual clinical outcomes in breast cancer patients.

NEW APPROACH USING PET-CT OF RADIOMICS AND RADIOGENOMICS IN BREAST CANCER

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With the improvement of understanding the biological characteristics of cancer, the new therapeutic approach and diagnostic method are being developed and applied to the clinical oncology fields.

In the PET/CT imaging, cancer lesions have the difference metabolism and response to treatment. However, there was no clinical criteria to evaluate or represent such heterogeneity.

Radiomics is a computer-vision based medical imaging analysis approach. Metabolic radiomics in particular analyses the spatial distribution patterns of molecular metabolism on PET/CT images and the other images. Image based measurement of intratumoral heterogeneity or intertumoral heterogeneity is one of the main targets of radiomics research, and it aims to build a image-based model for better patient management.

The workflow of radiomics using texture analysis follows these steps: 1) imaging (image acquisition and reconstruction); 2) preprocessing (segmentation & quantization); 3) quantification (texture matrix design & texture feature extraction); and 4) analysis (statistics and/or machine learning). The parameters or conditions at each of these steps are effect on the results. In statistical testing or modeling, problems such as multiple comparisons, dependence on other variables, and high dimensionality of small sample size data should be considered. Standardization of methodology and harmonization of image quality are one of the most important challenges with radiomics methodology.

Even though there are current issues in radiomics methodology, it is expected that radiomics will be clinically useful in personalized medicine and research for oncology.

MULTIMODAL IMAGING ASSESSMENT OF THE RESPONSE MONITORING TO NEOADJUVANT CHEMOTHERAPY

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Neoadjuvant Chemotherapy (NAC) is becoming the standard of care for patient with advanced breast cancer, and the use of NAC in the treatment is increasing. Imaging provides important information in assessing response to therapy as a complement to conventional tumor measurements by physical examination. Monitoring of treatment response during NAC by imaging may help predict which patients will achieve a pathologic complete response (pCR) early in treatment to provide alternate options for treatment and avoid unnecessary toxicity in patients who do not experience a response.

As current methods for evaluating response during and after NAC, mammography, ultrasound (US), dynamic contrast enhanced (DCE)-MRI are most widely used. Although mammography and US are reliable tools to determine tumor size at diagnosis, changes within the tumor secondary to NAC may be difficult to evaluate. Digital breast tomosynthesis (DBT) has more advantages in dense breasts, however still have some limitations of using morphologic information in limited mammographic views.

Therefore, functional imaging techniques are needed, and among these modalities, DCE-MRI is superior for predicting treatment response and evaluating residual disease. It permits evaluation of residual viable tumor after NAC by detection changes in tumor vascularity. There have been many supporting evidences of MRI usage in assessment of residual disease, and early response. However, MRI can both overestimate and underestimate the amount of residual tumor after completion of NAC. Moreover, pCR is associated with tumor subtype, and the characteristics and accuracy of imaging modalities in monitoring response may vary according to tumor subtype. Discordant results of various imaging modalities are possible.

In addition to response evaluation of primary tumor, axillary evaluation is essential and critical for these patients. NAC resulted in the eradication of axillary LN metastasis in 40% of the patients. The nodal pCR rate was significantly higher in patients with triple-negative and HER2-positive disease than in those with hormone-receptor-positive, HER2- negative disease. The increasing rate of pCR with current chemotherapy regimen lead to the wider use of sentinel lymph node biopsy among patients with known nodal positive disease and a clinical complete response. Therefore, for the node-positive patients treated with NAC, restaging of the axilla through incorporation of clinicopathologic factors with US or MRI findings, will be helpful in identifying possible candidate of sentinel lymph node biopsy or targeted axillary dissection.

The purpose of this lecture is to discuss the advantages, and limitations of current image assessment methods, as well as future directions of various diagnostic imaging modalities for the monitoring of NAC response in patients with breast cancer.

Reference

1. Fowler AM, Mankoff DA, Joe BN. Imaging Neoadjuvant Therapy Response in Breast Cancer. Radiology. 2017 Nov;285(2):358-375.
2. Rauch GM, Adrada BE, Kuerer HM, et al. Multimodality Imaging for Evaluating Response Neoadjuvant Chemotherapy in Breast Cancer. AJR Am J Roentgenol. 2017 Feb;208(2):290-299.
3. Boughey JC, McCall LM, Ballman KV, et al. Tumor biology correlates with rates of breast-conserving surgery and pathologic complete response after neoadjuvant chemotherapy for breast cancer: findings from the ACOSOG Z1071 (Alliance) Prospective Multicenter Clinical Trial. Ann Surg. 2014;260:608-614; discussion 614-606.
4. Slanetz PJ, Moy L, Baron P, et al. ACR Appropriateness Criteria((R)) Monitoring Response to Neoadjuvant Systemic Therapy for Breast Cancer. J Am Coll Radiol 2017;14:S462-s475.

PLANNING FOR SURGERY ACCORDING TO THE RESPONSIVENESS OF NEOADJUVANT CHEMOTHERAPY

Tari King

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Surgical considerations after preoperative chemotherapy

Preoperative therapy increases rates of breast conservation and decreases the need for axillary lymph node dissection (ALND) in select patients. In hormone receptor positive (HR+) HER2 negative breast cancer patients the choice between neoadjuvant chemotherapy (NAC) and neoadjuvant endocrine therapy (NET) to achieve breast conservation can be challenging and the low rates of axillary pCR with either approach have been associated with higher rates of ALND. In hormone receptor negative and HER2 positive patients, NAC results in much higher rates of pCR, leading to the opportunity to omit ALND in an increasing number of patients yet this has not translated into increasing rates of breast conservation. Barriers to breast conservation after NAC are likely multifactorial and include challenges with both imaging and pathologic evaluation of the extent of disease as well as provider and patient acceptance of this approach.

OPTIMAL REGIONAL NODAL IRRADIATION IN YPN0 AFTER NEOADJUVANT CHEMOTHERAPY

Alice Y. Ho

Massachusetts General Hospital, U.S.A.

IMMUNE TUMOR MICROENVIRONMENT IN BREAST CANCER

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It has been shown that a subgroup of breast carcinomas contains a dense lymphocytic infiltrate and that these tumors are characterized by a strong response to neoadjuvant chemotherapy. Neoadjuvant therapy approaches in breast cancer have been used as a strategy to characterize subgroups of tumors with increased tumor-infiltrating lymphocytes (TILs). We have described tumor-infiltrating lymphocytes (TILs) as predictors of pathological complete response to neoadjuvant chemotherapy in breast cancer trials conducted by the German Breast Group. It has been shown that increased TILs are linked to an increased response rate to neoadjuvant therapy and improved prognosis after adjuvant therapy, in particular in triple-negative and HER2 positive breast cancer. In addition to tumor-infiltrating lymphocytes, immune mRNA markers have been studied in breast cancer and are associated with increased chemotherapy response and improved prognosis. These results suggest that some subtypes of breast cancer are immunogenic and that there is an ongoing low-level immune response present even in clinically progressing tumors. The presentation will provide an overview on recent results on immune markers for prediction of response to neoadjuvant chemotherapy and prognosis with a focus in standardized histomorphological evaluation of tumor-infiltrating lymphocytes as well as clinical trials concepts and biomarker strategies for future immune checkpoint inhibitor therapies in breast cancer.

The international immune-oncology working group (“TIL working group”) has published standardized guidelines for TIL evaluation in breast cancer. International ring trials suggests that decentral TIL evaluation is feasible. In some situations, in particular in tumors with intermediate and heterogeneous TILs, additional tests, including gene expression signatures might be necessary. The ultimate usefulness of these biomarker concepts will be obtained in the ongoing and future clinical immunotherapy trials.

UP-TO-DATE STATUS OF IMMUNOTHERAPY IN BREAST CANCER: HOPE AND LIMITATION

Harold J. Burstein

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Immunotherapy with checkpoint inhibitors (immune-oncology; IO) has emerged as an important treatment for triple-negative breast cancer (TNBC). TNBC lesions tend to have more tumor infiltrating lymphocytes, higher PDL1 expression, and higher tumor mutational burden, creating a rationale for studying IO approaches. Trials of single agent checkpoint inhibitors in advanced TNBC showed only modest response rates, even in PDL1+ tumors, and minimal response beyond 1st line therapy. Trials comparing checkpoint inhibitors vs chemotherapy showed no improvement for use of IO instead of standard agents such as eribulin, capecitabine, gemcitabine, or vinorelbine.

In first-line treatment of metastatic TNBC, the Keynote 355 and IMpassion130 trials, but not the IMpassion131 study, demonstrated improvement in PFS and OS with the addition of checkpoint inhibitor to standard chemotherapy. This difference was only seen, however, in the subset of tumors with robust PDL1 expression, about 40% of TNBC cases.

Checkpoint inhibitors have been added to standard chemotherapy as neoadjuvant treatment for TNBC. Multiple studies have shown that adding IO to chemotherapy improves the rates of complete pathological response (pCR) among such tumors. Preliminary data suggest that there may be an event-free survival benefit for adding neo/adjuvant checkpoint inhibitor therapy. Interestingly, tumor PDL1 expression does not uniquely define which cases are more likely to achieve pCR with neoadjuvant IO.

The side effect profile of IO in breast cancer is largely similar to that observed in other tumor types. However, the risk of life long side effects, especially endocrinopathies, is a consideration for deploying IO in early stage breast cancer.

Collectively, these experiences suggest that IO may offer improvements in outcomes for a subset of late- and early-stage TNBC. Much work remains to define the optimal tumor types for treatment, and to characterize the true impact of these interventions on the longer-term natural history of TNBC.

PREDICTIVE BIOMARKERS FOR IMMUNOTHERAPY : CURRENT STATUS AND FUTURE DIRECTIONS

Roberto Salgado

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Reliable predictive biomarkers for immune-therapeutic approaches are needed in daily practices as well as in new trial designs, in order to identify those breast cancer patients that may benefit the most from these expensive and sometimes toxic treatments. There's a large body of literature on potential predictive biomarkers ranging from TBM, HRD, LDH, Tumor Infiltrating Lymphocytes (TILs), PDL1 as well as many others. The assessment of Tumor Infiltrating Lymphocytes (TILs) is gaining importance as a prognostic marker in breast cancer. Recently, the 2019 St Gallen Breast Cancer Conference concluded that TILs should be routinely reported in TNBC. TILs are also included also in the 2019 WHO/IARC Blue Book edition on Breast Tumor classification. High TILs are associated with a better outcome and a better response to neoadjuvant therapy in Triple negative and HER2 positive breast carcinomas, as well as having strong prognostic value in improving estimates of distant recurrence-free survival , disease-free and overall survival in early-stage TNBC treated with standard adjuvant/neoadjuvant chemotherapy (Level 1B evidence). This is based on an evaluation of TILs by pathologists at the time of diagnosis. Their quantification is done on H&E tissue sections during diagnosis procedure and follows international recommendations (www.tilsinbreastcancer.org). Development of computational pathology and machine learning methods in this area is very promising. Clinical utility using TILs as a biomarker for selection of patients for treatment with immune-checkpoint-inhibition is emergingly becoming important. PDL1-assessment in breast cancer is controversial with concerns on its reproducibility between pathologists and the fact that several PDL1-assays in Impassion130 predict outcome near as good as the approved companion diagnostic assay. This creates confusion in the pathology-field as well as among oncologists and at the regulatory level. It will be argued that TILs evaluated on an HE can be helpful to mitigate the current issues with PDL1-assays, based on phase II and phase III trial data. Furthermore, TILs should be used as a stratification factor in clinical trials and should be included in all studies involving or evaluating prognosis. The combined narrative of the importance of TILs in daily practice as a prognostic and predictive factor, together with PDL1, will be elaborated upon as this is becoming the most important predictive narrative for immunotherapeutic approaches in daily practice as well as in clinical trials in breast cancer. Furthermore, an overview of the potential predictive importance of other emerging biomarkers will be provided.

ADVANCES IN PRECISE TUMOR SAMPLING AND SEQUENCING IN BREAST CANCER

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Intra- and Inter- tumoral heterogeneity is one of the main hurdles in diagnosing and treating breast cancer. Selecting, sampling, and sequencing the samples optimally provide unique opportunities in realizing precision medicine. Here, we present two technical breakthroughs: Spatially-resolved Laser Activated Cell Sorter (SLACS) and high throughput screening (HTS) using partipetting. SLACS is a novel platform that sorts out single cells from a histological specimen, bridging the gap between histopathological or spatial information and biomolecular information. SLACS was applied to 2D sections of breast cancer tumor mass, in which the genetic heterogeneity was revealed within spatial context. Especially, by connecting the histopathological insights to the genomic signatures of the different subclones in a tumor mass, insights into tumor evolution in breast cancer are presented. SLACS is further applied to spatially resolved transcriptomics to connect the transcriptomic landscape to the histopathological landscape. Also, SLACS is applied to circulating tumor cells by enriching them from the peripheral blood of a breast cancer patient. SLACS successfully isolated circulating tumor cells and whole genome sequencing of single circulating tumor cells is presented. In parallel, I also present HTS platform using drug-laded encoded microparticles. The encoded microparticles are fabricated with different drugs, and a library of drugs is assembled in a drug chip via partipetting. The drug chips can be combinatorially or sequentially applied to the array of cancer cells, providing information regarding drug responses, by which in situ molecular profiling can measure. Altogether, novel methodologies for precise tumor sampling and sequencing in breast cancer presented herein will contribute to the advancement of diagnostics, prognostics, monitoring, and therapeutics in breast cancer.

ARTIFICIAL INTELLIGENCE BASED MEDICAL DATA ANALYSIS FOR PRECISION MEDICINE

Hwiyoung Kim

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Artificial Intelligence (AI) technology has shown remarkable results in some tests such as general image recognition, and further attempts are being made to apply this technique to medical area. The important thing is to define the problems that are clinical needs and to collect enough data to solve them in a data-driven perspective. Furthermore, researchers point to the development of a reliable medical AI model as a major prerequisite for applying AI technology to clinical care. AI as an auxiliary tool for clinical decision making can help medical staff to make decisions for diagnosis or treatment of patients only by securing the reliability of the results. Based on the experiences of collaborating with physicians, I would like to share and discuss about the present and future directions of medical AI research for precision medicine. In this talk, I would like to share some preliminary results and concepts on AI applications in medical image analysis for precision medicine. Finally, we will examine the technical limitations of AI models that are obstacles to securing such reliability and the methodology to deal with them.

DECIPHERING TUMOR MICROENVIRONMENT USING THE PATIENT-DERIVED XENOGRAFT MODELS

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Patient-derived xenograft model (PDX model) can be used as a platform to study the individual patients sensitivity to targeted agents as well as its ability to guide our understanding in various aspects of tumor biology including the tumors clonal evolution and interaction with microenvironment.

Since 2011, we have developed numerous PDX models from Korean breast cancer patients and our initial experience suggest that the PDX models can be an effective tool to understand the biology of triple negative breast cancer cells as the PDX engraftment is a process in which aggressive tumor cells are selected.

In this presentation, I will focus on the value of PDX model as a window to investigate the tumor-microenvironment interaction in breast cancer including drug resistance and pathogenesis of rare breast malignancies. Especially, I will discuss our experience in studying mouse genomes to elucidate the phenotypic transition of tumor microenvironment cells such as fibroblast that regulates tumor cells response to cytotoxic chemotherapy. Additionally, I will address the unique tumor-stroma interaction that we observed during our study involving a PDX model derived from the patients with malignant phyllodes tumors.

TARGETING CANCER STEM CELL

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Background: Flubendazole is a potent anthelmintic agent that has been widely used to treat intestinal parasites and systemic worm infections in humans and animals. Emerging evidence suggests that it can act as an anticancer agent in several cancer cell types due to its ability to inhibit tubulin polymerization, leading to mitotic catastrophe. The aim of the present study was to investigate the effects of flubendazole and its novel mechanism of action, with a focus on overcoming trastuzumab resistance in HER2-positive breast cancer cells.

Methods: The effect of flubendazole on HER2-positive cell lines in vitro was evaluated in terms of cell viability, cell cycle distribution, apoptosis, BCSC-like characteristics and HER2/Akt signaling. The trastuzumab-resistant xenografts were generated to examine the impact of flubendazole on tumor growth and angiogenesis in vivo.

Result: Flubendazole treatment caused a significant induction of apoptosis, accompanied by G2/M phase accumulation, caspase-3/-7 activation. Flubendazole downregulates p95HER2, phospho-HER2 and phospho-HER3, and disrupts HER2/HER3 hetero-dimerization and subsequently inhibits Akt activity in both trastuzumab-sensitive and –resistant HER2-positive breast cancer cells, highlighting potential application against trastuzumab-resistant cancers. To confirm the physiological relevance of our in vitro observations, we examined the impact of flubendazole on tumor growth, HER2 expression, stem-like properties, and apoptosis in trastuzumab-resistant xenografts. Flubendazole administration resulted in a significant reduction in tumor growth and an enhancement of apoptosis, as well as downregulation of ICD-HER2, CD44 and ALDH1A1 expression in vivo.

Conclusions: Taken all together, we have demonstrated for the first time that flubendazole induces apoptosis in HER2-positive breast cancers by targeting cancer stem-like properties and suppression of the HER2/Akt signaling pathway. These findings support the notion that flubendazole may have applications for the treatment of trastuzumab-resistant HER2-positive breast cancers.

NOVEL HER2 TARGETED THERAPIES: ADCS AND TKIS

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The past 20 years have brought a revolution in the management of HER2+ breast cancer, as the incorporation of therapies targeted against the HER2 receptor have led to dramatic improvements in survival for advanced disease. As of 2021, there are a total of eight FDA-approved HER2-directed therapies, which sort into three main categories. First, there are the classic monoclonal antibodies, trastuzumab and pertuzumab, typically used as first line therapy in combination with taxane chemotherapy (THP), and supported by the CLEOPATRA trial. The newest member of this mAb group is margetuximab, an engineered antibody designed to improve immune system activation. Results from the SOPHIA trial suggests improved activity of margetuximab over trastuzumab, however possibly limited to specific Fc genotypes. The second category of HER2-targeted therapy includes the antibody-drug conjugates, which link a small quantity of cytotoxic chemotherapy to a HER2-targeted antibody delivery system. The first-generation agent in this category, TDM1, is frequently used as second-line therapy after THP. The DESTINY-Breast01 phase II trial evaluated the second-generation ADC trastuzumab deruxtecan, which not only targets the HER2+ cancer cells but also exhibits a "bystander effect" on neighboring cells. Data from this study showed a high response rate and encouraging progression-free survival in a TDM1 resistant population. Importantly, serious pulmonary disease has been seen with this agent and requires close monitoring. Development of the third category of agents, small molecule tyrosine kinase inhibitors, has been limited by the need to achieve balance between maximizing potency against the HER2 receptor while minimizing toxicity related to targeting other members of the HER family of receptors i.e. EGFR. In addition to the existing agents lapatinib and neratinib, the newest addition to this group is the third-generation agent tucatinib, which balances the potency of neratinib but without the EGFR-related toxicities of rash and diarrhea. The HER-2Climb study demonstrated improved progression-free and overall survival when tucatinib was used in combination with trastuzumab and capecitabine versus placebo with trastuzumab and capecitabine, with minimal contribution of toxicity. Importantly, patients with active brain metastases were allowed on this study, and dramatic survival improvements were seen in this subset. Beyond TDM1, sequencing trastuzumab deruxtecan versus tucatinib in the third line setting may depend on presence or absence of CNS disease, as well as risk of pulmonary toxicity. Ongoing trials are evaluating these new agents in earlier line settings, as well as exploring the role of other novel agents including immunotherapy for HER+ breast cancer. Overall, the great progress in the management advanced HER2+ breast cancer reflects the ability to specifically and selectively target the HER2 receptor, and it is hoped that these scientific advances will translate into significant benefits for patients with this disease.

BEST COMBINATION OF NEW THERAPEUTICS IN PRECISION MEDICINE ERA

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Immunocheck point inhibitors (ICI) are already approved in any kind of solid cancers (lung, skin, head and neck, et al). Unfortunately, ICI monotherapy is not effective because of a little tumor mutation burden in breast cancer (BC). combination strategy (chemotherapy, radiotherapy, endocrine+CDK4/6 inhibitor therapy, et al) with ICI have been investigated in the world.

Novel combination therapy of Atezorizumab plus nab-paclitaxel was approved in the world including Asian countries last year. The target population is triple negative (TN) and PD-L1 positive metastatic breast cancer (MBC). In several years ago, chemotherapy is only systemic treatment for TN BC, but currently the testing of PD-L1 status and germline BRCA1/2 mutation is mandatory due to determine the treatment strategy for MBC with TN. Furthermore, many clinical trials using ICI are planning and ongoing due to develop the better outcome for any subtypes MBC and early BC.

I would like to talk the data about several combination strategies with ICI and perspective for MBC with TN and luminal subtype in this session.

RETROSPECTIVE AND PROSPECTIVE STUDIES ON EARLY BREAST CANCER PATIENTS FOR TREATMENT WITHOUT SURGERY

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Introduction: The pathological complete response (pCR) rate is approaching to 50% particularly in patients with hormone -receptor negative disease by neoadjuvant chemotherapy (NAC). If the disease is not recurred locally in cases with pCR and pCR could be accurately diagnosed preoperatively, it is possible to treat some population of patients without surgery after NAC. We conducted 1) a retrospective study to examine outcomes of patients who had achieved pCR by NAC and 2) a prospective study to examine diagnostic accuracy of pCR by NAC with core needle biopsy (CNB).

Methods: 1) Clinical outcomes were retrospectively investigated in 395 patients who achieved pCR from 1599 patients with breast cancer treated by NAC (overall pCR rate of 24.7%: 395/1599). The association of clinic-pathological factors with recurrence was investigated. 2) For 86 breast cancer patients who were diagnosed as clinical complete response (cCR) by MRI after NAC, ultrasound-guided core needle biopsy was performed before starting the surgery. The concordance of pathological results between CNB and surgical specimens was examined. The pathological diagnosis was categorized as no carcinoma (pCR), ducal carcinoma in situ (pDCIS) and invasive carcinoma.

Result: 1) In 395 pCR cases, recurrent diseases were found in 5.8% (23/395). According to subtypes, these were 2.0% (1/50) for Luminal type, 4.1% (4/98) for Luminal-HER2 type, 10.3% (12/116) for HER2 type, and 4.6% (6/131) for triple negative type. Local recurrence was found in 1.2% of cases (5/395). Risk factors of recurrence were HER2 positivity, clinical stage and lymph node metastasis before NAC. 2) In 86 cases, pCR was obtained in 41 cases (48%), pDCIS in 17 cases (20%) and invasive carcinoma in 28 cases (32%). Accuracy and false negative rate (FNR) of CNB for predicting pCR+pDCIS was 90.4% and 28.0%, respectively.

Conclusions: Outcomes of pCR cases were favorable with the exception of HER2 type. In particular, local recurrence was rarely observed. From the history of omitting axillary dissection by sentinel node biopsy, if the preoperative diagnosis could achieve 10% of false negative rate and 90% of accuracy for predicting pCR, an observational study without performing surgery could be planned. It is necessary to improve methods to predict pCR, because FNR was too high in this prospective study.

SENTINEL NODES FROM ABERRANT LYMPHATIC DRAINAGE IN RECURRENT BREAST CANCER

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With establishing prognosis for breast cancer, whether primary or recurrence, the presence and extent of axillary lymph node involvement is 1 of the most predictive factors for prognosis. In the early 2000s, sentinel lymph node biopsy (SLNB) became the standard of care for axillary staging in primary breast cancer with a clinically negative axilla. Since then the indications for sentinel lymph node biopsy, in contrast to axillary lymph node dissection, has expanded. They are reporting of ACOSOG Z0011 in 2010 lead to the adoption of sentinel lymph node biopsy only in the setting of a clinically negative axilla and 2 or fewer lymph nodes involved on sentinel lymph node biopsy.

As breast conserving surgery (BCS) became the standard treatment option for early stage breast cancer, ipsilateral breast tumor recurrence (IBTR) incidence has increased. About 10% of patients treated for BC develop IBTR within a 10year period after treatment. The merit of repeat sentinel node mapping after postmastectomy recurrences or IBTRs has been debated and studied in multiple trials. The controversy rests on whether this procedure unmasks unsuspected disease, aids in maintaining locoregional control if positive nodes are discovered, or influences the choice of systemic therapy. Moreover, the proponents of repeat SLNB argue that decisions regarding the use of regional irradiation may be directed by these findings. A recent meta-anaylsis of published studies reporting repeat lymphatic mapping and SLNB among 692 patients with a locoregional recurrence. Sentinel nodes were successfully identified in 65.5% and 68.9% of patients who underwent lumpectomy and mastectomy, respectively. Aberrant drainage patterns, namely to the contralateral axilla, have been found in 17.4% of cases with a prior SLNB compared with 69.2% after ALND. Overall, the success rate of repeat SLNB after a previous SLNB for a primary cancer was 81% compared with 52.2% ($p < 0.0001$) if performed after a prior ALND. Contralateral axillary sentinel nodes can be resected when repeat mapping drains to that basin. Although controversial, if positive, completion ALND and/or RNI could be considered. However, long-term outcome data are unavailable with respect to local control and subsequent distant metastases.

In this lecture, we will explore the existing data regarding the safety and efficacy of repeat sentinel lymph node biopsy and the possibility of aberrant drainage for recurrent breast cancer. We will discuss factors that predict for aberrant drainage and methods to improve accurate mapping. We will also discuss ongoing trials and the need for further study of large groups of patients to provide further guidance and predictive models for utility in accuracy of sentinel lymph node biopsy for recurrence breast cancer.

INTRAOPERATIVE TECHNIQUES FOR MARGIN ASSESSMENT IN BREAST CANCER SURGERY
: IS IT MANDATORY?

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Achieving negative resection margin is one of the most important factors in breast conserving surgery for breast cancer. A positive margin significantly increases the risk of local recurrence. Intraoperative margin assessment is needed to reduce resection positive margin rate and consequently reoperation rate and the morbidity, cost and inefficiency associated to it. In this session, various intraoperative margin assessment techniques will be reviewed with the purpose of answering the following question: Do we need these tools?

Intraoperative techniques for margin assessment can be grouped into three categories: localization methods, intraoperative pathology methods and cavity shaving margins.

Localization methods are mainly used to localize non-palpable breast lesions preoperatively.

The current gold standard localization technique is wire-guided localization (WGL). However, WGL has disadvantages such as, wire migration, patient discomfort and interference with the surgical approach. This has led to the development to other guidance techniques including, intraoperative ultrasound guided resection (IOUS), specimen radiography, radioguided occult lesion localization (ROLL) and radioactive seed localization (RSL).

IOUS and specimen radiography have the advantage of being a non-invasive technique, but IOUS is operative dependent and not suitable for cases with microcalcifications. Whereas specimen radiography cannot detect noncalcified lesions and misinterpretation of benign calcifications is possible too. Limited data are available on both tools, but can be considered an alternative to WGL in certain circumstances.

ROLL and RSL use radioactive material and injects it intratumorally under stereotactic or ultrasonographic guidance preoperatively. ROLL commonly uses technetium-99m (99mTc), whereas RSL utilizes a radioactive iodine (I125) seed. Previous studies show that the outcomes of ROLL and RSL are comparable to WGL, regarding positive margin rate and reoperation rate. These two techniques are increasingly being adopted, especially in Europe. ROLL has the advantage of simultaneous sentinel node identification, while RSL has the benefit of a longer and more flexible timing between seed insertion and surgery. Both ROLL and RSL can be offered to patients as a comparable replacement for WGL, but positive margin rate might be considered when adopting each tool.

Intraoperative pathology methods include frozen section analysis, imprint cytology and novel tools such as, radiofrequency spectroscopy (MarginProbe) or optical spectroscopy. A meta-analysis on intraoperative margin assessment techniques suggest that frozen section analysis and imprint cytology have the greatest diagnostic accuracy. However, these methods are resource intensive, include slow turnaround times, disrupt surgical workflow and are quite costly, preventing widespread international adoption. Still when assessing the efficacy of novel intraoperative margin assessment techniques, frozen section analysis is the tool for comparison in diagnostic accuracy. Data for radiofrequency spectroscopy or optical spectroscopy are still too limited to come to a conclusion. In order to adopt any emerging novel technique, the results must be comparative to frozen section analysis or imprint cytology and also provide with rapid results, cost-effectiveness, and accessibility of information to the surgeon. Considering the increased cost in performing intraoperative pathologic margin assessment, positive margin rate should be considered when adopting any of these tools.

Cavity shaving margins have been shown to reduce re-excision rate in two randomized controlled trials. A substudy of one of these trials also confirmed cost-effectiveness of this method. However, both studies report a re-excision rate of over 30%. Whereas, a similar study was performed in China with re-operation rates lower than 5%, reporting no difference between the no-shave and shave groups. Similar to other tools, the routine resection cavity shaving margin should be considered according to margin positive rates.

Various techniques have been introduced into the operation room to reduce positive margin rate. However, despite that these tools have been proven to be effective in reducing positive margin rate, the adoption rate differs due to resource intensiveness, time consumption and cost-effectiveness. Margin positive rate, cost-effectiveness and patient-related outcomes must be considered when adopting intraoperative margin assessment tools. More well designed trials are needed to evaluate the best technique for margin assessment, along with more consistent and standardized approaches in outcome reporting. Recently developed techniques are still required of further validation to be introduced into the clinic routinely.

ROLE OF IMMUNOTHERAPY IN TNBC: CUTTING EDGE OF EVIDENCES AND FUTURE CHALLENGES

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Regardless of enriched chemosensitivity and immunogenicity, majority of triple-negative breast cancer (TNBC) patients still suffer from dismal clinical outcomes including early relapse and metastatic spread.

Immunotherapy has emerged as a promising treatment modality for TNBC. Initial trials have established a role for anti-PD-L1 in the first-line metastatic setting in combination with chemotherapy. Ongoing trials will clarify the role of anti-PD-1/L1 in combination with other therapies. Additional work is ongoing to identify clinical factors (LDH, liver metastases) and biomarkers to optimize use of these agents. Multiple trials are also underway evaluating which combination of therapies may work best with immune checkpoint blockade including combinations with chemotherapy, radiotherapy, vaccines, and other targeted agents.

Despite the recent approval of atezolizumab and nab-paclitaxel in PD-L1positive mTNBC, many unanswered questions remain regarding immunotherapy in TNBC. Critical areas in need of development include immunotherapies for PD-L1negative mTNBC and TNBC refractory to prior PD-1/L1 therapies, as well as strategies that minimize immune-related toxicity. Altogether, clinical trials based on strong preclinical evidence combined with rich translational studies to understand mechanisms of response and resistance are necessary to advance the clinical development of immunotherapy in TNBC.

References

1. Park JH, Ahn JH, Kim SB. How shall we treat early triple-negative breast cancer (TNBC): from the current standard to upcoming immuno-molecular strategies. ESMO Open. 2018.
2. Keenan TE, Tolaney SM. Role of Immunotherapy in Triple-Negative Breast Cancer. J Natl Compr Canc Netw. 2020 Apr;18(4):479-489.

PARP INHIBITORS: OPTIMAL APPLICATION AND RESISTANCE MECHANISMS

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Two PARP1 inhibitors, olaparib and talazoparib, garnered regulatory approvals for the treatment of advanced HER2-negative breast cancer associated with a germline BRCA1 or BRCA2 mutation in 2018. The approvals were based on a prolongation of progression-free survival with PARP inhibitor monotherapy compared to non-DNA damaging single agent chemotherapy in the 1st – 4th line metastatic setting. While the availability of these therapies has increased therapeutic options for this group of patients, median progression-free survival ranged from 7 – 8.6 months and no overall survival advantage has been observed to date. While objective response rates with PARP inhibitor monotherapy are high at approximately 60%, development of resistance remains a significant clinical problem. Further, how PARP inhibitor monotherapy compares with platinum-based chemotherapy in this group of patients has been unclear. The recently reported phase III BROCADE 3 clinical trial examining carboplatin and paclitaxel with the addition of veliparib or placebo added important insights. This was the first phase III trial in patients with advanced germline BRCA1 and BRCA2 mutation-associated HER2-negative breast cancer that examined the use of a PARP inhibitor combined with DNA damaging chemotherapy in the 1st-3rd line setting followed by blinded monotherapy after discontinuation of chemotherapy. The median progression-free survival was significantly prolonged with the addition of veliparib (14.5 versus 12.6 months) with 26% of patients in the veliparib arm remaining progression-free at 36 months. Median overall survival was 33.5 months in the veliparib arm compared to 28.2 months in placebo with 44% of patients in the placebo arm crossing over to receive veliparib after disease progression. While important differences exist between these three trials, BROCADE 3 has reported the longest progression-free and overall survival to date with PARP inhibitor therapy in advanced germline BRCA1 and BRCA2 mutation-associated breast cancer. Beyond BRCA1 and BRCA2, PARP inhibitors are also being investigated in homologous recombination (HR) deficient advanced breast cancer in a number of clinical trials. In the Talazoparib Beyond BRCA study, clinical activity of talazoparib monotherapy was noted in germline PALB2 mutation carriers. The Olaparib Expanded trial is currently recruiting participants with advanced breast cancer with mutations in non-BRCA1/2 HR pathway mutations. A number of mechanisms of resistance to PARP inhibitor therapy have been reported to date and clinical implications will be discussed.

ALLEGED TARGETS, INNOVATIVE APPLICATIONS : PIK3CA PATHWAY

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Triple negative breast cancer is immunohistochemically determined by absence of ER, PR, and HER2. It is a heterogeneous disease with about 75% of the tumors having basal-like features, and 25% belonging to other intrinsic subtypes. While immunotherapies for immune-enriched TNBC and PARP Inhibitors for TNBC driven by DNA repair deficiency have already been entered into our clinical management, therapies targeting the androgen receptor or the PI3K pathway are still being investigated.

In basal-like tumors, PIK3CA is one of the most frequently mutated genes (9%) next to TP53 mutations, loss of RB1 and BRCA1 mutations. Moreover, PI3K/AKT pathway activation is frequent in these tumors, not just due to gene mutations but also by other pathway alterations such as PTEN loss or PIK3CA amplification. The clinical consequences of these pathway alterations have not yet been fully explored. Interestingly, in the SAPHIR study population, in contrast to patients with PIK3CA-mutated HR+/HER2- MBC, those with with PIK3CA-mutated TNBC had a better OS – which was explained by the investigators as potentially caused by loss of HR during tumor progression from primary to metastasis.

Nevertheless, the frequency of PIK3CA/AKT pathway alterations in TNBC have made this pathway an interesting target for novel therapeutics. In a small proof of principle trial in early TNBC, cisplatin and everolimus led to pathological complete responses and excellent outcome in patients with residual disease after standard anthracycline-taxane containing neoadjuvant therapy. The α-selective PI3K inhibitor alpelisib is already approved in HR+ HER2- MBC for treatment of PIK3CA-mutated tumors together with fulvestrant. Together with nab-paclitaxel, alpelisib led to significantly better PFS in metastatic TNBC with vs. without PIK3CA mutations. In the PAKT phase II trial, adding the AKT inhibitor capivasertib to 1st-line paclitaxel resulted in significantly longer PFS and OS vs. paclitaxel alone; therapy benefits were more pronounced in tumors with PIK3CA/AKT1/PTEN-alterations.

In the phase II LOTUS trial, metastatic TNBC patients receiving the pan-AKT inhibitor ipatasertib together with paclitaxel (vs. paclitaxel alone) had a better PFS and this benefit seemed more pronounced in PIK3CA/AKT1/PTEN-altered tumors. The phase III IPATunity 130 trial was not able to confirm this benefit in tumors selected by their pathway alterations.

In conclusion, the PI3K/AKT Pathway remains an interesting target in TNBC. Nevertheless, in view of recent trial results, the optimal strategies for incorporating drugs targeting this pathway into TNBC management still need to be evaluated. Additional trial results as well as further analyses from already reported trials may help to understand how drugs targeting the PIK3CA/AKT1/PTEN pathway can be best added to our armamentarium in TNBC.

STANDPOINT FROM REGULATORY AUTHORITY : GUIDELINES AND APPROVAL

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Background: Since the EU approved the first biosimilar product in 2006, the number of biosimilar products is increasing fast. But many clinicians still doubt whether biosimilar products have similar efficacy and safety comparable to the original products

Result: Biosimilar products are biological products that are approved to be comparable to already marketed reference products in terms of quality, safety and efficacy. Major global regulatory agencies share common principles in establishing biosimilarity : 1) The approval of a biosimilar product should be based on demonstration of similarity to a chosen reference product 2) The comprehensive characterization and comparision at quality level should provide basis for reduction in nonclinical and clinical data 3) Biosimilar development should follow stepwise approach 4) Regulatory decision making should be based on comprehensive evaluation of quality, safety and efficacy data.

Conclusions: Korea had served as the first chair of Biosimilar Working Group of International Pharmaceutical Regulators Program (IPRP) and will continue to promote global harmonization of biosimilar regulations.

BUILDING CONFIDENCE IN BIOSIMILARS
: FROM DATA TO PATIENT

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The foundation for developing biologic medicines is based on a sound understanding of the science and regulatory framework, both of which have evolved in the past decade. Historically, the characterization and manufacturing of biologic medicines was felt to be too complex for anyone but the innovator company. However, the advances in the specificity and sensitivity of the analytic assays has allowed unprecedented levels of detail and consequently the ability to control key specifications. Many of these are related to the physicochemical properties of each biologic medicine, but the most clinically relevant ones are linked to the functional activity of the target. During the development of the trastuzumab biosimilar (SB3), Samsung Bioepis undertook an extensive program of characterization of the reference product, Herceptin from both the EU and US. As a result, a clear downward drift in several quality attributes was noted, including antibody-dependent cellular cytotoxicity (ADCC), during the course of the Ph3 clinical trial in 875 women with HER2-positive early or locally advanced breast cancer in the neoadjuvant setting comparing SB3 with TRZ (reference product). The results showed no difference in the primary and secondary endpoint, including EFS or OS at the 1-year timepoint. Subsequent analysis using non-drifted TRZ and drifted TRZ showed no difference between SB3 vs non-drifted TRZ (HR 1.60, 0.58-4.40, $p = 0.3617$), but a clear difference between drifted TRZ vs non-drifted TRZ (HR 5.50, 1.81-16.65, $p = 0.0026$). Despite the limited number of patients, these data suggest a potential correlation between a downward drift in ADCC with EFS at 4-year follow up. (Pivot, X. et. al., J Clin Oncol 38: 2020 (suppl; abstract 578)

To ensure product quality from biosimilar companies, systematic control strategies like QbD (quality by design) and tollgate system were employed from start to end. From extensive control, quality attributes are maintained throughout product lifecycle.
Pharmacovigilance in the era of biosimilars can be seen largely as extensions of the innovator biologic medicine, which has a well-established safety specification and benefit-risk profile, controlled by product labeling and any remaining risk management activities agreed with regulatory agencies in risk management plans. The expectation of finding a new safety signal is considered low given the maturity of the product. Nevertheless, some concerns remain, for which continued attention is required.

Every adverse event or product quality complaint must be accompanied by the batch or lot number. This is to confirm that the product is from the manufacturer and not a competitor product, and also to ensure that any manufacturing quality issues are identified early and possible actions are taken to protect the health of patients. The size and complexity of the product manufacturing supply chain means that a number of global sites are needed to ensure global supply of the medicines. In this way, any changes to the process at each site can be appropriately monitored.

OUTLOOK FROM CLINICIAN: CLINICAL EVIDENCES AND APPLICATION

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Panel Discussion

GBCC10

10th Global Breast Cancer Conference

PATHOLOGIC RISK STRATIFICATION OF DCIS

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Ductal carcinoma in situ (DCIS) is a clinically, radiologically and histologically heterogeneous non-obligatory precursor of invasive breast cancer. Categorically they can be divided into high grade and low/intermediate grade, with different clinical and histologic features. Breast cancer specific survival of women with DCIS is extremely good, but some patients develop invasive recurrences hence worse outcome. Currently most DCIS cases are managed similarly. Recent efforts are directed at identifying factors predictive of recurrent risk; thus patients can be spared of over or under treatment. Traditional histopathologic factors and clinical parameters have been used to stratify patients into different prognostic groups. The heterogeneity with DCIS reflected the different underlying pathogenesis. Low/intermediate grade and high grade DCIS demonstrated different molecular alterations. Characterization of DCIS at molecular level has shed lights on the biological nature of the disease and aid to improve its risk stratification. The continuous efforts on investigating new factors for DCIS risk prediction could have potential to transform patient care by providing a more personalized approach for clinical management.

PERSONALIZING TREATMENT STRATEGIES FOR LOW RISK DCIS

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Advances in epidemiology and cancer biology have clearly established that the group of diseases currently deemed cancers in fact encompasses many conditions with enormous variation in biologic behavior. Decades of cancer screening have preferentially diagnosed early, asymptomatic, indolent lesions. This trend will only increase as screening technologies become ever more sensitive, leading to an epidemic of overtreatment in completely asymptomatic individuals. The treatment of many of these conditions often has unclear benefit on cancer mortality, while coming at the cost of treatment-related morbidity.

Molecular testing may have a role in refining treatment recommendations based upon risk of progression. Further, risk modeling may yield insights about which patients derive greatest benefit from intervention. For asymptomatic tumors at low risk of cancer progression, there may be little to no benefit to treatment, whereas for more high-risk lesions, progression to invasion and metastasis may be more likely.

Worldwide, there are three international trials (LORIS, COMET, LORD) which are evaluating whether DCIS with favorable biologic features may be managed with close monitoring, with treatment only undertaken upon disease progression. These trials will determine whether there may be some women with low-risk DCIS who do not substantially benefit from treatment and who could thus be safely managed with close surveillance. If active monitoring for DCIS is deemed to be safe and feasible, additional work must be done to optimally implement this approach, involving effective communication between patients and their physicians about the risks and benefits of treatment versus surveillance. Importantly, these treatment decisions must take into account patient factors such as risk tolerance, age, and competing causes of mortality.

Tailoring treatment to biology for early screen-detected cancers such as DCIS is an important goal of ongoing research. An improved understanding of the biology and clinical implications of this heterogeneous disease will improve the overall health and quality of life for hundreds of thousands of future women who will be diagnosed with DCIS.

DE-ESCALATION OF RADIOTHERAPY IN DCIS

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Ipsilateral breast tumor recurrence (IBTR) is the most common failure event after breast conserving surgery for DCIS. The NSABP randomized trials for DCIS (B-17 and B-24) at long-term follow up time demonstrated that radiation therapy (RT) reduced the invasive-IBTR (I-IBTR) rate by 52% as compared to surgery alone ($p < 0.001$), while the addition of endocrine therapy reduced I-IBTR by 32% ($p = 0.025$). Individual patient-level EBCTCG meta-analysis (4 trials, 3 729 women) showed that RT addition after surgery decreased local relapse (LR) risk of around 50%, with an absolute 10-year reduction of LR risk of around 15% (28.1% [no RT] vs. 12.9% [RT], $p < 0.00001$). For all patient subsets (i.e., small, low-grade tumors, negative surgical margins) RT halves LR risk while it did not improve breast cancer and all-cause mortality. With no documented improved survival, later studies focused on a subset of low-risk DCIS patients identification. However, low-risk patients who did not benefit from RT was not identified, thus identification of high risk of invasive LR patients is still a challenge. Both retrospective and randomized studies showed that younger age had higher risk of LR for DCIS after conserving surgery (around 20% difference absolute 10-year LR rate risk and 10% difference of I-LR rate, using a threshold of 40 years old). Although no evidence of any survival difference was demonstrated, patient age should be included in the discussion of pros and cons of the various options for treatment. The use of a RT tumor bed boost is able to reduce the absolute LR rate independently of age but is not able to overcome the negative impact of an inadequate final surgical margins status, thus the latter representing the only LR risk factor potentially modifiable. Although randomized studies cannot be used to determine the optimal negative margin width, the SSO-ASTRO-ASCO consensus guideline on margins for breast conserving therapy in DCIS recommended the use of a 2 mm margin as the standard for an adequate margin in DCIS, warranting low rates of IBTR, decreased re-excision rates, improved cosmetic outcome, and decreased health care costs. Moderate hypofractionated whole breast irradiation use for DCIS after conserving surgery has increased over time. It should represents the new standard of care, as it resulted in equivalent rates of both local control and safety from brand-new randomized trials results. Data from randomized trials on partial breast irradiation as compared to whole breast radiation therapy including patients with DCIS are limited. However, a partial breast irradiation approach could reasonably represent a compromise between overtreatment and undertreatment, as per ASTRO recommendations. Concerning the role of clinic-pathological features and biomarker integration, no conclusive data for biology as potential treatments driver still exists. However, hormonal receptors status seems to be the most significant molecular factor with a significant negative impact on LR risk of negative status. Several genome-based assays are currently tested worldwide.

In conclusions postoperative RT after conserving surgery halves LR in most of patients, RT omission may be considered only in very-low risk patients, tumor bed RT boost could be avoided in most of patients while hypofractionation should replace conventional fractionation. Adjuvant endocrine therapy is avoidable in most of patients, while partial breast irradiation could be considered in very-low risk patients (ASTRO guidelines) and in the context of clinical trials; surgery could be avoided in some cases, preferably in the context of controlled trials. Treatment for DCIS should not be a one-size-fits-all approach. Every patient should be assessed individually concerning tumour characteristics, comorbidity/frail scores, patients choice, assessment of benefits and risks of treatments. A multidisciplinary discussion is crucial and, where available, a de-escalation ongoing clinical trial should be considered.

OPTIMAL APPLICATION OF STANDARD OF CARE IN SYSTEMIC THERAPY: GENERIC, BIOSIMILAR, COST-EFFECTIVENESS?

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Cancer care is becoming an economic burden not only for low-income individuals, but also for the entire country. With the improved availability and access of generic medicines and biosimilars, cost-effective and affordable treatment can be offered to cancer patients. However, those medicines are being troubled by negative perceptions that impact the adoption in the clinics. Lack of understanding regarding the quality, safety, effectiveness, and stability, and manufacturing are more common in the developing countries. Therefore, collaborative efforts for enhanced utilization of generics and biosimilars in oncology should be made by physicians, healthcare professionals, manufacturers and sponsors of these drugs, and national healthcare systems. By doing a series of efforts, outcomes in a cancer field can be improved with the adoption of generics and biosimilars, in particular in low-income countries where access and affordability of chemotherapy is limited.

CAN WE INCREASE THE RATE OF ACCEPTING BREAST CONSERVING SURGERIES IN COUNTRIES WITH LIMITED RESOURCES?

Kong Wee Ong

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The healthcare environment is often challenging in developing countries, with many competing demands for limited resources. In these countries, breast cancer is often diagnosed at an advanced stage. Hence, it is not surprising that the only surgical option for these patients is a mastectomy. However, with gradually improving socio-economic conditions, more patients are presenting with early disease. In tandem to this, neoadjuvant chemotherapy has been shown to be very effective in downsizing tumours for certain tumour sub-types. These developments have made it possible for breast conserving surgery (BCS) to be considered in these cases.

Nonetheless, there remain many obstacles to improving the BCS rates. Deep seated collective mindsets, lack of up-to-date medical knowledge and practice, the chronic lack of skilled manpower and necessary resources and equipment are examples of the issues limiting the adaptation of BCS.

BREAST CANCER RADIOTHERAPY AT HO CHI MINH CITY ONCOLOGY HOSPITAL

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Background: The Ho Chi Minh City Oncology Hospital is the largest cancer center in the South of Vietnam. Here, every year, more than one thousand breast cancer patients are diagnosed and treated. The incidence of breast cancer in Vietnam is 26.4 (GLOBOCAN 2018). The national breast cancer screening program has not been implemented and not supported by the medical insurance since the coverage cost is too expensive. Concerning the radiation treatment, the Radiotherapy Department is always overloaded due to limited number of radiotherapy machines.

Methods: In order to supply an accurate, safe and effective treatment to a great number of breast cancer patients, we have been applying radiotherapy protocols which are appropriate to Vietnamese women physical constitution, and using hypofractionation to treat more patients (3 Gy/fr for post mastectomy and 2.6 Gy/fr after breast conservative surgery). Beside the two main prognostic factors which are tumor and nodes, other factors such as young age, localization of the tumor in the breast, biologic subtype, high histologic grade, lymhovascular invasion are also considered for post-mastectomy radiotherapy indication.

Result: In 2012 a retrospective study has shown encouraging results in 4 year disease free survival and overall survival for stage I-IIIA, 88.9% and 92.6%. The loco-regional recurrence is 2.5%.

Conclusions: In the setting that breast cancers are not detected very early by screening, the treatment of early and loco-regionally advanced stage breast cancers must be adequate, in which taking full advantage of radiotherapy – a not expensive tool – is a reasonable approach of cancer treatment in developing countries.

MANAGEMENT OF SKIN METASTASIS AND MALIGNANT WOUNDS

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Cutaneous metastasis from other primary site accounts about 2% of all skin cancers. These cutaneous manifestations may be the first sign of internal metastasis and occurred in up to 22% of patients. Breast cancer is the most common origin of skin metastasis (70%), followed by ovary, oral cavity, lung, and large intestine. The frequency is much different with male population. Skin involvement is also presented in 23.9% of all patients with breast carcinoma, Pathways of skin metastasis include direct invasion, hematogenous spread, lymphatic spread, and surgical implantation. These cutaneous metastasis usually presented as asymptomatic nodules and hardened consistency, however, they could also mimic benign dermatologic conditions, such as eczema, cellulitis, tinea infection, and contact dermatitis. Skin metastasis is usually assumed as a manifestation of systemic metastasis. Systemic therapy (such as chemotherapy, antihormone therapy, anti-HER2 therapy) is usually the backbone of treatment, while radiotherapy would provide benefit in symptom control. The efficacy of systemic therapy varies a lot in different breast cancer subgroups, and sometimes the skin lesion will spread very quickly. The treatment sequence and option will be reviewed in this section, and we also discuss the way of managing such malignant wounds.

RADIATION THERAPY TO PRIMARY TUMOR IN STAGE IV BREAST CANCER

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The benefit of local therapy in the form of primary tumor resection (PTR) or radiation therapy to the chest wall or intact breast remains unproven in patients diagnosed with stage IV breast cancer. The standard of care for stage IV breast cancer is systemic treatment, as the disease itself is regarded as incurable. Thus, local therapy has usually performed for palliative purposes only.

Due to the heterogeneous demographic and tumor characteristics of stage IV breast cancer patients, their survival varies from months to years. In addition, advances in systemic agents since the mid-1990s have prolonged survival in patients with metastatic breast cancer, suggesting that early and planned local therapy may be beneficial for selected patients with favorable features.

Several retrospective studies have reported that PTR has a positive impact on local control and overall survival. Although three prospective randomized controlled trials in India, Turkey, and Austria, compared PTR with systemic therapy alone, conflicting results were observed. In real world practice, PTR has been performed on 3580% of patients with stage IV breast cancer. Accordingly, the incidence of postoperative radiotherapy (PORT), including post-mastectomy radiotherapy, has also increased. Despite these increases, relatively little is known about the efficacy of PORT in patients with stage IV breast cancer compared to the efficacy of PTR. There has been an anticipation that radiation therapy could lead to a prolongation of survival by decreasing the risk of systemic shedding from the primary site of disease. Recently, a population-based propensity-score matched analysis demonstrated PORT increased cancer-specific survival rates in stage IV breast cancer compared to PTR alone. Also, the use of primary radiation therapy alone could be considered for loco-regional control in patients with a disease status whose prognostic benefit depends on systemic therapy.

This presentation will cover a detailed review of studies on the effect of radiation therapy on the primary tumors in stage IV breast cancer.

LOCOREGIONAL TREATMENT MODALITIES IN BREAST CANCER PATIENTS WITH OLIGOMETASTASES

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Background: Recently, molecular targeted therapy can prolong survival of patients with metastatic breast cancer (BC). Among them, oligometastatic BC is occasionally found. Several retrospective studies demonstrated survival benefit of locoregional therapy in addition to systemic therapy for oligometastatic BC patients. However, it remains uncertain what is the best treatment to cure oligometastatic BC. To clarify the standard care of oligometastatic BC, the Federation of Asian Clinical Oncology (FACO) conducted a retrospective cohort study on oligometastatic BC (OLIGO-BC1) (UMIN No.000030047).

Methods: BC patients with oligometastases diagnosed from 2007 to 2012 were registered by EDC system. The definition was adopted according to the Advanced Breast Cancer guidelines, which defines oligometastatic BC as low volume metastatic disease with limited number and size of metastatic lesions up to five and not necessarily in the same organ. The primary endpoint is the advantage of overall survival (OS) of patients treated with combination therapy of locoregional and systemic therapy in comparison to systemic therapy alone. When the 5-year OS rates are expected to be 50% and 40%, respectively, the estimated sample size is calculated to be the number of 698 cases needed to prove the superiority of survival with a two-sided type I error rate of 5% and a statistical power of 80%. A multivariable Cox regression model was performed to estimate hazard ratio (HR) for therapy and other risk factors.

Results: In 1,295 cases registered from February 2018 to May 2019 from KSMO, CSCO and JSCO, 1,200 remained for analysis after exclusion of unavailable cases. One metastatic site was found in 578 cases, 2 in 289, 3 in 154, 4 in 102 and 5 in 77. Locoregional and local recurrence was recorded in 25 and 83 cases, and bone, visceral and multiple organ metastases in 301, 387 and 404 cases, respectively. At the median follow-up of 4.9 years, 5-year OS was 59.6% and 41.9% for 495 cases with combination therapy group and 705 cases with ST group, respectively

($p < 0.01$). An adjusted HR by multiple imputation method was 0.61 (95% CI: 0.51, 0.74). Type of systemic therapy, younger age, ECOG performance status 0, stage I BC, non-triple negative subtype, fewer metastatic sites, local recurrence and longer duration of surgery to relapse were significantly favorable prognostic factors.

Conclusions: Combination therapy may have survival advantage of some types of oligometastatic BC.

APPLICATION OF GENOMIC ANALYSIS IN CLINIC
: ESMO RECOMMENDATION

Giuseppe Curigliano

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NGS is a technology that is used to assess the sequence of DNA in genes. Hundreds or even thousands of genes can be quickly sequenced at the same time at a relatively low cost. It is extensively used in oncology, particularly in metastatic cancer, to determine the mutations in a tissue sample from a tumour. The aim is to select treatment according to the genomic alterations detected in the tumour, applying so-called precision medicine. The ESMO Translational Research and Precision Medicine Working Group developed the recommendations on the basis of the ESMO Scale for Clinical Actionability of molecular Targets (ESCAT) ranking for genomic alterations occurring in the eight cancers responsible for the most deaths worldwide. For each tumour type, experts used the ESCAT ranking and prevalence of alterations to calculate the number of patients that would need to be tested with NGS to identify one patient who could be matched to an effective drug in daily practice. ESMO makes recommendations at three different levels: recommendations for daily practice with an impact on public health; recommendations for research to improve access to innovation; patient-centric recommendations.From a public health perspective, NGS should be routinely used in patients with these metastatic cancers: advanced lung adenocarcinoma, prostate cancer, ovarian cancer, cholangiocarcinoma.In addition to its use in those four cancers, patients with other cancers could decide together with their doctor to order NGS on a large panel of genes providing there is no extra cost for the public healthcare system and the patient is informed about the relative likelihood of benefit (patient-centric perspective).The third recommendation is that clinical research centres should perform NGS to generate more evidence about the use of this method and accelerate drug development. Evidence for the cost-effectiveness of using multigene sequencing in daily practice is currently weak. ESMO's recommendation is therefore that large panels of genes can be used if they generate an acceptable increase in the overall cost, drugs included. Considering that the results of NGS panels could lead to prescription of expensive drugs outside of their approved indications, volumes of NGS procedures should be regulated at the national level. The recommendation from the expert panel is therefore that the use of off-label drugs matched to genomics is done only if an access programme and a decision-making procedure have been developed at national or regional level.

ISSUES IN TISSUE BASED NGS ANALYSIS

Woong-Yang Park, Joonho Shim, Tae-Hee Hong

Samsung Genome Institute, Samsung Medical Center, Korea

Targeted deep sequencing on cancer gene panel could provide accurate detection of actionable mutations for personalized cancer treatment. The clinical utility of panel sequencing could be validated in clinical samples with low tumor purity for target therapy. In addition, panel sequencing could estimate tumor mutation burden (TMB), which is critical for the prediction of clinical outcome in patients with immune checkpoint inhibitors (ICIs) treatments. However, the clinical utility of TMB for identifying patients who may benefit from ICIs is still challenging. In this study, we analyzed whole exome and panel sequencing data from lung and breast cancer to improve the analytical and clinical validity of panel sequencing. We will present the performances of panel sequencing for the prediction of immunotherapy response.

CLINICAL IMPLEMENTATION OF LIQUID BIOPSY PANELS

Sarat Chandarlapaty

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Lethality from breast cancer is almost entirely due to metastatic spread and progression of distant disease. Adjuvant systemic therapies have proven benefits in reducing mortality due to the unique capacity to target and eradicate micrometastatic populations relative to overt metastatic tumors. The efficacy of such therapies implies the value of identifying such micrometastatic populations more precisely in order to both determine the subsets of patients at risk and in need for such therapy as well as to specifically assign therapies most relevant to the disease is present. As such technologies are needed to detect such minimal residual disease that are highly sensitive but also robust enough to provide detailed molecular profiles that can direct therapy from among many choices. Circulating tumor DNA (ctDNA) has emerged as having potential for both detection of minimal systemic disease as well as for broad profiling of the tumor genome. However, challenges have also emerged in the specificity of mutation detection (e.g. alternative sources of mutations form clonal hematopoiesis), heterogeneity of metastatic disease (e.g. polyclonal metastatic disease), and the intractability of certain disease subsets to current therapies limiting the full potential use of molecular profiling. In this session, I will review recent advances in ctDNA for molecular profiling and minimal residual disease detection and the clinical approaches we and others are using to make the most effective use of these technologies in breast cancer practice.

GENOMIC DIFFERENCES BETWEEN ASIAN AND WESTERN BREAST CANCER PATIENTS

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During the past few decades, breast cancer incidence has been increasing rapidly in East Asia including South Korea. It seems to be related to change in lifestyle and environmental factors in addition to the increase in breast cancer awareness and screening. The relative frequencies of estrogen receptor, progesterone receptor, and HER2 positivity in breast cancer appear to be similar between East Asian and white populations overall. Some studies showed that the proportion of luminal B relative to luminal A tumor is higher in Chinese population than Western, although it is still controversial. For somatic genetic changes, there are some data that the prevalence of TP53 mutation was higher in Asian than other TCGA cohort. Also, there was a data suggesting that Asian tumors harbor a more immune-active microenvironment. In an analysis of TAILORx trial result according to ethnicity, the clinical outcome of Asian was not different from white population with hormone receptor-positive, HER2-negative, node-negative breast cancer.

For germline mutation of predisposing genes, BRCA2 mutations appear to be more common than BRCA1 mutations in East Asian populations (including Chinese, Korean, and Japanese) in contrast to white. Recently, a possible pathogenic founder mutation of BRCA1 (p.Leu1780Pro) was observed in Korean patients. In multigene panel studies, other gene mutations, such as, PALB2, TP53, RAD51D, and ATM were found commonly in Asian. However, the CHEK2*1100delC mutation found in 1% of European populations was absent in Asian. For common gene single-nucleotide polymorphisms (SNPs), only about half of the 70 variants identified initially in European ancestry GWASs could be directly replicated in East Asian populations. This means that the frequencies of mutations and SNPs of breast cancer predisposing genes are different in Asian compared to white.

PHARMACOKINETIC AND/OR PHARMACODYNAMIC DIFFERENCES BETWEEN ASIAN AND WESTERN BREAST CANCER PATIENTS

Louis Wing Cheong Chow

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There is an increasing amount of evidence on the differences in pharmacokinetics or pharmacodynamics between different racial populations, which may result in differences in treatment outcome and tolerability. For example, single-agent docetaxel alone has been known to produce a higher rate of toxicity in the Asian population, with the pharmacogenomics of the metabolizing enzymes suspected to play a role. Racial differences in the treatment outcomes of the small molecule tyrosine kinase inhibitors (TKIs) on lung cancer, gastroesophageal carcinoma, and colorectal cancer were also observed, and these could potentially have implications on the use of TKIs in treating breast cancers. Ongoing investigations on the use of Z-endoxifen, the potent derivate of tamoxifen that bypasses the CYP2D6 route, are also expected to elucidate the influence of genetic polymorphism in drug transporter or metabolism pathways. In this presentation, more pharmacokinetic and pharmacodynamics differences between the Asian and Caucasian breast cancer populations will be discussed, including the potential disparity in tumor immune microenvironment of breast cancer that may impact the prognosis and development of immunotherapies for breast cancer treatment in the near future.

ETHNIC DIFFERENCES OF ASIAN BREAST CANCER PATIENTS FROM WESTERN PATIENTS
: LESSONS FROM JAPANESE CLINICAL TRIALS

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Development of investigational new drug has become global process including many of countries and races. In general, there is no obvious difference in efficacy and safety among each race. However, from the recent experience in CDK4/6 inhibitors and some molecular target drug development, we have encountered a few critical barriers in terms of safety. Some of these due to genetic polymorphism issue and some seems to be failure of finding of proper dose modification. In this session I would try to summarize possible pitfall in drug development in Asia and present an example of our study about polymorphism and drug doses.

FORMING A MULTIDISCIPLINARY TEAM FOR BREAST CANCER TREATMENT

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Every medical treatment, including cancer treatment, requires a multidisciplinary team. For early-stage breast cancer, treatment is often prolonged, mainly hormonal therapy, and can last for more than ten years. Also, late complications such as cardiotoxicity caused by anthracyclines and anti-HER2 drugs need to be controlled over a long period. The prognosis for metastatic breast cancer is improving with advances in treatment, and long-term support for metastatic patients is needed. Support by the multidisciplinary team is essential not only for treatment and its complications but also for patients' socio-psychological, employment, and financial problems. Various teams have been formed in each medical institution, but few can be called genuinely patient-centered high-performing teams. So, how can we create a patient-centered high performing team?

Vision is defined as a unique and ideal image of your future. Mission provides clarity and gives you and your team a sense of purpose. It defines who you/your team are and how you will live. Mission also tells you how to reach your vision. The shared mission and vision are required to unite the team. A multidisciplinary team consists of various specialties depending on its form and purpose. The multidisciplinary team can be divided into four components. One is the patient itself. One is the active care that provides direct medical care. Another one is a base support that provides support or circumstance for patients to receive medical care, and a community resource that supports medical care through developing drugs, making policy, e.t.c. But is not directly involved with the patient.

Furthermore, in order for each member to function in the multidisciplinary team, it is necessary to understand the three elements of team medicine. The elements are consist of leadership, communication, and evidence-based medicine. While being aware of and practicing these necessary elements of the multidisciplinary team, it is necessary to evaluate the team's state objectively. There is no standard method to evaluate the team, but the Tuckman model is one concept that is useful for understanding the state of the team.

In Japan, the Japan TeamOncology Program (J-TOP) was established in 2002 to educate medical professionals for the spread of the multidisciplinary team. The speaker has been serving as the J-TOP chair since 2018, and J-TOP has been making efforts to spread true TeamOncology through in-person workshops and online activities. I want to discuss the multidisciplinary team in breast cancer treatment, including J-TOP's efforts and the future direction.

ROLE OF MULTIDISCIPLINARY TEAM IN EARLY BREAST CANCER PATIENTS

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The role of the multidisciplinary team in optimizing early stage breast management has been a "gold standard" in delivering cancer care in large health care systems since 1995. The multidisciplinary team has traditionally been composed of surgeons, radiologists, pathologists, medical oncologists and radiation oncologists. As cancer care has become more complex, the team has expanded to include geneticists, psychologists, physical therapists, nursing, and research personnel among others. Collectively, the goal is to deliver coordinated, compassionate and cutting-edge care to all breast cancer patients. Most studies demonstrate that presentation of the patient cases at the multi-disciplinary meetings changes treatment recommendations approximately 20% of the time, increases research participation, improves patient satisfaction and in some studies improves outcomes (improved survival). Given the rapidly changing environment in breast cancer treatment paradigms, the multidisciplinary team is the ideal way to disseminate new information and changes in practice to optimize patient outcome. We will review the data surrounding the success of the multidisciplinary teams and what the future may look like.

MULTIDISCIPLINARY TEAM MANAGEMENT OF METASTATIC BREAST CANCER

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The treatment of metastatic breast cancer requires that health care providers and caregivers from many disciplines work together on the intertwined physical, psychological, social, and spiritual needs of patients. Providing a conceptual framework explaining how the members of multidisciplinary breast treatment teams may best interact with each other and the patient helps drive patient-centered care and clarifies the roles of specific team members at various times throughout treatment. The ABC model of multidisciplinary care in cancer treatment describes the roles of the active caregivers (for example, physicians or nurses), basic supportive caregivers (for example, psychologists or chaplains), and community support (for example, advocacy groups or hospital staff) providing the entire continuum of the metastatic breast cancer treatment experience.

The challenges of MBC are that the clinical progression patterns are heterogeneous; patients experience acute and stable phases at different time points. The acute phase consists of rapidly progressive, symptomatic changes, whereas patients have a relatively low symptom burden in the stable phase. Therefore, personalized inter/multidisciplinary care is essential. Providing the best multi- or inter-disciplinary care for patients with MBC requires understanding the ABC model with awareness of the dynamic change of the care needs depending on the patients' disease progression pattern.

VOLUME DISPLACEMENT AFTER BREAST CONSERVING SURGERY

Douglas Macmillan

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Oncoplastic surgery is not about planning the most complicated operation, but more about finding the simplest technique that achieves the oncoplastic goals of cancer excision and an acceptable cosmetic outcome.

One key role of the oncoplastic surgeon is to fill / close the tumour excision cavity in a safe and cosmetically sensitive way and there are a variety of ways of doing this, as categorized below. Whilst these do vary in difficulty, simplified variations can be chosen according to surgical experience and patient-specific risk factors. Having a range of techniques available and choosing the ideal technique for any given patient will greatly facilitate achieving good outcomes.

Techniques of excision cavity closure.

SIMPLE EXCISION
- Simple small excisions with sensitive scar placement and limited skin undermining

VOLUME DISLACEMENT
- Skin undermining and parenchyma redistribution
- Skin reduction and parenchyma redistribution (therapeutic mastopexy)
- Skin and overall breast volume reduction (therapeutic reduction mammaplasty)

VOLUME REPLACEMENT
- Replacement of lost volume from outside of the breast

For volume displacement, which technique to choose will depend primarily on surgeon experience, breast size, degree of ptosis, patient risk factors, and breast composition (fatty of glandular).

Simple skin undermining and parenchyma redistribution is safe in glandular breasts and best avoided in fatty breasts. Its use is mostly limited to relatively small excisions in the lateral half of the breast, where more breast tissue is available and often more mobile. Contour irregularities are also better tolerated in this area. Elsewhere in the breast and for any large percentage excision, other techniques are usually preferred.

Therapeutic mastopexy and therapeutic reduction mammaplasty techniques are usually performed with simultaneous contralateral symmetrisation, though can be unilateral when the degree of resulting asymmetry is acceptable. They are commonly used in larger or ptotic breasts and allow large percentage excisions. They can not only be used to close a defect anywhere in the breast but can also offer quality of life benefits of overall alteration of breast size and shape.

VOLUME REPLACEMENT AFTER BREAST CONSERVING SURGERY

Jung Dug Yang

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Oncoplastic surgery, which is the expanded concept of BCS, was first attempted by Audretsch et al. in 1998 and included consideration of breast cancer and aesthetics. Two techniques are currently used in oncoplastic surgery according to the excised volume of the breast: the volume displacement (VD) technique based on glandular reshaping or reduction mammoplasty, and the volume replacement (VR) technique, which uses autologous tissue for different types of flaps.

Our hospital has made consistent efforts to establish algorithms for breast reconstruction techniques applicable to different types of patients, depending on breast size and excised volume. In patients with relatively large breasts, the residual tissue is sufficient to obtain satisfactory cosmetic outcomes using the VD technique. However, Asian women have smaller breasts than their western counterparts, lumpectomy often results in significant breast deformity as the residual breast tissue is minimal. VR techniques can overcome this limitation and provide sufficient volume and stable aesthetic results.

In this presentation, we will talk about our representative VR techniques such as lateral thoracodorsal flap, perforator flap (TDAP, LICAP) and mini LD flap and also introduce our recent mini LD harvesting techniques using endoscopic and robotic approach to minimizing back scar.

BREAST RECONSTRUCTION WITH MINIMAL STIGMATA

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While the breast reconstruction is accepted as an essential part of the breast cancer treatment and the outcome of the reconstruction has reached to the point of near perfection, the processes of mastectomy and reconstruction still cannot avoid leaving marks of the surgeries on multiple sites of the victims' body.

For the mastectomy to be completed, skin incision has to be made either on the breast mound or in the vicinity of the breast. To be less conspicuous, the scar can follow two rules; 1) incisions can preferably be made along the pre-existing natural lines or boundaries of the breast, 2) the shorter the scar is, the better it looks. Several variations from the traditional radial incision were tried such as periareolar, inframammary fold, and lateral incisions. Recently, very short incision at lateral border is under trial with aid of endoscope or robot.

To achieve an optimal aesthetic outcome, it is important not only to choose a good individualized material, but also to understand the geometry of symmetry of breasts. During the inset of implant of autologous tissue, it is helpful to check the symmetry of volume, projection, and positions of inframammary fold and nipple areolar complex.

When using autologous tissue, it is inevitable to leave a large scar on donor site. However, every effort to achieve best scar quality and donor contour would be appreciated. In abdominal flap based reconstruction, donor closure should be done just as in aesthetic abdominoplasty, trimming the fat tissue to get even surface and using the best materials such as monofilament suture and skin adhesives. The low DIEP flap which utilizes the lowermost abdominal tissue enables best donor site aesthetic with very low scar just above the pelvis and normal-looking umbilicus and eventually allows the patient to wear a two piece swimsuit.

HOW TO REDUCE POSTOPERATIVE COMPLICATION AFTER ONCOPLASTIC BREAST SURGERY

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The oncoplastic surgery (OPS) aims to harmonize the oncologic resection with an aesthetic result. OPS evolved from breast-conserving surgery (BCS) by broadening its general indication to achieve wider margins without compromising on the cosmetic outcomes. The American Society of Breast Surgeons defined OPS as: "BCS incorporating an oncologic partial mastectomy with ipsilateral defect repair using volume displacement or volume replacement techniques with contralateral symmetry surgery as appropriate". Volume displacement OPS is defined as closing the lumpectomy defect and redistributing the resection volume over the preserved breast, and is divided into two levels: level 1 (< 20%) and level 2 (20-50%). Volume replacement includes those situations when the volume is added using flaps or implants to correct the partial mastectomy defect. In OPS, even though complication rates varied widely among studies, an early complication rate of 20% was commonly described, consisting mostly of seroma, hematoma, infection, delayed wound healing, wound dehiscence, partial skin necrosis, and skin retraction. Common late complications of OPS include fat necrosis and skin retraction, the rate of former is about 10% to 30%. The complication rate of OPS seems to be similar or even lower than that of conventional BCS. However, some complications are significantly more common in OPS than in conventional BCS, and fat necrosis is a representative one.

Nipple-sparing mastectomy (NSM) combined with immediate reconstruction using prosthesis or autologous tissue has gained popularity for breast cancer treatment and prevention. The overall complication rate of NSM has been reported up to 48%. Among complications after NSM, nipple-areolar complex (NAC) and skin flap necrosis are the more ominous and the most frequent adverse events. Reported rates of NAC and skin flap necrosis range from 4.4% to 37.5% and 2% to 12.7%, respectively. Smoking, obesity, periareolar mastectomy incisions, preoperative radiation, and mastectomy specimen weight have been identified as risk factors for the ischemic complications after NSM. The perfusion of the NAC and breast skin after NSM is also a critical factor for the development of ischemic complications.

This session will review potential postoperative complications after OPS and NSM and seek the way to reduce them.

INDIVIDUALIZED MANAGEMENT OF INTERNAL MAMMARY LYMPH NODES

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In addition to the axillary lymph node (ALN), the internal mammary lymph node (IMLN) drainage is another first-echelon nodal drainage site in breast cancer. The status of IMLN also provides important regional staging and treatment choice information for breast cancer patients. The 15-year results of the EORTC 22922/10925 trial, along with the MA.20 and Danish Breast Cancer Group (DBCG) trials, suggest that, with the improved efficacy of systemic therapy, IMLN irradiation for patients with high risk of IMLN metastasis can not only reduce breast cancer mortality and recurrence, but also increase disease free survival and overall survival. Indication is key in deciding whether to administer IMLN irradiation, taking into account survival benefits, side effects, and health economics. Internal mammary sentinel lymph node biopsy (IM-SLNB) guided IMLN irradiation represents a future direction of IMLN irradiation research, while technical solutions to improve therapeutic gain should be continued to investigate.

Although IM-SLNB is a minimally invasive staging technique to assess IMLN metastatic status for breast cancer, there has been little change in surgical practice patterns due to the low visualization rate of internal mammary sentinel lymph node (IM-SLN) with the traditional radiotracer injection method. In addition, the uncertainty in the indications and accuracy of IM-SLNB has also led to no consensus on its clinical application.

High visualization rate and low false negative rate are prerequisites for the widespread of IM-SLNB. A series of single-center studies on IM-SLNB had been conducted to improve the visualization rate with the modified injection technique under the hypothesis of internal mammary lymphatic drainage from not only the primary tumor area, but also the entire breast parenchyma. Using the modified injection technique (periareolar intraparenchymal, high volume, and ultrasound guidance), we were able to improve the IM-SLN visualisation rate of IM-SLNB from 15.5% to 71.1% in the prospective multicentre CBCSG026 trial. In the subsequent prospective, multicentre CBCSG027 trial, IM-SLNB followed by first to third intercostal IM-LND to verify the accuracy of the biopsy, was done in patients with positive axillary nodes. According to the updated CBCSG027 results, the IM-SLNB false-negative rate was 328%, and the IM-SLN was the only positive IMN in 525% of patients. With a positive IMLN found in 61 (41.2%) of 148 patients, 72.0% of patients with axillary pN1 and 42.4% of those with axillary pN2 and pN3 could safely avoid IMN irradiation after a negative IM-SLNB. A nomogram for the prediction of IM-SLN metastasis (area under the curve of 0860) was also produced to guide use of IMLN irradiation in hospitals that are unable to do IM-SLNB or in patients who are not suitable for an IM-SLNB.

With the significantly improved detection rate of IM-SLN with the modified technique of radiotracer injection, present data support IM-SLNB is a minimally invasive and accurate staging technique and could tailor the individualized management of internal mammary lymph nodes.

CONSIDERATIONS FOR RADIOTHERAPY AFTER BREAST RECONSTRUCTION

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The complex decision of breast reconstruction in the setting of postmastectomy radiotherapy (PMRT) involves a weighing the risks and benefits of various reconstruction & radiation therapy options suitable for each patient. PMRT can lead to an increased frequency of complications in the reconstructed breast. A collaborative effort among providers is therefore of utmost importance in selecting an optimal approach of reconstruction in the setting of PMRT to minimize postoperative complications (1).

If a patient requires radiation therapy following mastectomy, there is much variability among practitioners with respect to radiation technique. Some of the variables specific to radiation are whether or not to keep the TE inflated or deflated during radiation therapy, delivery of a boost dose in the presence of a TE, utilization of bolus, thickness of bolus material used, and frequency of placement of bolus material (2).

Other variables are various dose-fractionation schedules and beam delivery techniques. Interestingly, most breast cancers behave differently from other, rapidly proliferating tumors so that shorter and more convenient hypofractionated (HF) schedules are now considered an acceptable and even preferred standard of care in the adjuvant, intact-breast population.

Even in HF schedules, there is also much variability across continents and institutions. All above-mentioned variables may have effects on the desired dose distribution of radiation therapy, postoperative healing, and psychologic recovery of the patient.In recent years, several state-of-the-art radiation delivery techniques has been adopted in many institutions that deliver more concentrated and homogenous doses of radiation with greater precision. Nevertheless, an important analysis is still lackinga systematic comparison of the effects of different radiation delivery techniques on implants, which are present in the irradiated field.

We first demonstrated a dose-response relationship between risk of reconstruction-complications and maximum radiation dose of reconstructed breast (3). As a radiation technique, fractionation schedule, planning, and delivery evolve, number of factors increase the influence of near Dmax on complications.

Based on these hypothesis-generating results, multi-center retrospective study was conducted and successfully validated our findings regarding dose-response relationship (KROG 1804). In patients who received post-mastectomy RT from the KROG 1804 study, smoking, prosthetic reconstruction, shortened timing of RT following mastectomy and prescribed biologically effective dose were identified as risk factors for the development of post-RT major breast complication.

In 2018, we have initiated prospective multi-center observational study (NCT 03523078) to help guide radiation oncologists and breast surgeons to optimize the outcomes in this clinical setting.

References

1. Ho AY, Hu ZI, Mehrara BJ, Wilkins EG. Radiotherapy in the setting of breast reconstruction: types, techniques, and timing. The Lancet Oncology 2017;18:e742-e53.
2. Thomas K, Rahimi A, Spangler A, Anderson J, Garwood D. Radiation practice patterns among United States radiation oncologists for postmastectomy breast reconstruction and oncoplastic breast reduction. Practical Radiation Oncology 2014;4:466-71.
3. Chang JS, Song SY, Oh JH, Lew DH, Roh TS, Kim SY, et al. Influence of Radiation Dose to Reconstructed Breast Following Mastectomy on Complication in Breast Cancer Patients Undergoing Two-Stage Prosthetic Breast Reconstruction. Frontiers in Oncology 2019;9.
4. Chung SY, Chang JS, Shin KH, Kim JH, Park W, Kim H, et al. Impact of radiation dose on complications among women with breast cancer who underwent breast reconstruction and post-mastectomy radiotherapy: A multi-institutional validation study. Breast. 2021 Jan 20;56:7-13.
5. Yang G, Chang JS, Shin KH, Kim JH, Park W, Kim H, Kim K, et al. Post-mastectomy radiation therapy in breast reconstruction: a patterns of care study of the Korean Radiation Oncology Group. Radiat Oncol J. 2020 Dec;38(4):236-243.
6. Song SY, Chang JS, Fan KL, Kim MJ, Chang HP, Lew DH, et al. Hypofractionated Radiotherapy With Volumetric Modulated Arc Therapy Decreases Postoperative Complications in Prosthetic Breast Reconstructions: A Clinicopathologic Study. Front Oncol. 2020 Nov 17;10:577136.

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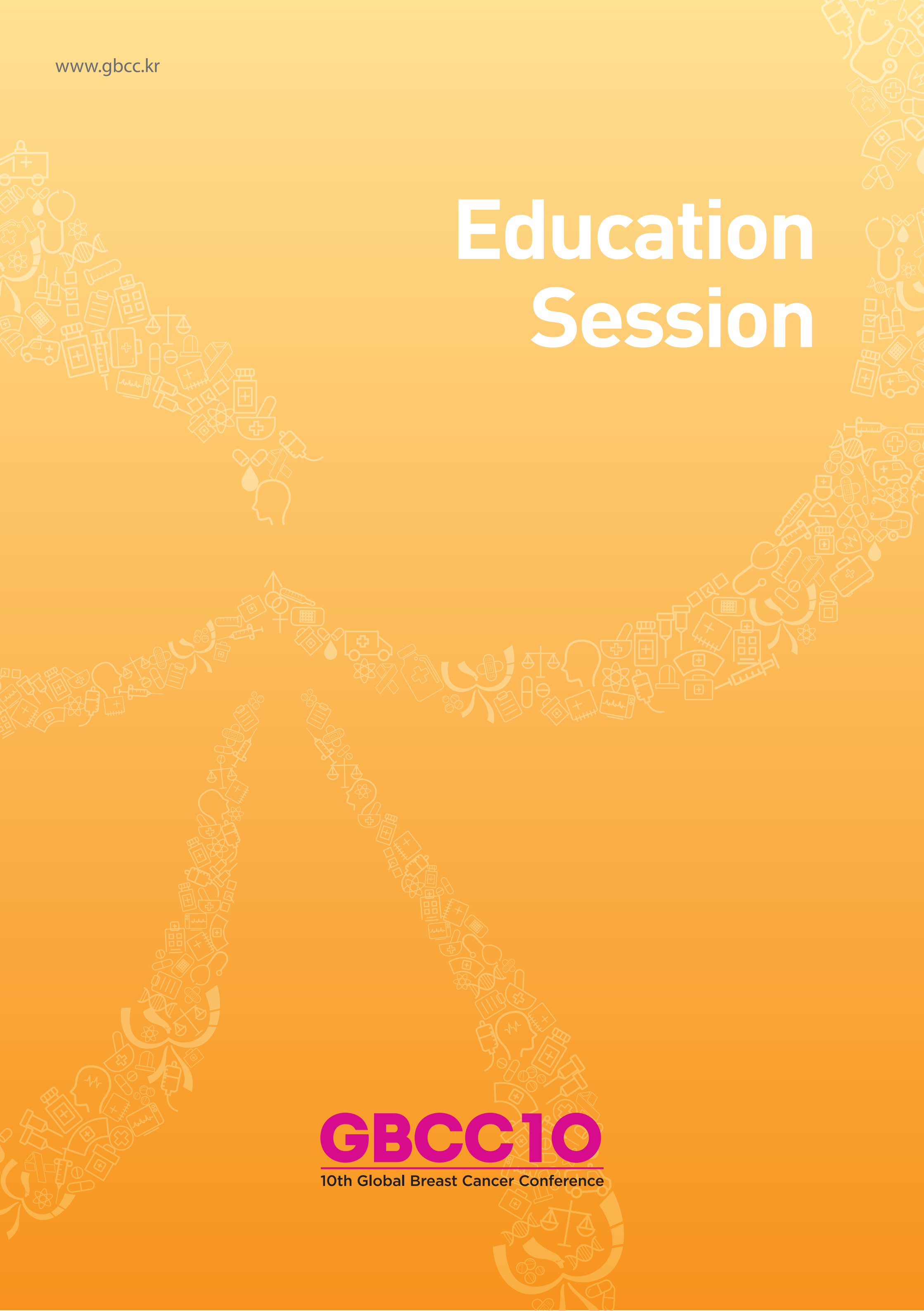

Education Session

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10th Global Breast Cancer Conference

RISK-BASED BREAST CANCER SCREENING
: AGE TO BEGIN AND INTERVAL

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Populationwide breast cancer screening programs have been adopted in many countries using a one-size-fits-all approach to reduce breast cancer mortality. Such screening programs offer routine mammographic screening to women starting at age 40 to 50 years at an interval of 1-3 years. However, the specific age to start screening and interval differs slightly according to each guideline. For instance, although the American College of Radiology, the American Cancer Society and U.S. Preventive Services Task Force (UPSTF) all agree that annual screening mammography saves the most lives when beginning at age 40 years in women with an average risk for breast cancer, they differ in their recommendations.

Although several guidelines recommend enhanced screening at earlier ages to a subset of women at increased risk, primarily based on family history, high penetrance genetic mutations or history of radiation to the chest, the majority of women are recommended to undergo screening in accordance with populationwide breast cancer screening programs, and risk-based breast cancer screening is not commonly adopted. Risk-based breast cancer screening can potentially increase the benefits and decrease the harms of screening, but accurate risk assessment is essential before its implementation. Recently, there has been active research exploring the potential of such risk-based breast cancer screening as an alternative to current populationwide age-based breast cancer screening.

In this talk, current breast cancer screening recommendations of various guidelines will be reviewed, along with recent research regarding risk-based breast cancer screening.

References

1. Siu AL. Screening for Breast Cancer: U.S. Preventive Services Task Force Recommendation Statement. Ann Intern Med. 2016;164:279-296.
2. Lee EH, Park B, Kim N-S, et al. The Korean guideline for breast cancer screening. 2015;58:408-419.
3. Oeffinger KC, Fontham ET, Etzioni R, et al. Breast Cancer Screening for Women at Average Risk: 2015 Guideline Update From the American Cancer Society. Jama. 2015;314:1599-1614.

4. Monticciolo DL, Newell MS, Hendrick RE, et al. Breast Cancer Screening for Average-Risk Women: Recommendations From the ACR Commission on Breast Imaging. J Am Coll Radiol. 2017;14:1137-1143.
5. Monticciolo DL, Newell MS, Moy L, Niell B, Monsees B, Sickles EA. Breast Cancer Screening in Women at Higher-Than-Average Risk: Recommendations From the ACR. J Am Coll Radiol. 2018;15:408-414.
6. Saslow D, Boetes C, Burke W, et al. American Cancer Society guidelines for breast screening with MRI as an adjunct to mammography. CA Cancer J Clin. 2007;57:75-89.
7. Burnside ES, Trentham-Dietz A, Shafer CM, et al. Age-based versus Risk-based Mammography Screening in Women 40-49 Years Old: A Cross-sectional Study. Radiology. 2019;292: 321-328.
8. Price ER, Keedy AW, Gidwaney R, Sickles EA, Joe BN. The Potential Impact of Risk-Based Screening Mammography in Women 40-49 Years Old. AJR Am J Roentgenol. 2015;205: 1360-1364.
9. Mukama T, Kharazmi E, Xing X, et al. Risk-Adapted Starting Age of Screening for Relatives of Patients With Breast Cancer. JAMA Oncol. 2019.
10. Gierach, G. L., et al. (2019). "Toward Risk-Stratified Breast Cancer Screening: Considerations for Changes in Screening Guidelines." JAMA Oncol.

SCREENING MAMMOGRAPHY: RISK AND SAFETY

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Mammography is the only screening test by randomized clinical trials to reduce breast cancer mortality. The results of previous large trials show an average 30% reduction in breast cancer mortality rate. The sensitivity of mammography is approximately 70%, with a specificity of about 90%.

< Age >
To date mammography screening is generally accepted and recommended for women aged 50-69. However, only around 50% of breast cancers occur between ages 50 and 69. Approximately 20% of breast cancers occur before age 50, whereas 30% occur after age 70.

Currently, annual screening starting at age 40 is the recommendation of many professional organizations, including Korean breast cancer society and the American Cancer Society. National breast cancer screening program in Korea recommended biennial screening mammography for asymptomatic women age 40-69. Screening mammography is optional after age 70.

A previous meta-analysis of all data from randomized studies in women age 40-49 reported an average mortality reduction of 17% (Magnus et al. 2011). Women of average risk for breast cancer should begin annual mammographic screening age 40. For women above 40-50 the expected benefit of screening mammography appears to safely exceed the risk. Before age 40, however, sonography should be considered first. The data for women beyond age 70 confirm a high sensitivity of mammography and low false positive rate. However, with increasing age (mainly > 75) the rate of overdiagnosis will increase.

< Parenchymal Density >
The sensitivity ranges form 32% (for dense breast tissue: ACR type C, D) to 98% (for fatty breast, ACR type A). Dense breast composition was correlated with high recall rate, but is was note correlated with cancer detection (J Korean Soc Breast Screening 2017;15:7-14). The recall rate was 10.8% (2,458 abnormal findings in 22,777 cases) in research of Korean National Cancer Center.

Risk

< Radiation Risk >
The glandular tissue of the breast is sensitive to radiation. The radiation dose at the image receptor does not exceed 300μGy for a normal breast image. This dose is very small. Today, the average glandular dose amounts to less 4mGy per breast. The individual dose depends of fur-

ther factors such as breast size, density and breast compression. Today the lowest dosage is achieved using DR mammography, followed by screen-film mammography and CR mammography.

Good compression can markedly reduce the thickness, significantly reducing the required radiation dose. Optimum adjustment of radiation quality is most easily achieved using newer mammography units that automatically select both voltage and target/filter material matched to the type of breast. In the interest of reducing the radiation dose, an effort should be made to avoid repeating images by ensuring optimal technical conditions, continuous quality assurance, and well-trained personnel.

< False-positive >
Virtually no medical test is able to solely and effectively filter out only positive findings. False-positive screening results can cause unnecessary concerns and anxiety to patients. Additional costs may be incurred due to the necessity for further examinations procedures to clarify any such ambiguous findings. The psychological stress of a recall cannot be avoided. Women with high tissue density, for whom the sensitivity of mammography falls to 30 to 40% when no complementary examination procedure is used.

< Interval Carcinoma >
Breast cancer (invasive or in situ) detected after a negative screening examination (including diagnostic work-up, if performed) and before the next regular screening appointment. When mammographic screening is performed, in good-quality assured programs with 2-year intervals, about 20-30% of carcinomas become apparent between two screen examinations (up to 24 months after the examination), usually by manifesting clinical symptoms (interval carcinomas).

To avoid delayed diagnoses in women with interval cancers, all screened women must be adequately informed that mammography is not able to detect all cancers. Interval cancer is a limitation of screening.

< Overdiagnosis >
Overdiagnosis of breast cancer in a screening program describes the fact that in a screened population more breast cancers are detected than in a comparable unscreened population. Overdiagnosis is a side effect of mammography screening.

Safety (including advantages)
Mortality reduction is considered to be the main effect of mammography screening. Another advantage of mammography is to improve therapeutic options, such as reduced rate of axillary dissections, reduced need for chemotherapy, reduction of mastectomy, and better cosmetic results. Even though women should know and are informed by us that a negative mammogram cannot guarantee absence of malignancy in all cases or for the complete subsequent interval, most women are grateful and relieved to receive this information (patient reassurance).

Mammography is highly sensitive in detecting carcinomas containing calcifications.

AI AND THE FUTURE OF BREAST CANCER DETECTION AND RISK PREDICTION

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Innovative methods of risk assessment and image interpretation that leverage the strength of Artificial Intelligence (AI) are essential to propel the goals of precision prevention forward. Since the creation of the Gail model in 1989, risk models have supported risk-adjusted screening and prevention, and their continued evolution has been a central pillar of breast cancer research. Prior research has explored multiple risk factors related to hormonal and genetic information. One factor that has received substantial attention is mammographic breast density. Incorporating mammographic breast density into clinically used models such as the Gail and Tyrer-Cuzick risk models significantly improves prediction and discrimination.

However, current risk models are limited in that they incorporate only a small fraction of data available on any given patient. Using breast density as a proxy for the detailed information embedded in the mammogram is extremely limited, as breast density assessment is subjective, varies widely across radiologists, and restricts the rich information contained in the digital images to a single crude value. Patients of the same age assigned the same density score can have mammogram images that appear drastically different and can have very different future risk profiles. While previous studies have explored automated methods to assess breast density, these efforts reduce the complex data contained in the mammogram into a few statistics, which are not sufficiently rich to distinguish patients who will and will not develop breast cancer.

Deep learning models can operate over full resolution mammogram images to assess a patient's future breast cancer risk. Rather than manually identifying discriminative image patterns, machine learning models can discover these patterns directly from the data. Specifically, models are trained with full resolution mammograms and the outcome of interest, namely whether the patient developed breast cancer within five years from the date of the examination. Our recent work demonstrates that application of novel artificial intelligence applications to imaging data can significantly improve breast cancer risk prediction. In addition, unlike traditional models, our DL model performs equally well across varied races, ages, and family histories and we have built a clinical platform which is currently in use to support implementation of our risk model into clinical care.

The COVID-19 pandemic has revealed severe inequities in healthcare while providing opportunities for essential reform. In breast cancer care, preliminary, conservative estimates predict the disruption of breast cancer screening due to the COVID-19 pandemic will result in a significant upward stage shift of cancers diagnosed and more than 5,000 breast cancer deaths in the U.S. alone.

Due to severely limited healthcare resources during pandemics, and to protect patients and healthcare workers, state governments urge providers to focus cancer screening efforts on those patients at higher risk. These mandates are necessary responses to support fair allocation of scarce resources to maximize benefits for all patients across the full spectrum of healthcare needs. AI-based breast cancer risk models have the potential to support more effective and more equitable mammographic screening for breast cancer during these times of severely restricted access to screening.

AI tools are also available to support more effective image interpretation through improved methods of triage and human reader support.

PERCUTANEOUS INTERVENTION (NEEDED) FOR TARGETED AXILLARY DISSECTION

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Breast cancer metastasizes via lymphatics, rather than via hematogenous spread. Survival of the breast cancer patient is directly related to the nodal stage at diagnosis. Hence, much investigation and interest reside in study of the lymph nodes in breast cancer by all medical disciplines. Historically, surgical removal of the lymph nodes via axillary lymph node dissection was thought to be necessary in breast cancer treatment. In recent years, sentinel node lymph node biopsy has replaced axillary lymph node dissection as the initial surgical approach in early-stage cancers. If the sentinel lymph node biopsy (removal of a few nodes) do not show cancer, then there is no need to proceed to axillary lymph node dissection. Additionally, the results of the ACOSOG Z0011 trial showed that for early-stage cancers that will be additionally treated with adjuvant methods, perhaps the removal of the sentinel nodes are sufficient without proceeding to full surgical axillary lymph node dissection, with the accompanying morbidity to the patient, including lymphedema. The results of the Z011 has significantly impacted the treatment of breast cancer.

But do these results extend to patients who undergo neoadjuvant therapy, prior to the definitive nodal surgery? The ACOSOG Z1071 trial aimed to address this question, and answer was "no", since the false-negative rate of sentinel lymph node biopsy in this setting was 12.6%. Then came another idea. Can there be a "middle-ground procedure", so that surgery less extensive than axillary lymph node dissection is performed, but yet the false-negative rate is acceptably low?

This is the so-called targeted axillary dissection (TAD). Targeted because, along with the sentinel node(s) via the traditional methods (methylene blue and/or radio-isotope), the "clipped node" or the "marked node" is also removed. This clipped node is defined as the biopsy-proven metastatic node in the axilla ipsilateral to the breast cancer, identified through imaging before administration of neoadjuvant therapy. This is usually detected, biopsied, and "clipped" or "marked" by the breast radiologist. At TAD, the surgeon will need to be able to identify this node and surgically excise it. By excising the clipped node in addition to the sentinel node(s), the false negative rate decreases to 2%, which is considered to be acceptable.

In order for TAD to occur, the clipped node must be localized so that it may be excised surgically. There are a number of methods for this to occur, ranging from intraoperative ultrasound to radiofrequency identification (RFID) tags placed into the clipped node via US guidance preoperatively. The current literature focuses on the following methods, which are almost always performed using real-time ultrasound guidance: (hook)wire, I-125 radioactive seed, non-radioactive seed (radar reflector, magnetic seed, RFID). There are also innovative ways to localize the clipped node, such as use of pigments to tattoo the biopsy-proven malignant node, or marking of the skin as in the SMART trial. There are pros and cons to each method. While the newer non-radioactive localizing devices allow the placement of the device many days ahead of the surgery, they are significantly more costly.

Regardless of the method used, important features of an optimal localization method include: 1) safety; 2) cost-effectiveness; 3) efficacy. It is universally agreed upon that a successful TAD program requires multidisciplinary collaboration between the pathologist, radiologist, and surgeon.

When there has been response to neoadjuvant therapy, the clipped node may no longer be well visualized, as the biopsy-proven metastatic node decreases in size and returns to normal morphology. This poses a technical challenge for localization. One method to aid in identification of the clip (when the node is longer seen) is information regarding distance between the skin and the clip. This distance should be noted from the onset, when the biopsy-proven node is readily and easily visible at ultrasound.

At the current time, there is an ongoing trial called the Magellan trial, examining the placement of the magnetic seed into the biopsy-proven malignant node at the beginning of neoadjuvant therapy. This has the potential of overcoming the technical challenges of localization after neoadjuvant therapy when there has been significant response (and the clipped node can no longer be well visualized), and this may potentially reduce the number of interventions needed (and improving the patient experience).

PREOPERATIVE IMAGE-GUIDED BREAST INTERVENTION (WIRE, TATOOING, MARKER)

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Achieving adequate surgical margins with an acceptable cosmetic outcome is very important in breast conserving surgery (BCS). Therefore, a careful preoperative planning with proper localization of the lesion, especially in non-palpable breast lesions, is required for successful BCS.

Wire localization has been used as a standard of percutaneous preoperative localization for decades, but recently nonwire localization methods such as dye injection, carbon marking, radioactive seed, radar reflector, magnetic seed, surgical thread localization, etc.

Usually the imaging modality that best shows lesions is chosen for guiding the localization procedure (mammography, ultrasonography, or MRI).

1. Wire localization

Positioning an introducer needle containing a flexible wire through the non-palpable target under imaging guidance; using freehand technique under US guidance or stereotactic technique under mammography guidance (orthogonal views). After removing the needle, wire is left in the breast as a guide. Post procedure mammography obtained with wire is recommended.

< Advantage >

Relatively simple and inexpensive

Retrievable wires

Visualization of wire in correlation with lesion on mammography.

- for lesions with calcifications
- for lesions that need mammographic correlation (density, architectural distortion

< Disadvantage >

Patient's discomfort -- This technique requires a good compliance from the patient, who has to keep the wire in position all the time long before the surgery.

The patient cannot be discharged with the wire in the breast. must be performed the same day as the breast operation.

Risk of wire displacement, and fracture or transection before or during the surgical procedure

* Surgical thread (retaining thread) localization

Positioning a guiding needle sheath with surgical thread inside. After localization of needle tip, turn the guiding needle one or two full turn, and remove it leaving the surgical thread from the lesion along the needle course and to the outside of skin.

< Advantage >

Simple and easy

Localizations from both vertical and profile direction are possible.

No residual pigmentation on skin

Less patient's discomfort than metallic wire localization

< Disadvantage >

Not visible on mammography

Anchoring failure in case of soft and fragile lesion

When the lesion is fragile, the thread is not fixed within the lesion and pulled to the resistant tissue such as fascia or skin during the surgery.

2. Tattooing localization (Carbon marking)

Injection of sterile charcoal powder diluted with saline solution into the site of a nonpalpable breast lesion. As it was slowly withdrawn from the breast, a trail of carbon was left in the breast parenchyma from the lesion out to the skin. The subsequent surgical excision of the tumor is guided by the presence of the carbon suspension, which is removed with the lesion.

< Advantage >

Simple and easy, No specific preparation and device.

Because of the stability of the charcoal powder, a delayed surgery after the localization procedure is possible.

No risk of displacement.

It allows the most appropriate surgical route to be followed (the shortest distance from skin to the lesion).

< Disadvantage >

Obstruction of needle tip due to precipitation of charcoal particles.

Possibility of residual skin pigmentation

Delayed foreign-body giant-cell reactions mimicking malignancy.

3. Tissue marker insertion

.Type of tissue marker

- Radiopaque clip (titanium or stainless steel)
- Radioactive seed
- Magnetic seed
- Rader reflector clip

Radiopaque clip is the most popular tissue marker after percutaneous biopsy or before neoadjuvant chemotherapy of breast cancer.

* Radiopaque clip - designed to be visible on mammography. Most of metallic clips are also visible on ultrasound and MRI.

< Advantage >
Easy to insert under real-time imaging of ultrasound
good for imaging follow up (mammography, ultrasound, and MRI)
can be placed days prior to surgery
< Disadvantage >
needs additional localization (wire localization or tattooing) before surgery

No single technique has proved to be better among the various ones described for achieving adequate surgical margin. Understanding the advantage of each type localization and possible complications, will guide the appropriate practice and management for breast lesions.

References

1. Mayo RC 3rd, Kalambo MJ, Parikh JR. Preoperative localization of breast lesions: Current techniques. Clin Imaging. 2019 Jul - Aug;56:1-8.
2. Srour MK, Kim S, Amersi F, Giuliano AE, Chung A. Comparison of wire localization, radioactive seed, and Savi scout radar for management of surgical breast disease. Breast J. 2019 Aug 25. doi: 10.1111/tbj.13499. [Epub ahead of print]
3. Park SY, Kim HJ, Kim WH, et al. Feasibility of ultrasound-guided absorbable retaining thread needle localization for nonpalpable breast lesions. Ultrasonography. 2019;38(3):272276.
4. Koo JH, Kim EK, Moon HJ, Yoon JH, Park VY, Kim MJ. Comparison of breast tissue markers for tumor localization in breast cancer patients undergoing neoadjuvant chemotherapy. Ultrasonography. 2019 Oct;38(4):336-344

STRATEGY OF IMAGE-GUIDED INTERVENTION IN THE DIAGNOSIS OF SUSPICIOUS MICROCALCIFICATION

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Breast Microcalcification

Calcifications that are assessed as benign at mammography are typically larger, coarse, round with smooth margins, and more easily seen than malignant calcifications. Calcifications associated with malignancy (and many benign calcifications as well) are usually very small and often require the use of magnification to be seen well. Magnification view evaluates the presence of microcalcification, number, morphology, and distribution. When a specific, typically benign etiology cannot be assigned, a description of calcifications should include their morphology and distribution. The American College of Radiology Breast Imaging Reporting and Data System (ACR BI-RADS) 5th edition subcategorize calcification as typically benign, suspicious morphology and distribution.

- Typically benign: skin, vascular, coarse or popcorn-like, large rod-like, round, rim, dystrophic, milk of calcium, suture
- Suspicious morphology: amorphous, coarse heterogenous, fine pleomorphic, fine linear or fine linear branching
- Distribution: diffuse, regional, grouped, linear, segmental

Amorphous calcifications are so small and/or hazy appearance that a more specific particle shape cannot be determined. Amorphous calcifications in a grouped, linear, or segmental distribution are suspicious and generally warrant biopsy. Coarse heterogenous calcifications are generally between 0.5 mm and 1mm and tend to coalesce. Fine pleomorphic calcifications are usually more conspicuous than amorphous forms and are seen to have discrete shapes. They have a somewhat higher PPV for malignancy (29%) than amorphous or coarse heterogenous calcifications. Fine linear or fine-linear branching calcifications are thin, linear, irregular calcifications which may be discontinuous and branching forms may be seen. They have the highest PPV (70%) and placed in BI-RADS assessment category 4C regardless of their distribution.

Diagnosis of Microcalcification

The histopathological diagnosis is determined for suspicious microcalcifications detected on mammography using a variety of biopsy methods, including stereotactic vacuum assisted biopsy, US-guided core needle biopsy, US-guided vacuum assisted biopsy, or surgical biopsy, depending on the imaging findings and each patients clinical situation. In general, patients prefer sonographically-guided procedures to mammographically-guided procedures, as patients tend to be more comfortable in the supine position, the breast is not compressed, and the procedure is less time-consuming. In addition, no ionizing radiation is used, the needle insertion site is more flexible, and real-time observations can be made. For these reasons, if microcalcifications are detected on US, US-guided core needle biopsy is conducted for the diagnosis. To confirm the calcification, specimen radiography is performed after the biopsy. Stereotactic biopsy is performed primarily on mammographically identified lesions that consist of clustered suspicious microcalcifications. Stereotactic biopsy involves definitively calculating the 3-dimensional location (x, y, z coordinates) of a nonpalpable lesions within the breast and properly deploying a sampling device to obtain pathologic samples from the lesion. Most stereotactic biopsies are performed with vacuum-assisted devices. Lesions only or best visualized on tomosynthesis may now undergo stereotactic biopsy under tomosynthesis guidance. For the calcifications that are only seen on mammography and may not be diagnosed by stereotactic biopsy, surgical biopsy after mammo-guided hook wire localization is considered.

Reference

1. American College of Radiology (2013) ACR BI-RADS atlas: breast imaging reporting and data system. 5th edn. American College of Radiology, Reston, VA
2. Park JM, Yang L, Laroia A, Franken EA Jr, Fajardo LL. Core biopsy of the breast lesions: review of technical problems and solutions: a pictorial review. Can Assoc Radiol J 2011;62(1):73-82.
3. Mahoney MC, Newell MS. Breast intervention: how I do it. Radiology 2013;268(1):12-24.
4. Huang ML, Adrada BE, Candelaria R, et al. Stereotactic breast biopsy: pitfalls and pearls. Tech Vasc Interv Radiol 2014;17(1):32-9.
5. Bae S, Yoon JH, Moon HJ, Kim MJ, Kim EK. Breast microcalcifications: diagnostic outcomes according to image-guided biopsy method. Korean J Radiol 2015;16(5):996-1005.

CLINICAL PROTEOMICS FOR BREAST CANCER

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Proteomics is the large scale of study of proteins, particularly their function and structure. The main theme of interest proteomics it gives a much better understanding of an organism than genomics. Genomics can give a rough estimation of expression of a protein. Most of the proteins function in collaboration with other proteins, and the main goal of proteomics are to identify which proteins interact. After genomics, proteomics is often considered as the advanced step in the study of biological systems. Expression proteomics is used to study the qualitative and quantitative expression of total proteins under two different conditions. Like the normal cell and treated or diseased cell can be compared to understand the protein that is responsible for the stress or diseased state or the protein that is expressed due to disease. Mass spectrometry is an analytical technique that produces spectra of the masses of the atoms or molecules comprising a sample of material. Mass spectrometry (MS)-based proteomics is used for an in-depth quantitative profiling of the proteome of a disease model and its appropriate control systems. The rapid development of high-throughput technologies in the past decade, which is linked to a reduction in their costs, opens up new possibilities to interrogate a biological system at multiple regulatory levels and simultaneously offers us an unprecedented vision.

TRADITIONAL YET IMPORTANT BIOMARKERS IN BREAST CANCER: ER, PR, HER2 AND KI-67

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It might sound odd, and considered obsolete, to address the role of traditional biomarkers of breast cancer (hormone receptor and HER2 status, Ki67 labelling index) in this exciting era of molecular assays. Still, in the daily clinical practice and in the clinical studies, we use these markers to identify the relevant subtypes (i.e: luminal, Her-2 positive and triple-negative) of breast cancer, and to inform the choice of systemic interventions. Certainly, predicting the response of patients with breast cancer to the different therapeutic options remains one of the most challenging tasks for translational and clinical researchers. Traditional markers play a major role in the selection of candidate patients to systemic interventions, but they are of limited value in predicting the actual response of the patients to different treatments, especially when these markers are evaluated individually. The predictive value of the traditional markers, however, may be magnified when used in combination, so to offer a more comprehensive assessment of the biological features of the tumour cells.

The currently available molecular assays, based on gene expression profiling, complement the information provided by established markers. A hierarchical approach that includes clinical (age and menopausal status) and pathological features (tumour grade and stage), traditional biomarker evaluation and the use of molecular assays -whenever appropriate- will eventually lead to a more personalized and more effective treatment of patients with breast cancer.

This multimodality approach, however, requires the most accurate assessment of all the traditional biomarkers in a reproducible and timely manner. Guideline recommendations for optimal testing have been issued and maintained updated by the ASCO/CAP (for hormone receptors and HER2) and the International Ki67 in Breast Cancer Working Group for Ki67, and pathologists should strictly follow these recommendations to avoid as much as possible false-negative or false-positive results.

The accurate assessment of these biomarkers is also an essential pre-requisite for the optimal use of the multigene molecular assays. Indeed, these more sophisticated assays are of particular value in deciding whether or not to offer chemotherapy -in addition to hormone therapy- to patients with luminal tumours. It is therefore of paramount importance that the candidate patients are precisely identified by an accurate evaluation of hormone receptor and HER2 status.

Furthermore, in some Countries, use (and reimbursement) of the molecular assays is restricted to patients with luminal breast cancer of intermediate risk of recurrence, based on clinico-pathological and biological features, including estrogen receptor (ER) and Ki67 status, whereas patients with low-risk tumours are offered endocrine therapy only, and those with high-risk tumours receive chemotherapy in addition to endocrine therapy. This implies that traditional biomarkers should ensure the proper identification not only of patients with luminal breast cancer, but also of those with intermediate risk of recurrence, who would benefit most from the use of molecular tests.

CLINICAL MOLECULAR TESTING FOR BREAST CANCER MANAGEMENT

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The landscape of molecular testing for breast cancer has dramatically changed over the past decade. Testing for somatic genomic mutations, e.g. PIK3CA mutations, now allows health care providers to select the drug most likely to produce a response. Germline genomic testing helps to identify familial risks for the development of cancer. However, universal screening for both somatic and germline mutations is not recommended. We need to consider who should be tested, the timing of the genomic testing based on disease progression, basic molecular subtypes of the tumor (e.g., HER2, ER status), and the hereditary risk.

Other types of molecular testing for breast cancer include multi-gene genomic tests, which are used mainly to analyze early-stage, hormone-receptorpositive, HER2-negative breast cancer. These tests can predict the risk of recurrence usually within 5 to 10 years after diagnosis so that we can determine the need for chemotherapy or hormonal therapy. Furthermore, the recent introduction of immunotherapy has resulted in the testing of PD-L1 expression in breast tumors to determine whether immune checkpoint inhibitors should be used for TNBC.

The talk will summarize the controversy and development of new markers related to immunotherapy selection. I will also talk about molecular subtyping of triple-negative breast cancer to illustrate the heterogeneity of the disease.

In summary, understanding the importance of clinically relevant molecular testing will improve the quality of care for patients with both early and advanced breast cancer. The learning objective of this talk is to identify the optimal use of molecular testing in a real-world treatment scenario for breast cancer.

MANAGEMENT OF CLIMACTERIC SYMPTOMS FROM HORMONE TREATMENT

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The management of breast cancer has improved drastically over the past decade resulting in better outcomes and prognosis. However therapeutic treatment commonly used including hormonal therapy is not without a cost and can result in menopausal symptoms which are often more severe, frequent and of a greater duration compared with natural menopause. Symptoms associated with estrogen depletion-sleep disorders includes, vulvovaginal atrophy (VVA), vasomotor symptoms (VMS), mood changes, depressive symptoms, cardiovascular disease, osteopenia, and osteoporosis.

There have been a number of randomized controlled clinical trials, observational studies, evidence-based guidelines, and expert opinion from professional societies reviewing the various management options for menopausal symptoms in women after breast cancer. Treatment of vasomotor symptoms would include non-hormonal treatment such as antidepressants, selective serotonin/noradrenaline reuptake inhibitors and gabapentenoid agents, vitamin, herbal treatments; and hormonal treatments including oral and vaginal topical options. Low-dose vaginal estrogen is absorbed in small amounts with blood levels remaining within the normal postmenopausal range but could potentially stimulate occult breast cancer cells, and although poorly studied, is not generally advised for those on aromatase inhibitors as safety after breast cancer has not been established.

Apart from Vasomotor symptoms, urogenital atrophy, osteoporosis, sexual dysfunction and bone pain are also common symptoms that needs to be addressed. A review of the various forms of treatment available will be presented. Clinicians should be made aware of the frequency of such symptoms and provide individualization of treatment.

ASSESSMENT AND MANAGEMENT OF ACUTE TOXICITY OF CHEMOTHERAPY

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Chemotherapy is a major treatment modality for patients with metastatic breast cancer. Adjuvant chemotherapy results in an improvement in both disease-free and overall survival and is routinely administered for women with early-stage breast cancer. Although the acute toxicities must be considered when assessing the relative risk-benefit ratio of adjuvant chemotherapy, in general, the survival benefit gained exceeds the negative impact of side effects on quality of life (QOL) in both premenopausal and postmenopausal women.

However, chemotherapy is associated with both acute and long-term complications for the breast cancer patients. Acute chemotherapy toxicity can have negative effects for the patient and the health economy.

Taxanes such as paclitaxel are associated with both a motor and sensory neuropathy that is dose- and schedule-dependent and cumulative. Taxanes are also associated with pneumonitis in a minority of cases, as well as dose-related myalgias and arthralgias.

In the acute setting, anthracycline-containing regimens are associated with higher frequency of emesis relative to non-anthracycline-containing regimens. A small number of patients may experience acute cardiotoxicity.

Nausea, vomiting, stomatitis (mucositis), and bone marrow suppression are acute and reversible side effects of systemic chemotherapy. The agents most commonly used in adjuvant therapy for breast cancer are associated with a high frequency of alopecia. Hair loss is typically transient, and regrowth typically occurs after cessation of therapy, although reduced density may be observed.

Moderate to severe fatigue is a common complaint during adjuvant chemotherapy; contributory factors include anemia, vasomotor symptoms, and depression.

Use of patient reported outcomes (PROs) in routine care has been demonstrated to improve the identification of symptoms, ability to monitor symptoms over time and quality of life. Emerging results suggest routine use of PROs decrease health service use (like emergency room visits) and improve overall survival.

DETECTION AND MANAGEMENT OF LONG-TERM TOXICITY OF SYSTEMIC TREATMENT: CARDIAC TOXICITY, IMMUNOTHERAPY-INDUCED ENDOCRINOPATHY, ETC.

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The long-term toxicity can be caused by chemotherapy, target therapy and immunotherapy. In this section, we discuss about chemotherapy (anthracycline) related cardiotoxicity, anti-Her2 therapy related cardiotoxicity and immunotherapy related toxicity.

Anthracycline based adjuvant chemotherapy can improve the survival in patients with early breast cancer. However, anthracycline can induce cardiotoxicities as three types: acute, early-onset chronic, and late-onset chronic. The overall incidence of cardiotoxicity is about 9%, and the cardiac function of a part of these patients can recovery. Most cardiotoxicity after anthracycline-containing therapy occurs within the first year and is associated with anthracycline dose and LVEF at the end of treatment. Early detection and prompt therapy of cardiotoxicity appear crucial for substantial recovery of cardiac function. Patients who develop LV dysfunction or heart failure (HF) during cancer therapy may have a better cardiac outcome when treated with ACE inhibitors or angiotensin II receptor blockers and beta-blocker, similar to the general HF population.

Patients with Her2-expressed breast cancer have a poor prognosis; anti-Her2 therapy, including trastuzuamb, pertuzumab, TD-M1 and lapatinib, improves their survival. Cardiac adverse events such as decreased ejection fraction and heart failure have been of particular concern in patients with HER2+breast cancer. Regular cardiac monitoring, dose modification or cessation of anti-Her2 therapies, and pharmacologic treatment of early cardiotoxicity will contribute to improved cardiac outcomes in patients with anti-HER2 therapy.

Immune checkpoint blockade therapy improve the survival in a variety of malignancies. Atezolizumab plus nab-paclitaxel prolonged progression-free survival (PFS) among patients with PD-L1(+) metastatic TNBC. Adding pembrolizumab with chemotherapy was demonstrated better response rate in the neoadjuvant setting for patients with early stage TNBC. However, Immune checkpoint blockade therapy may generate immune-related adverse events (irAEs), including skin toxicity, hepatitis, endocrinopathy, gastrointestinal toxicity and pneumonitis. irAEs may be delayed onset and prolonged duration compared to adverse effects from chemotherapy. The main treatment for irAE consists of immunosuppression with corticosteroids or other immunosuppressant agents such as infliximab; most irAE can resolve after appropriate management.

DE-ESCALATION OF BREAST SURGERY

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With current advances in neoadjuvant systemic therapy (NST) and improved breast imaging, the potential of nonoperative therapy for invasive breast cancer has emerged as a viable option when utilizing meticulous image-guided percutaneous biopsy to document pathologic complete response. Feasibility clinical trials utilizing this approach are being performed by teams of investigators from single and multicenter/cooperative groups around the world. Imaging alone after NST lacks sufficient sensitivity and specificity in predicting pCR and therefore cannot be utilized for clinical selection of patients for omission of surgery. Imaging with adequate sampling after NST of the residual lesions (or around the remaining clip if a complete radiologic response occurs) appears to be essential in selecting patients with pCR to lower the false-negative rates based on initial reported feasibility studies to identify pCR without surgery that range from 5 to 49%. In this presentation, recently completed, ongoing, and planned clinical feasibility trials and a new omission of surgery trial are described. Drastic rethinking of all diagnostic and therapeutic management strategies that are ordinarily utilized for patients who receive standard breast cancer surgery is required. A roadmap of essential questions and issues that will have to be resolved as the field of nonoperative breast cancer management advances is described in detail.

INDIVIDUALIZED MANAGEMENT OF THE AXILLA

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Over recent decades, the individualized surgical management of breast cancer has become widely accepted. For the breast various types of mastectomy with a range of reconstruction options, conservation as an alternative to mastectomy and oncoplastic techniques to maximize cosmetic outcome are now widely practiced. The increasing use of neoadjuvant therapy has also impacted surgery leading to a reduced extent of surgery to the breast, although recent reports of no breast surgery trials have proven to be disappointing. Management of the axilla has lagged behind advances in breast surgery.

However, axillary lymph node dissection (ALND) as standard of care has given way to axillary node sampling and subsequently targeted axillary node sampling using a range of agents. The paradigm that ALND is required for one or two positive nodes has been successfully challenged with the evidence that modern radiation therapy to the nodal basins may be as effective oncologically as ALND but with reduced morbidity, particularly less lymphedema. Suggestions that patients with a low axillary node burden may not need further locoregional treatment in the era of modern systemic therapy have been made from the ACOSOG Z011 trial, with the UK ANZ POSNOC trial poised to definitively address the issue for mastectomy, breast conservation and macrometastases, not just micrometastases in breast conservation. In the neoadjuvant setting, the timing of node sampling has been addressed with targeted axillary dissection post neoadjuvant therapy gaining favor as an option following excellent response to neoadjuvant therapy, particularly for HER2 positive or triple negative breast cancer. Conversely, for women with low risk hormone receptor positive breast cancer, clinical trials seek to confirm case series with long follow up that no axillary surgery is needed for a clinically negative axilla.

Further methods for axillary node sampling continue to emerge, with the timing and type of node identification, particularly in the neoadjuvant setting, under scrutiny. Refinements in when, how and even if to manage the axilla surgically in the setting of early breast cancer look set to remain challenging for some time to come.

DILEMMA OF LOCAL THERAPY FOR METASTATIC BREAST CANCER

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USEFULNESS OF COMPREHENSIVE GERIATRIC ASSESSMENT

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Older age is one of the risk factor for breast cancer surgery. In the United States, almost half of new breast cancer cases are diagnosed in women who are older than 65. But older patients are underrepresented in clinical trials and chronological age itself do not give much information to the provider as there is a huge heterogeneity even among older patient with the same age. A healthy 70 year old women who are engaged in daily physical activity should expect about 20 years of life expectancy, so she would need to receive the standard of care treatment, while 67 year old woman who are dependent on basic activities of daily living should have a different approach. Typical eye ball test would be difficult to identify the seemingly frail older person who would benefit from and tolerate standard therapy, as well as the seemingly fit older person who would experience side effects and require modified treatment options. A comprehensive geriatric assessment would be able to help providers to have the insight on the balance between the potential benefits and side effects of therapy.

Comprehensive geriatric assessment is composed of cognitive assessment, functional assessment, medication review, nutritional assessment, psychosocial assessment and review of comorbidities. Cognitive assessment is important as we need to ensure that patient can follow instructions on medications and report any clinical changes. Impaired functional status is associated with an increased risk of mortality from surgery and toxicity due to chemotherapy. Medication review would be able to decrease the burden of polypharmacy among cancer patient, as older patients are prone to have harms from adverse medication effects, nonadherence or medication interactions. Nutritional status is an important prognostic factor. Especially weight trend is a valuable clinical tool to assess patients outcome. Social support is crucial for cancer survivors. Depression would increase risk of subsequent functional decline. As an individual ages, the number of comorbidity increases and comorbidity and life expectancy should be considered when we estimate the risks and benefits of treatment.

The information from a comprehensive geriatric assessment can be used to anticipate and manage toxicity from treatment, predict survival, uncover unexpected health problems, improve mental health and wellbeing, and improve pain control.

OPTIMAL MANAGEMENT OF EARLY STAGE GERIATRIC PATIENTS: COST VS. BENEFIT

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Asia is an aging society with 14% of the population expected to belong to the elderly age group by 2035. Due to the dropping birth rate, our society is facing the declining working-age population. In Japan, working-age population had started declining in 2000. It is estimated to take 24 years for Japan and 18 years for Korea to transition from an aging society to an aged society, while 115 years for France and 47 years for UK. We entered from the era of population bonus (the status where the ratio of working-age population increase exceeds the rate of total population expansion) to the era of population onus (the status where the ratio of working-age population dramatically drops and simultaneously population of aged people largely expands). As a medical society, we are urgently required to consider future medical costs.

Although the peak age of incidence for breast cancer is relatively younger compared with western countries, it is gradually shifting towards an older peak age, and incidence of cancer is increasing with age. While breast cancer incidence has been increasing in all age groups, the annual increase rate tends to be higher in the older age group (＞50 years) at 2% compared to 0.8% in the youngest age group (＜50 years). Mortality rate was observed to decline more in the youngest group at 2.5% on average annually, and smallest decline was seen in the older age group (＞70 years) at 0%. The difference could be related from tumor biology itself and/or comorbidity. However, early detection by cancer screening program in the age group targeted by screening (50-69 years) clearly contribute to this difference. Furthermore, the improvements of treatments have a major impact on outcome. Therefore, discussion is necessary to determine up to what age breast cancer screening should be offered and what degree of treatment should be given for the elderly population who are diagnosed with breast cancer. A concerted effort is needed in optimal management of early stage elderly patients with the balance of Cost vs. Benefit.

SPECIAL ASPECTS OF MANAGEMENT OF OLDER PATIENTS WITH MBC

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With increasing incidence of breast cancer and longer life expectancy, more patients are being diagnosed with breast cancer at older age. There are very limited data on how best to manage older patients with metastatic breast cancer (MBC), due to under-representation of older patients in clinical trials.

Life expectancy, biologic and functional age of the patient, patient's goal and preference, and extent and biology of cancer itself, are key factors to consider before deciding how to manage metastatic breast cancer in older patients. Most guidelines recommend performing geriatric assessment, in order to correctly assess patients' biological age, functional status and address age-specific problems of the elderly, leading to early interventions. Goal of therapy should also be individualized to maintain the quality of life, function, and independence of older patients with cancer.

Although older patients have more indolent disease with more HR positive disease and less HER2 positive disease, disease-specific mortality remains lower than younger patients, owing to late diagnosis, under treatment due to age bias, less access to healthcare, and socioeconomic issues. Older patients with advanced breast cancer should be treated based on their biological tumor type. Endocrine treatment plus CDK 4/6 inhibitors are the standard treatment for HR-positive, HER2 negative disease, and older patients derive similar progression-free survival benefit albeit higher incidence of myelosuppression. For HER2 positive MBC, HER2 targeted agent with chemotherapy or endocrine therapy or HER2 targeted agent alone, should be considered according to the patient's general health status and preferences. Many older patients have cardiovascular comorbidity and risk of greater toxicity from therapy therefore serial cardiac function should be carefully evaluated. Chemotherapy should be considered for patients who are HR negative, HR-positive but refractory to endocrine treatment or patients with rapidly progressing visceral crisis. Generally, sequential chemotherapy with single-agent is recommended over combination chemotherapy.

Many chemotherapy toxicities are more common and more severe in older patients and older patients may suffer more functional decline and delayed recovery from the same grade of toxicities than younger patients. Prediction, prevention, and preemptive management of chemotherapy toxicities are warranted using pretreatment geriatric assessment and toxicity prediction tools such as CARG and CRASH score. In older patients, comorbidities and polypharmacy may affect response and adverse events to targeted therapy therefore management of comorbidities and avoidance of potentially inappropriate medications, and checking for drug interaction are mandatory before starting targeted therapy for older patients with cancer.

Older patients have unique characteristics that need special consideration in the management. Nevertheless, advanced age alone should not be the only reason to preclude effective cancer treatment. Treatment should be individualized based on the biology of the disease, the physiologic status of the patient, and the patient's preferences.

BASICS OF HEREDITARY BREAST CANCER

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Genetic predisposition is an important risk factor for breast cancer, accounting for 5% to 10% of all breast cancer cases. Sporadic breast cancer with no family history accounts for 75-85% of breast cancer, and familial breast cancer caused by exposure to the same environment and risk factors accounts for 10-15% of total breast cancer. Clinically hereditary breast cancer has an early onset compared with that of sporadic breast cancer, and they are characterized by bilateral breast cancer and multiple cancers. Most of them are autosomal dominant.

BRCA1 and BRCA2 genes are the most common cause of hereditary breast cancer. Since BRCA1 and BRCA2 have been identified in 1994 and 1995, respectively, studies have been undertaken on biochemical experimental techniques to identify the function of BRCA1/2 and related proteins in the biochemical domain and to detect such mutations. Scientists tried to figure out the function of each mutation and its relationship to disease. Epidemiologists researched prevalence of genetic mutation in each ethnic group, identified new problematic genetic loci, increasing the risk of disease. They expanded area of study into gene-gene interactions and gene-environment interactions.

The breast cancer predisposition factors identified to date can be stratified by risk profile into three levels. High-Penetrance breast cancer predisposition genes confer a greater than tenfold relative risk of breast cancer. At the present time, five high-penetrance genes (BRCA1, BRCA2, TP53, PTEN, and LKB1) have been discovered. Four intermediate-penetrance genes (ATM, BRIP1, CHEK2, and PALB2) have been discovered. Mutations in these genes are rare and confer a relative risk of breast cancer of 2 to 4. There is currently strong evidence for the association with breast cancer of various low-penetrance loci (rs3803662, rs889312, rs3817198, and rs13281615), which each confer a relative risk of breast cancer of < 1.5.

In the clinical field, there are BRCA1/2, TP53, and PTEN genes that need to be noted in the medical setting environment because they are frequently found and/or have high penetration rates, and the main medical guidelines involving hereditary breast and ovary cancer syndrome target these genes. Clinical researchers are studying appropriate management, treatment, and prophylactic interventions in carrier and genetic alteration in mostly BRCA1/2 associated breast ovarian cancer patients.

In this presentation, basic knowledge of hereditary breast cancer would be reviewed briefly.

PREVENTIVE OPTIONS IN WOMEN WITH GERMLINE MUTATIONS PREDISPOSING FOR BREAST CANCER

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Healthy women with deleterious mutations in BRCA1/2 are at a singularly high risk to develop breast cancer: the cumulative breast cancer risk to age 80 is approximately 70%. Women with a previous diagnosis of breast cancer remain at high risk for contralateral breast cancer. The cumulative risk 20 years after the first diagnosis is between 26-40% (Kuchenbaeker et al, Jama 2017).

This lecture will briefly discuss options of breast conservation in a highly select women and then focus on a) skin sparing types of mastectomies and b) methods of primary reconstruction.

We and others have studied residual parenchyma after risk reducing surgery. Our recent study (SKINI trial, Papassotiropoulos et al, Annals of Surg.Oncol 2019) analyses causes and risk factors. Furthermore, there are stark long-term differences in reconstruction methods that use autologous tissue versus those that use prosthetic reconstruction.

TREATMENT OPTIONS IN BRCA 1/2 BREAST CANCER PATIENTS

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The field of germline genetic testing for breast cancer (BC) risk has evolved substantially in the last decade. Since advances in next-generation sequencing technology, reduction in testing costs, and increased public awareness have led to a growing demand for genetic services.

1) BRCA testing to all BC patients

The National Comprehensive Cancer Network (NCCN), U.S. Preventative Services Task Force, National Institute for Health and Care Excellence, and several other professional organizations recommend genetic risk evaluation for patients who are at high risk for harboring a pathogenic mutation in one of the BC predisposition genes. These organizations have developed criteria based on personal and family history and age of onset of cancer to identify patients at high risk. Several risk-assessment models are also available to help identify patients at risk for carrying a pathogenic mutation. However, the majority of these guidelines and models are primarily based on the probability of carrying pathogenic mutations in BRCA1/2. Thus, the sensitivity of these criteria for identification of pathogenic mutations in other high- or moderate-risk genes may be limited. Recent studies suggest that up to 50% of women with germline predisposing mutations do not qualify for testing based on current testing criteria (1). In response to these limitations, In addition, family historybased criteria have limited applicability in patients who are adopted, have limited family structure, or are not aware of the cancer history in the family. The American Society of Breast Surgeons recently updated their guidelines to suggest that all patients with BC should receive genetic testing, regardless of age at onset of disease or the extent of family history Although the logistical challenges of testing all patients with BC, including insurance coverage, are not clear at this time, it is evident that testing criteria will continue to be modified to include a greater proportion of possible mutation carriers.

2) Population-based testing for hereditary BC

Although population-based testing for hereditary BC risk is not yet ready for clinical practice, it may become a reality in the future for select groups, such as Ashkenazi Jews, as studies evaluating population-based mutation screening provide information on the feasibility of population testing, improved yield, and cost effectiveness. Until that happens, clinicians should understand that genetic risk evaluation is not a one-time event but an ongoing assessment, because guidelines for testing are frequently updated and the personal and family history of patients may change.

3) Selection of genetic tests for assessment of breast cancer risk

For many years, sequential single-gene testing was the standard approach to genetic testing. In 2013, the landmark U.S. Supreme Court decision against gene patenting led to the introduction of competition and reduction in prices for BRCA1/2 testing. Clinical genetic testing laboratories subsequently took the more-is-better approach and introduced MGPT at prices equivalent to BRCA1/2 testing. Although the ability to identify additional patients at increased risk for BC was lauded, there was also some criticism of this approach because of unclear clinical utility of the genes included in the panels, poor understanding of mutation penetrance, and high rates of variants of uncertain significance (VUS). In the past few years, MGPT has gained more acceptance as understanding of the yield of MGPT and the risk for BC associated with mutations in several genes included in panels has improved.

4) Polygenic Risk Scores for Risk Assessment

The introduction of MGPT led to an urgent need to understand the cancer risk associated with several genes included in the panels. Although the research on understanding the cancer risk associated with mutations in several genes continues, there is also a need to understand the modifying effects of race and ethnicity, family history, and BC pathology on the prevalence of germline mutations and associated BC risk. Furthermore, polygenic risk scores (PRSs) to predict BC risk in patients with or without germline mutations in cancer-predisposition genes are now available for clinical use, although data on the clinical utility of PRSs are lacking.

5) Direct-to-consumer (DTC) genetic test

On average, approximately ten new genetic testing products enter the market every day. In April 2017, the FDA began granting approval of the first direct-to-consumer tests that provide genetic risk information for certain conditions, and in October 2018, 23andMe received authorization to offer reports to customers on pharmacogenetics.

6) Implications of positive results for BC management

In patients with advanced BC associated with BRCA1/2 mutation, olaparib and talazoparib are now approved for treatment. In addition, molecular profiling studies are being used to clarify the BC tumor biology in mutation carriers to identify potential therapeutic options.

HOW TO HANDLE ISSUES ON FERTILITY PRESERVATION AND PREGNANCY

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Breast cancer (BC) is the most common female malignancy: overall, about 15% of women are diagnosed during their reproductive years. In Europe, approximately 1 in 200 women under the age of 40 is faced with a diagnosis of BC.

In the last decades women tended to delay childbearing for different (i.e. cultural, educational, professional) reasons: consequently, in an increasing number of patients, BC occurs before the completion of their reproductive plans.

Consequently, fertility and family planning are extraordinarily important issues for this younger patient population and the few surveys conducted in patients facing BC at young age report that infertility concerns often influence treatment decisions. The reported baseline results of the Helping Ourselves, Helping Others (HOHO), the Young Womens Breast Cancer Study, a prospective cohort study conducted in selected European Institutions, showed 67% of patients discussed fertility issues before starting therapy, 64% were concerned about becoming infertile after treatment, and 15% decided not to follow prescribed therapies because of fertility concerns.

The best retrospective evidence suggests that pregnancy after BC does not increase a womans risk of recurrence, and it may even confer a protective effect but no definitive data, based on prospective and systematic evaluation, is available. Overall, the number of women who become pregnant after BC is extremely low (less than 10%). Given the amount of uncertainty, patient preferences regarding their future fertility should be part of the discussion as they make their treatment decisions both at diagnosis and in follow-up.

Clinical research on this age group is particularly difficult. The POSITIVE study, evaluating Pregnancy, disease Outcome and Safety of Interrupting endocrine Therapy for premenopausal women with endocrine responsIVE breast cancer who desire pregnancy, has recently closed accrual and will provide prospective evidence on the risk of BC relapse associated with temporary interruption of ET to permit pregnancy. POSITIVE will also investigate pregnancy success rate and offspring outcome as well as the biology of BC in young women.

MULTIDISCIPLINARY COUNSELING FOR VERY YOUNG PATIENTS UPON DIAGNOSIS

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Despite the fact that breast cancer survival has improved dramatically, a less favorable outcomes has historically been reported in younger women with breast cancer. In the landmark 1986 report of Adami et al, women under 45 years of age had poor relative survival and higher annual hazard of recurrence in early periods compared with women diagnosed ages 45-49. Since that time, hormonal, cytotoxic and targeted therapies have improved survival for women with breast cancer. However, more recent data, patients age <40 continued to have significantly inferior overall and breast cancer specific survival compared to middle aged women especially hormone receptor positive (HR), HER2 negative breast cancer.

Very young women can have more large tumor and aggressive phenotype, there are more chance to receive chemotherapy compared with other aged women. SOFT, TEXT and ASTRRA studies showed improved survival in young women with HR positive, HER2 negative breast cancer by adding ovarian function suppression especially who are very young and/or has high risk tumor. Age, regimen and duration of chemotherapy are predictive factors of ovarian function restoration after chemotherapy. Therefore, individualized ovarian function restoration considering patient`s age, type and duration of chemotherapy should be taken into account not only oncologic plan but also for oncofertility and/or survivorship after modern chemotherapy regimen. Oncoferility includes what to expect in terms of fertility preservation and also ovarian function preservation.

Surgical treatment options including bilateral mastectomy, oncoplastic surgery and types of reconstructions need to be discussed with surgical oncologist and young women with breast cancer. Recently increased use of neoadjuvant chemotherapy and improved response of systemic treatment increase candidate of breast conserving surgery, however, rates of breast conserving surgery are decreasing in some countries.

Parenting for young children for very young women with breast cancer is complex and difficult issues. Long term medical complication including bone health, dermatologic issue such as hair loss, urologic difficulty and cardiovascular complications should be addressed and monitored.

Personalized integrated treatment in terms of biological, social and long term medical complication are warranted in young women with breast cancer, and we need to establish system for multidisciplinary approach for this.

TREATMENT STRATEGIES FOR PREGNANT BREAST CANCER PATIENTS

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The diagnosis of breast cancer during pregnancy represents a very challenging situation for the patient, her family and the treating physician. Pregnancy adds complexity to oncological treatment planning, considering that many anticancer therapies can be potentially dangerous to the fetus. Hence, a multidisciplinary approach with oncologists, gynecologists, obstetricians and neonatologists is needed to obtain both a correct care of this complex situation as well as the best possible outcomes for the mother and the future child. On this regard, a proper understanding of the safety of systemic treatment administration during pregnancy is a crucial step to avoid detrimental consequences to the mother and the fetus.

The administration of most of the chemotherapy agents used in the field of breast cancer is considered safe and not contraindicated during the second and third trimesters. On the contrary, chemotherapy use is highly contraindicated in the first trimester due to a significant risk of fetal malformations. Most of the safety data for chemotherapy use during pregnancy are available for anthracyclines. More recently, a growing amount of evidence suggests the potential safety of using taxanes; hence, these drugs can be administered during pregnancy when clinically warranted or indicated.

Both endocrine therapy and targeted agents are not recommended during any trimester of pregnancy and should be postponed after delivery. Nevertheless, evidence is limited on the safety of administering during pregnancy new anticancer drugs including both small molecules and biological agents (e.g. CDK 4/6 inhibitors and pertuzumab). Notably, similarly to chemotherapy, small molecules like tyrosine kinase inhibitors can cross the placenta throughout the pregnancy period. On the contrary, biological agents like monoclonal antibodies are large molecules requiring active transport via the placenta for reaching the fetus: this is not active before week 14th of gestation. Hence, it can be speculated that accidental short-term first-trimester exposure to monoclonal antibodies should not be of particular concern (e.g. no cases of fetal malformations with short accidental exposure to trastuzumab in the first trimester have been reported so far). The use of targeted agents is also contraindicated due to their on target effects (e.g. oligohydramnios for anti-HER2 agents like trastuzumab).

Pregnancies in cancer patients should be considered as high risk and monitored more closely than those in the general population not exposed to anticancer treatments. After the initiation of systemic therapies, regular fetal monitoring is highly recommended. Moreover, it is very important to prolong into adulthood the follow-up of the health of individuals with prior in utero exposure to chemotherapy to exclude the possible occurrence of long-term adverse effects.

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UP-TO-DATE KNOWLEDGE OF COVID-19

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The coronavirus disease 2019 (COVID-19) outbreak, which was first detected in December 2019 in Wuhan, Hubei Province, China, has quickly spread throughout countries worldwide. As of February 23, 2021, more than 111,000,000 people worldwide have been infected with the novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

Clinical course of COVID-19 is phenotypically diverse. While many people have only mild symptoms but actively transmit the virus, some others display severe symptoms with development of respiratory failure. Subgroups of patients with COVID-19 have been identified who appear to be at increased risk of morbidity and mortality. Cancer patients are traditionally considered at high risk for complicated respiratory viral infections, due to their underlying immunosuppression. However, not all cancer patients are similarly at risk for a complicated COVID-19 course. There have been contradictory reports on the outcome of COVID-19, which would be largely attributed to the multiple confounders operating in this highly heterogeneous patient population, rather than the cancer or its treatment per se.

Recently several clinical trials evaluated potential SARS-CoV-2 vaccines at the record-breaking pace, which will hopefully mitigate the effects of the pandemic on our community. Given that patients with cancer are not included in many of these trials, how they will ultimately respond to such preventive measures remains largely unknown.

Although we are now drowning in the growing torrent of new scientific papers about SARS-CoV-2 as well as COVID-19, numerous uncertainties remain in our understanding of COVID-19. Based on the evidence to be discovered till now, I would like to introduce up-to-date information about COVID-19 concisely.

BEFORE AND AFTER THE OUTBREAK OF COVID-19 IN THE DIAGNOSIS OF BREAST CANCER

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Since the COVID-19 pandemic began in early 2020, there have been many reports that it has had a significant impact on screening, case identification and referral in cancer diagnosis. What will happen to patients that cannot undergo screening or diagnosis due to the outbreak? How will many patients with breast cancer be diagnosed with more advanced conditions? Tang presented in SABCS that without screening mammography between March and May 2020, new diagnoses were reduced by 64 percent, many newly diagnosed patients presented with advanced and aggressive breast cancers. Tumor doubling times are not constant. Studies estimating the mean of tumor doubling times varied from 45 to 260 days, and this very inaccurate measuring is unhelpful in determining the effect of screening delays on breast cancer survival. It is safe to estimate that, in 6 months, up to 50 percent of breast cancer cases could exhibit growth of more than the size of a centimeter. Some studies reported delay of 2 or 3 months was not affect survival outcomes in breast cancer. We investigated the screening, diagnostic and surgery status of breast malignancy before and after the COVID-19 pandemic at the multi-institution level.

We have reviewed the medical records of patients with breast cancer from February 2019 to July 2020 in six Univ. hospitals in Korea. The patients were divided into two groups according to the initial date of cancer diagnosis: Period A, from February 1st to April 30th and Period B, from May 1st to July 31st in 2020. The two groups were compared for the same periods in 2019. The goals were to determine whether breast cancer screening and diagnosis have been delayed and thus resulted in stage migration of cancer patients. We also examined the difference in the number of surgeries in patients diagnosed with breast cancer during those periods.

Of the 4,173 patients, 3,038 cases were enrolled. The total of 1,669 breast malignancy diagnosis was made in the grouped periods of 2019, and 1,369 diagnoses in 2020. All patients in 2020 were screened by PCR test for COVID-19 prior to hospitalization, and none of them tested positive. Overall, there was a 9.9% reduction in the number of diagnoses compared to the same period in 2019 and the decrease was more significant in Period A compared to Period B (11.1% vs. 8.7%). When comparing the difference according to the age, there was no difference between 2019 and 2020 during the two periods in those under 30s. However, the number of diagnoses decreased from those in their 40s and above. In Period A, the number of diagnoses decreased the most in 60s; In Period B, it was most noticeable in 50s. The COVID-19 pandemic has affected breast cancer screening (reduced by 27.4%) and more diminished in Period A compared to Period B (41.0% vs. 19.0%). Invasive breast cancer stage was not statistically different between 2019 and 2020 in Period A ($p = 0.170$). But the stage in Period B was different ($p = 0.032$), and more patients were observed in advanced stages in 2020. The decrease in surgery was noticeably observed in Period A (4.6%, from 480 to 438 surgeries) and not in Period B. In Period A, there were more breast reconstruction surgeries in 2019 (88 surgeries) compared with 2020 (60 surgeries), while there was no difference between the years in Period B.

Patients with COVID-19 increased exponentially from late February in Korea. However, the number of patients per day decreased to less than 100 on March 15, and then the COVID-19 curve flattened. The health care system for cancer was not overloaded and restrictions on visiting hospitals were minimal. Analysis in the pandemic period of the 6-month showed that the number of breast cancer screening, diagnosis and surgeries decreased compared with the previous year. Those decreases were prominent in Period A when the COVID-19 patient surged. It is especially noticeable in the elderly. The upstage migration of breast cancer was generally insignificant but slightly occurred in Period B. The outbreak of infectious diseases makes patients reluctant to come to the hospital, especially in the elderly. We need to discuss the potential long-lasting deleterious effect of the COVID-19 pandemic on cancer diagnosis and management. And also, we should prepare for how to deal with the backlog caused by the COVID-19 pandemic.

GUIDELINES IN THE MANAGEMENT OF BREAST CANCER PATIENTS DURING COVID-19 PANDEMIC

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COVID-19 pandemic, started in 2019, is still expanding globally. Although vaccination has been incorporated, it is a huge issue in our current practice. A variety guidelines, recommendations, Q and A, and consensus have been made in a recent year time. Regarding the breast cancer treatment, surgical therapy, radiation therapy and medication therapy are mostly included in major guidelines. Major guidelines are associated with each other in these major issues. In Japan, multiple academic societies and parties have worked together and cooperated with oversea societies, and then developed recommendations for diagnosis and treatments, and for patients and medical staffs. We have experiences treatment delay, modifications, and problems in breast cancer clinic, because of this pandemic. On the other hand, some major changes have been done in common practice, in the field of neoadjuvant endocrine therapy and radiation therapy. These issues would be presented and discussed.

APPLICATION OF AI FOR BREAST IMAGING & DIAGNOSIS

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During the past decade, researchers have investigated the use of computer-aided mammography interpretation. With the application of deep learning technology, artificial intelligence (AI)-based algorithms for mammography have shown promising results in the quantitative assessment of parenchymal density, detection and diagnosis of breast cancer, and prediction of breast cancer risk, enabling more precise patient management. AI-based algorithms may also enhance the efficiency of the interpretation workflow by reducing both the workload and interpretation time. Today, I will discuss application of AI for Breast Imaging & Diagnosis.

APPLICATION OF AI FOR BREAST PATHOLOGY

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Histopathologic diagnosis of cancer is the key step of cancer diagnosis and treatment. The accurate diagnosis of histologic type and assessment of grade and stage is the main interpretation target of pathologic diagnosis. Histologic type of cancer is the nature of cancer based on the morphologic, genetic or biologic characteristics. Grade and stage are the main factors relating prognosis. Genetic or biologic features of cancer such as hormone receptor or biomarker expression status, specific gene alteration are influencing cancer behavior or response to treatment. Recently, technology to digitize pathology image and machine learning, particularly deep learning are promising tools to analyze pathology images and to provide rapid, objective, and quantitative pathologic evaluation. Breast cancer is the most common cancer of women and has grading system for tumor aggressiveness, hormone-dependent biologic behavior, several targeted therapy based on the hormonal status and genetic alteration that are assessed in hematoxylin-eosin(HE) stained histologic slide, immunohistochemically stained slide or fluorescence or chromogenic in situ hybridization images. Because breast cancer uses all types of pathologic images in routine pathology practice and has the prototype of personalized precision therapy, image analysis technology for computation pathology has been early developed and commonly used in practice and many deep learning technology have been tried on breast cancer images. Rule-based quantification tools to automatically detect hormone receptor, like estrogen-receptor(ER), progesterone receptor (PR), and Ki-67 in immunohistochemistry images or HER2 expression in fluorescence in situ hybridization images has been used in practice since early 2010 as medical devices. Deep learning methods are being developed to lesion detection, cancer classification in HE images in where the accuracy of rule-based image analysis technique was low. Detection rates of ductal carcinoma in situ, invasive carcinomas are 80-90% accuracy in slide or patch levels and classification of normal, benign, ductal carcinoma in situ, and invasive carcinoma are 75-80% accuracy. The accuracy of detection of metastatic carcinoma in axillary lymph nodes was over 90% in formalin-fixed slide and intraoperative frozen slides. Cancer detection in biopsy, resected specimen or lymph nodes will help to reduce read time and reduce human error in practice. As the cell level analysis, mitosis detection of cancer cells or prediction of proliferative activity based on the genetic data and HE images are reported in breast cancer. Mitosis is the main factor of breast cancer grade and detection of mitosis is the labor-intensive work and subjective among pathologists and automatic mitosis count increased agreement rates. The other new approaches for image analysis by deep learning are analysis of tumor microenvironment, and prediction of genetic alteration, classification molecular subgroup. Cell segmentation of cancer into tumor cells, stroma, lymphocytes or macrophages are one of the most anticipated AI technologies in cancer biology. This is because humans cannot count in real practice, and several semi-quantitative evaluations has demonstrated a correlation with prognosis or treatment response. Quantification of tumor infiltration lymphocytes (TIL) or tumor-associated macrophages(TAM), cancer-associated fibroblast(CAF), spatial distribution of tumor cells and stroma are the main targets of deep learning used cancer image analysis. Several cell segmentation algorithms have been published to increase detection accuracy and overcome the noise of images and shortage of label dataset at cell level. Prognosis model is evolving to hybrid model using multi-omic data, tumor microenvironment, hormonal status, stage or genetic data from single-feature used. Genetic prediction on HE slides such as HER2 expression is expected to be used as a replacement or screening tool for genetic test. In this time, the current status of various deep learning technologies for breast cancer and issues applying them to practice are introduced.

APPLICATION OF AI FOR MANAGEMENT OF BREAST CANCER

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Breast cancer is a very heterogeneous disease. In addition to various types of breast cancer, patients within the same pathological type may have different prognosis and treatment depending on the status of hormone receptors, target receptors, pathological differentiation and genetic mutations. Because the types of breast cancer are subdivided increasingly by various biological markers currently being studied, and therapeutic drugs are developed rapidly, finding optimal treatment tailored to individual patients is expected to become increasingly more complex.

With the development of computers and the Internet, artificial intelligence (AI) has achieved remarkable progress and its application is expanding into many areas. AI is also presented in medical care, specially treating the breast cancer. Several information technology companies, including IBM, Google, and Apple, are developing Clinical Decision Support System (CDSS), among them Watson for oncology and Watson for genomics. CDSS analyzes dozens of variables to evaluate the patient's condition and recommend the most appropriate treatment for the patient based on various studies and data. It provides associated research data and journals supporting recommended treatment. Also, presenting the dosage and usage, sequence, side effects, and interactions of medications, it is very helpful for inexperienced clinicians and students.

However, there are also several limitations. Although various studies have been conducted, there is still a need for sufficient validation of whether the treatment presented by CDSS is appropriate. In addition, in many countries, the treatment proposed by the CDSS may not fit the situation. For example, the treatment presented by CDSS may not be acceptable institutionally, and be difficult to use.

There remain strong thoughts which anthracycline and taxane-oriented treatments are mainly used for breast cancer, and recommendations for various treatments are not really helpful. However, the complexity of new anticancer drugs and the development of various drug-resistant cancers will increasingly complicate treatment choices for clinicians. Therefore, it is expected that the latest artificial intelligence, which is gradually developing, will be more helpful in the treatment of breast cancer.

CURRENT GLOBAL STATUS OF ADVANCED CARE DECISION

Janice Tsang

The Univ. of Hong Kong, Hong Kong

Advanced care decision (ACD) or advanced care planning (ACP) provides a vehicle for an individual to communicate his or her wish about the end-of-life care to the significant others such as one's family and friends, as well as to indicate the wish for end-of-life care to the healthcare workers.

The first advanced directive and advanced care planning was proposed in the late 1960s with further emergence in the mid-1970s. Over the last five decades, there has been various evolution and development of this proposal and this healthcare tool has become legitimate in many countries over the years with further transformation of the concept and acceptance.

Yet, the relative proportion of normal individual or those with chronic illness especially those with advanced disease such as terminal cancer, taking part in the advanced care planning is still limited. While there are different forms of advanced care planning strategies or options for advanced directives, the development and situations differ very remarkably across the regions and there are still many direct and indirect factors contributing to the apparently relatively slow development, especially in the Asian population. The actual prognostic awareness of the disease, the awareness and knowledge about advanced care decision, the acceptance of the patient and the family members, their readiness and preparedness as well as the readiness and preparedness of the healthcare workers to discuss advanced care decision do vary, and there is much unmet needs not only in public education, but also lack of communication and collaboration among all potential stakeholders.

This lecture will give an overview of the current situation of advanced care decision from the global perspective, the ongoing challenges and opportunities with particular reference to breast cancer including those living with the disease, and those serving in the multidisciplinary team for breast cancer care and more.

PALLIATIVE AND SUPPORTIVE CARE FOR BREAST CANCER PATIENTS IN KOREA

Hyun Jung Jho

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In Korea, the term palliative care is often used linked with hospice care, which refers to supportive care at the end of life. Hospice palliative care in Korea has been largely promoted by the national policy since the 2000s, which enabled an increase of inpatient hospice units and also lead to the pilot projects for home hospice as well as hospice consultation. With this growth of hospice palliative care provision, utilization of hospice unit among terminal cancer patients constantly increased from 7.3% in 2008 up to 22% in 2017, reflecting awareness for end of life care among cancer patients and their carers has been somehow improved over this period. In 2016, the Act on Hospice and Palliative Care and Decisions on Life-Sustaining Treatment for Patients at the End of Life was implemented. This act defined the process and effect of individual decision making on life-sustaining treatment at the end of life.

In this topic, the situation and various factors related to the care of breast cancer patients at the end of life in Korea will be depicted.

PALLIATIVE AND SUPPORTIVE CARE FOR BREAST CANCER PATIENTS IN JAPAN

Masanori Mori

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Provision of palliative and supportive care is essential to ensure optimal quality of life of breast cancer patients throughout the disease trajectory. Among the key elements of palliative and supportive care is advance care planning (ACP). ACP enables individuals to define goals and preferences for future medical treatment and care, to discuss these goals and preferences with family and health-care professionals, and to record and review these preferences if appropriate (Rietjens JAC, et al. Lancet Oncol 2017). In 2018, the Japanese government revised the guidelines on decision-making process on end-of-life care, and officially introduced the concept of ACP. Since then, awareness of ACP has rapidly been increased.

In this presentation, we will first summarize the history and current status of ACP in Japan. We will then review recent evidence of ACP and end-of-life communications with a specific focus on breast cancer. Lastly, we will discuss systematic approach to facilitate ACP including patient care, education, and policy making. To develop and implement culturally appropriate ACP models, further efforts should be made to address how to respect patient preferences through shared decision-making while ensuring that family harmony is maintained.

THE MANDATE OF CANCER PREDISPOSITION CASCADE GENETIC TESTING: LEGAL AND HEALTHCARE SYSTEM BARRIERS & FACILITATORS IN SWITZERLAND

Olivia Pagani

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In Switzerland, only 11% of all breast cancer patients and 25% of those with a strong family history access genetic counselling and testing. These numbers suggest that many Swiss mutation carriers and their family members may not benefit from advances in healthcare technology and medical diagnostics and therapeutics. Mutation carriers are routinely asked to communicate test results to relatives and advocate for genetic service access. This process is highly variable from family to family, overall resulting in low (< 40%) use of cancer genetic services among relatives, indicating lack of effective communication and family management.

In 2007, a Swiss federal law on human genetic analyses was enacted. The law states that a physician is not allowed to disclose genetic test results to anyone except the tested individual and/or his/her legal representative. Results can be disclosed to family members, spouse, or partner with the explicit consent of the tested individual. If the tested individual refuses to disclose test results to family members whose health may be affected, and would require such information, the physician could ask cantonal authorities to be free from the processional secrecy obligation. Thus, interventions that support the disclosure of genetic test results to relatives, enhance coping, and reduce conflict in mutation-harbouring families could contribute to more effective management of hereditary breast and ovarian cancer.

Cascade screening is the sequential process of identifying and testing blood relatives of a known mutation carrier to determine if additional individuals carry the pathogenic mutation in the family and propose preventive and/or other clinical management options to reduce morbidity and mortality. However, translation of this knowledge into public health interventions is lacking on both the national and cantonal level. Little is known about the cancer status and surveillance behaviour of mutation carriers and their relatives, needs for coordination of medical care, and psychosocial, patient-provider, and family communication support.

Establishing cascade screening for Hereditary Breast Ovarian Cancer (HBOC) and promoting public health interventions for communicating hereditary cancer risks poses several challenges at the medical and social level. It requires close and effective inter-professional collaboration within different healthcare professionals (e.g. geneticists, genetic counsellors, family doctors, oncologists, surgeons, psychologists, healthcare and social science experts).

CASCADE is an observational study conducted in oncology and/or genetic testing centers from the three linguistic regions of Switzerland (French, Italian and German): it aims to survey first- and second-degree adult relatives, and first cousins identified from pedigrees and/or family history records of HBOC index cases and determine their current cancer and mutation status; cancer surveillance practices; needs for coordination of medical care; barriers and facilitators to using cancer genetic services; psychosocial needs; patient-provider and patient-family communication needs; quality of life; willingness to participate in a study designed to increase use of cancer genetic services.

Based on epidemiological cancer records, current geographical (linguistic region) prevalence rates and estimated acceptance rates from index cases (70%) and relatives (50%) we expect to recruit approximately 381 relatives.

PSYCHOSOCIAL BARRIERS AND FACILITATORS OF CASCADE GENETIC TESTING

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Background: Although clinical guidelines recommend cascade genetic testing (CGT) be offered to blood relatives, disclosure of genetic test results is highly variable from family to family and is impeded by ineffective family communication. For hereditary breast ovarian syndrome (HBOC) it has been reported that $<40\%$ of at-risk relatives use cancer genetic services. In Korea, uptake of family-specific mutation testing in ovarian cancer relatives was 30.5%.

Methods: Based on review of the CGT literature, individual and interpersonal barriers and facilitators of CGT were identified.

Results: Individual psychosocial barriers of CGT include lack of knowledge, negative attitudinal factors and emotional response of mutation carriers (MC) and/or relatives, low perception of risk in MC/relatives, and poor communication skills. Interpersonal psychosocial barriers include family communication/ distance and poor family dynamics, low provider awareness, and social stigma. Conversely, individual psychosocial facilitators include knowledge of screening and risk reduction, positive attitudinal factors (e.g., desiring support from relatives, high levels of perceived control, high satisfaction with decision to genetic testing) and the desire to protect family and moral obligations. Open family dynamics and recommendation from provider were interpersonal psychosocial facilitators of CGT. While disclosure to and uptake appear to be better in female and better educated relatives, more studies are needed in diverse populations.

Conclusion: Consideration of psychosocial barriers and facilitators of CGT is important to improve disclosure and uptake in at-risk relatives. Areas for further exploration of cultural factors include social ideation of shame/blame and gender interplay with psychosocial burden. Interventions that can mitigate barriers and strengthen facilitators, framed within family communication improvement, are needed to improve CGT in HBOC.

THE SWISS CASCADE: A SPRINGBOARD FOR INTERNATIONAL COLLABORATION

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Background: Breast, colorectal, ovarian, and endometrial cancers constitute approximately 30% of newly diagnosed cancer cases in Switzerland. About 2-15% of incident cases are associated with Hereditary Breast and Ovarian Cancer (HBOC) and Lynch syndrome. Approximately 5% of breast cancer cases and 10-15% of epithelial ovarian cancer cases are attributed to HBOC. LS is associated with increased lifetime risks for colorectal, endometrial cancer, ovarian, gastric and urothelial cancer and accounts for about 2-5% of colorectal cancer and endometrial cancer burden. HBOC and LS develop due to single germline gene mutations that are passed down in the family. For every identified mutation carrier there are multiple biological relatives who may carry the same mutation. First- and second-degree relatives and first cousins have up to 50% probability for inheriting the cancer predisposition. When a pathogenic variant is identified, relatives can be tested with 100% accuracy. Evidence-based recommendations suggest genetic testing in affected individuals and relatives when there is a known family history of HBOC or LS-related cancer. HBOC and LS patients have an increased risk of secondary cancers and can benefit from intensive surveillance, pharmacoprevention, and/or prophylactic surgery. Biological relatives who test positive benefit from high-risk management care starting at age 25-30, or 10 years before the earliest age of breast cancer onset in the family, while those who test negative can be excluded from unnecessary medical interventions. Moreover, it is critical to monitor cancer surveillance of mutation carriers and ensure adequate quantity, quality, and coordination of cancer care in order to improve their survival and overall quality of life. However, in Switzerland only about 11% of all breast cancer patients and 25% of those with a strong family history use genetic services. These figures are lower for LS-related colorectal and endometrial cancer, suggesting that many high-risk families may not benefit from advances in medical genetics.

Methods: CASCADE is a Swiss-wide, family-based cohort including families harboring pathogenic variants associated with HBOC and LS. CASCADE is using surveys designed to examine behavioral and psychosocial factors in mutation carriers and relatives, and factors that enhance cancer surveillance and coordination of care, and cascade genetic testing for HBOC and LS in untested blood relatives. Repeated observations are the optimal way for assessing these outcomes. The cohort is established by ongoing recruitment of known HBOC and LS cases from genetic testing clinics, and systematically identifying all their blood relatives, but contact only those who have been approached by the index case and who are willing to participate in the study. Recruitment takes place in oncology and/or genetic testing centers from three linguistic regions of Switzerland (Basel, Bellinzona, Bern, Delemont, and Geneva).

Result: From August 2017 to December 2019 we identified 574 mutation carriers from clinic records (399 HBOC and 175 LS). From n = 525 eligible, participation rate was 55.4% for HBOC and 39.7% for LS carriers. We identified overall n = 507 biological relatives eligible for cancer predisposition cascade genetic testing. Mutation carriers were willing to invite close to 40.0% of eligible relatives to participate in the study. Participation rate among relatives is 51.5%. Relatives who accepted participation were willing to invite additional 40.0% blood relatives. Among relatives who completed the baseline survey, 64.0% are females for HBOC and 58.9% males for LS. First-degree relatives account for 58.0% for HBOC and 48.4% for LS. Preliminary indications show that approximately 35% of relatives who take part in the study have not pursued genetic testing. Ongoing data analyses examine additional study outcomes.

Conclusions: Recruitment to the CASCADE study is ongoing but preliminary findings support the feasibility of identifying and recruiting mutation carriers. The current recruiting method suggests that reaching all at-risk relatives requires multiple contacts and with multiple members of at-risk families. The significance of the CASCADE cohort is that it captures data and generates information across the risk continuum i.e., affected mutation carriers, cancer-free mutation carriers, untested individuals, and true negative cases at population cancer risk. This approach means that fewer individuals need to be followed and for a shorter period of time. The cohort facilitates the collection of epidemiological, cancer surveillance, behavioral, and psychosocial data, which currently are fragmented and dispersed across different clinical sites. Findings can enhance the development of new models for systematic detection of individuals at-risk for hereditary cancer and the implementation of high quality comprehensive support systems to improve use of cancer genetic services. Cancer predisposition cascade genetic testing is a priority public health intervention and the methodology of the CASCADE cohort is transferable to different healthcare contexts, such as the K-CASCADE cohort in Korea.

OPBS Session

GBCC10
10th Global Breast Cancer Conference

HOW TO ESTABLISH A TRAINING CENTER FOR ONCOPLASTIC AND ENDO-ROBOTIC BREAST SURGERY

Benjamin Sarfati

Institut Gustave Roussy, France

Robotic Breast Surgery is a new technique, in Europe, we are still waiting for the CE marquing to have the authorization to use this technique outside of a clinical study. But we need to be prepared to create an educational program for all the surgeons who want to start this surgery.

VISITING AND TRAINING SYSTEM FOR ONCOPLASTIC AND ENDO-ROBOTIC BREAST SURGERY

Jeeyeon Lee

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A critical point of breast surgery has been changed from "only oncologic surgery" to "also esthetic surgery". Furthermore, many oncoplastic breast surgeons pursue not only better shape of breast, but also minimized scars. These unmet needs led development of oncoplastic breast surgery (OPS) and Robotic, Endoscopic breast surgery.

Although the junior surgeons can learn a new OPS and minimal invasive techniques on online website with video clips, the critical tips and expert's own tips can not be acquired only with video clips. Therefore, a visiting training system is necessary to watch and learn directly for beginners of OPS and minimal invasive surgery.

Until now, when the surgeon wants to learn something new, he/she had to send an e-mail to manager, get a permission and arrange the visiting schedule by himself which was very difficult process. However, like the previous European Institute of Oncology (EIO) system, if we set up a common visiting training system, we can share the exchange programs and get information novel techniques to give an opportunity to our fellow surgeons.

In order to such program should be well set-up, a head chief is needed to manage general works and a person in charge is required for each hospital or country. After a candidate set the goal which he/she want to learn and apply to the program with searching specific hospital, the head office connect to the coordinating of country of hospital and the visiting training program can be started.

To save a lot of manpower and time, the program should be standardized and simplified to easily apply and operate. From Oncoplastic surgery session in GBCC, we can gather the opinions, set up web-based program together and each country can take charge of program annually or bi-annually. And the issued certification can encourage the junior surgeons to have confidence. Therefore, the senior doctors in each country should cooperate closely and go forward to the same direction, which requires active efforts of senior doctors.

EXPERIENCE OF CLINICAL ONCOPLASTIC FELLOWSHIP IN VARIOUS COUNTRIES

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Breast conservation surgery (BCS) and adjuvant radiotherapy has become the standard treatment for early breast cancer patients, with similar prognosis to that of mastectomy and improved body image. However, BCS has not always had good cosmetic results in all patients. Recently, the oncoplastic surgery (OPS), integration of plastic surgery techniques for immediate breast reshaping after wide excision for breast cancer, could be introduced and applied for BCS patients for better cosmetic results.

For mastectomy patients, immediate or delayed-, implant based- or autologous tissue based-breast reconstruction surgery could result in good cosmetic result and good quality of life. Because the Korean National Health Insurance Service (KNHIS) began covering breast reconstruction for the mastectomy patients since 2015, the number of breast reconstruction surgery is expected more increasing in Korea.

Today, I want to share my six-month experience for clinical oncoplastic fellowship as a breast surgical oncologist in Bringham Womens Faulkner Hospital, Boston, USA and Siriraj Hospital, Bangkok, Thailand and discuss what is necessary to establish a training course of OPS and reconstruction surgery for breast surgical oncologists.

WHAT IS KEY POINT IN TRAINING OF ONCOPLASTIC AND ENDO-ROBOTIC BREAST SURGERY

Eisuke Fukuma

Kameda Medical Center, Japan

DIFFERENCES BETWEEN SURGICAL ONCOLOGIST AND ONCOPLASTIC SURGEON

Visnu Lohsiriwat

Siriraj Hospital, Mahidol Univ., Thailand

EXPERIENCE OF ONCOPLASTIC AND ENDO-ROBOTIC BREAST SURGERY & INTERNATIONAL FELLOWSHIP TRAINING

Hung-Wen Lai

Endoscopic & Oncoplastic Breast Surgery Center, Changhua Christian Hospital, Taiwan

Oncoplastic and reconstructive breast surgeon (ORBS) aimed to incorporate aesthetics and plastic technique into breast cancer operations to balance the oncologic safety and cosmetic outcome, and also to promote breast reconstructions. I received formal oncoplastic and reconstructive breast surgery training in IEO, Milan Italy. I also received endoscopic breast surgery training in KMC, Japan and also observed laparoscopic omentum flap surgery in Okinawa, and been a clinical observer in KNUH, Daegu, South Korea. I also visited China, Thailand, US, and France to learn a variety of surgical techniques. I had performed various oncoplastic breast surgeries and breast reconstructions. Around 450s breast reconstructions performed since Jan 2011-May 2020 had been performed by ORBS-HWL, 75.8% were gel implant reconstructions, 3.3% were tissue expander, 16.9% were transverse rectus abdominal myocutaneous (TRAM) flap, 3.1% latissimus dorsi (LD) flap, and 0.9% LD flap+implant. Experience of oncoplastic and breast reconstructive surgeries performed by ORBS-HWL would be shared.

Minimal invasive surgery had become the main stream of operations, and new surgical innovations of NSM, like endoscopic assisted nipple sparing mastectomy (E-NSM) or robotic nipple sparing mastectomy (R-NSM), are emerging and increasingly applied in the surgical treatment of breast cancer. One of the aims of minimal access breast surgery is to decrease the wound length and hidden in more inconspicuous location, and therefore increase the patients' satisfaction. R-NSM, which incorporated 3D imaging system and flexibility of robotic arm & instruments, was reported to have the potential to overcome the limitations of E-NSM and showed promising preliminary results. The widespread use of R-NSM, however, was limited to prolonged operation time and higher cost. New surgical innovations balancing efficacy, operation time, and medical cost are needed. E-NSM compared with R-NSM had the advantages of shorter operation time, less costly, and less instruments demanding. Single port 3D E-NSM, which is safe, efficient, not costly, and associated with good aesthetic result, is a promising new technique for breast cancer patients indicated for mastectomy, however, long-term oncologic safety follow-up still be needed.

A TO Z OF ENDOSCOPIC MASTECTOMY

Eisuke Fukuma

Kameda Medical Center, Japan

RECENT UPDATE OF AUTOLOGOUS RECONSTRUCTION

Jung Ho Lee

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After mastectomy, implant-based breast reconstruction is the most commonly performed. Especially, with the widespread of skin or nipple sparing mastectomy, the patients satisfaction after implant-based breast reconstruction is increased significantly.

However, for those women who want more natural breasts and look to avoid foreign bodies, autologous breast reconstruction is still a good option. In addition, with autologous breast reconstruction, the longevity of results can be anticipated and the risk of late complication or revisional surgery is quite low compared with implant based reconstruction,

In this session, I will introduce various surgical techniques to overcome existing limits and expand indications of autologous breast reconstruction.

RECENT UPDATE OF IMPLANT-BASED BREAST RECONSTRUCTION

Ung-Sik Jin

Department of Plastic and Reconstructive Surgery, Seoul National Univ. Hospital, Korea

Implant-based breast reconstructions are more widely used than autologous tissue breast reconstructions. Implant-based breast reconstruction is relatively simple, quick to recover, and no donor site morbidity. However, there are many considerations for implant-based reconstruction.

First of all, we have to consider whether it is one stage (DTI) or two stages (expander to implant). If it is one stage, we should decide whether it is a prepectoral plane or a retropectoral plane implant insertion. Also, consideration should also be given to balancing procedure of contralateral breast.

Other considerations include what implants are used and whether ADM is used. Acellular dermal matrix (ADM) became an essential product for implant-based breast reconstruction. There are many types of ADM and we can choose according to the mastectomy state. BIA-ALCL (breast implant associated anaplastic large cell lymphoma) is a shortcoming of recently emerging from implant-based breast reconstruction.

In this presentation, I would like to present how to address the above considerations. Also, I will introduce the latest trends of implant-based breast reconstruction.

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Survivorship Session

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10th Global Breast Cancer Conference

RESEARCH FOR YOUNG BREAST CANCER SURVIVORS (HOHO TRIAL)

Ann H. Partridge

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Over 14,000 American women age 40 or younger are diagnosed with breast cancer on a yearly basis in the U.S. alone, with tens of thousands more diagnosed worldwide. At the present time, there is far less known about breast cancer in younger women than older women. Breast cancer is the leading cause of cancer-related deaths in women under 40. Furthermore, younger breast cancer survivors are at greater risk of psychosocial distress than their older counterparts. Young women with breast cancer face a variety of unique medical and psychosocial issues as a result of their diagnosis and treatment. Despite the extensive literature on breast cancer, in general, there is little known about issues unique to younger women with breast cancer. To address this gap In research, we established a longitudinal cohort study of young women with breast cancer, Helping Ourselves, Helping Others (HOHO): the Young Women's Breast Cancer Study (NCT01468246). We enrolled over 1300 women age 40 and younger with newly diagnosed breast cancer from academic and community health care institutions in this study from 2006-2016. Patient surveys, medical record review, and blood and tissue collection are utilized, and women have been surveyed every 6 months for the first 3 years after diagnosis, then are surveyed yearly thereafter for an additional 17 years (for a total follow-up of 20 years following diagnosis). The study investigates short and long-term disease and treatment issues, biologic and disease issues, and psychosocial concerns at baseline and in follow-up among a cohort of young women (age 40 or younger) newly diagnosed with breast cancer through institutions in Eastern Massachusetts, Colorado, Minnesota, and Toronto. We have conducted several analyses to date to characterize the population of young women at diagnosis and in follow-up regarding disease and psychosocial outcomes (e.g., presentation and disease characteristics, treatment patterns and quality of care, short and long-term side effects, genomic predictors of recurrence in ER+ disease, and psychosocial concerns including fertility, sexual functioning, and menopausal issues). And studies are underway to develop unique predictors of outcome for this population with the goal of identifying areas that may be amenable to intervention to improve outcomes tackling issues such as weight gain and physical activity, local recurrence, and fertility and pregnancy and disease outcomes in this large cohort of young women.

EXPERIENCE OF KOREAN BREAST CANCER SURVIVOR STUDY

Jung Eun Lee

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The incidence of breast cancer has dramatically increased in recent years in several Asian countries which experienced rapid economic growth along with demographic and environmental changes. Breast cancer rates vary substantially among countries, with incidence in developing countries being less than that in Western countries. Given the upward trend in Asian countries and the large variation in incidence around the world, modifiable factors have been thought to contribute to breast cancer development.

In Korea, the incidence of breast cancer ranks first among women since 2016. The age-standardized incidence rate of breast cancer has steadily increased in Korea, reaching 54.9 per 100,000 in 2016 with average annual increase of 7.8% from 1999 to 2016. Asian women have higher proportion of premenopausal breast cancer and different genetic and anthropometric profiles compared to Western women. However, we have limited data of Asian breast cancer survivors. There is a clear need to examine the roles of diet and lifestyle factors in breast cancer survival in this population.

We investigated diet, physical activity and quality of life of breast cancer survivors during the past few years. We recruited more than 1,000 female breast cancer survivors between 2012 and 2018 with a median survival time of 7.5 years and enrollment is currently ongoing. We collected dietary information using either 3-day dietary records or food frequency questionnaire (FFQ), which we have developed for Korean breast cancer survivors. We asked participants about information on demographic factors, lifestyle factors including smoking and alcohol intake, reproductive history (e.g. menstrual status and parity), physical activity, and health-related quality of life. We calculated a metabolic equivalent (MET)-hours/week for each type of exercise according to the Compendium of Physical Activities. We obtained clinical information via medical records from each hospital (e.g. estrogen receptor status, tamoxifen use, and stage). In a subset of this population, we also collected biospecimen and measured circulating levels of metabolic biomarkers and nutrients. In a cross-sectional study of Korean breast cancer survivors, we found that dietary pattern and physical activity levels were associated with health-related quality of life.

Understanding of characteristics of Korean breast cancer survivors, Korean health care system, and a teamwork of investigators may be important in breast cancer survivor research. Further prospective studies are warranted to explore how to improve quality of life and prognosis of Korean breast cancer survivors.

EXPERIENCE OF COHORT STUDY

Heather Eliassen

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Breast cancer is the most common cancer in women worldwide, and the number of women living with the disease is increasing. In the U.S., there are currently an estimated 3.8 million breast cancer survivors. Breast cancer survival rates have been improving since the 1980s, largely attributable to screening, earlier detection, and improved treatments. Survival is strongly influenced by tumor stage and molecular subtype, but even women with less aggressive subtypes continue to be at risk for long-term recurrence. Understanding the impact of modifiable lifestyle factors on survival after breast cancer is critical to improving outcomes in women with breast cancer.

Several modifiable factors have been identified that influence breast cancer survival. Post-diagnostic weight gain and higher body mass index are associated with increased recurrence, while post-diagnostic physical activity is associated with lower breast cancer specific mortality. While these factors are associated with both breast cancer incidence and survival, other lifestyle factors differ in their associations with incidence and survival. For example, while smoking is not a strong risk factor for breast cancer incidence, it is associated with poorer breast cancer prognosis. In contrast, while alcohol intake is a well-established risk factor for breast cancer incidence, it does not appear to be associated with breast cancer prognosis. Several common medications, including aspirin, metformin, and statins may also be associated with improved breast cancer survival, though their associations with incidence are not consistent. The role of diet in breast cancer survival is emerging as an important factor to consider among breast cancer survivors. Preliminary studies in the Nurses Health Study and the Nurses Health Study II show the potential for modifiable dietary factors to influence both breast cancer specific as well as overall survival after breast cancer diagnosis.

Given the long-term survival of many women with breast cancer, as well as the late recurrence in some cases, cohort studies with long follow-up and repeated measures provide an excellent context in which to study the impact of modifiable lifestyle factors on survival. The availability of both pre- and post-diagnostic measures allows for a thorough investigation of timing of exposure and whether change in lifestyle factors after diagnosis may impact survival. Further, updated exposures after diagnosis can be leveraged to explore late recurrence of disease as well as long-term survival. Finally, given that many women with breast cancer ultimately die of other causes, understanding the impact of lifestyle factors on overall mortality also is important.

The Nurses' Health Studies, with repeated measures over time and more than 30 years of follow-up, provide a unique opportunity to investigate the role of modifiable lifestyle factors in breast cancer survivorship.

APPLICATION-BASED LIFE STYLE MODIFICATION FOR BREAST CANCER SURVIVORS

Seungjae Song

LifeSemantics, Corp., Korea

Most survivors of breast cancer experience the isolation of medical services after discharge from hospital. In the face of the depletion of health insurance finances, improvement of self-manageable lifestyle such as exercise and nutrition are important to fill the blind spots of medical services outside hospitals. According to medical researchers, lifestyle accounts for about 90% of breast cancer causes. The development of ICT and Servitization trends have enabled cancer survivors to manage their lifestyle at home through digital health. With the early diagnosis and development of medical technology, cancer survivors as well as cancer patients are increasing, and from the viewpoint of strengthening the security of health insurance, national-level discussions on the introduction of digital health are being embodied.

Recent digital health has tended to evolve into a DTx (Digital Therapeutics) that can be compared to a third new medicine. A type of SaMD (Software as a Medical Device) that is independent software and effective in treating disease, must ensure its proven clinical utility and ease of use. In the United States, the largest market for digital health, a pre-certification system for SaMD manufacturing companies is being implemented, and SaMD has been launched as a DTx through FDA approval. In the case of South Korea, the SaMD is expected to enter the institutional area as an innovative medical device in May. Depending on various levels, some SaMD may be prescribed as a DTx.

Globally, the DTx market is also in the early stages and a promising industry area with high altitude growth of over 20% per year. It has already emerged as a global topic at CES2020, an increasing number of companies are starting to develop DTx at home and abroad occurred. DTx is useful as a tool for patient decision support (PDS) for lifestyle management of cancer survivors particularly. Unlike assisting medical staff in making clinical decision support (CDS), it is noted for improving the health literacy of patients. A patient's low Health Literacy increases the risk of a variety of illnesses, including drug misuse and abuse, mismanagement.

LifeSemantics' DTx, efil care M is designed to promote the clinical efficacy of breast cancer survivors, including self-rehabilitation management content and care plans for customized prescriptions, as well as to reduce side effects and edema. Health monitoring functions such as management and customized permanent management programs for quick recovery are applied. LifeSemantics and Seoul Natoinal University Bundang hospital have done clinical trials on breast cancer patient whether efil care M has positive clinical effect on behavioral improvement. We have achieved and verified a higher user satisfaction of 4.2 points based on a 5- point scale.

The key is to implement AI for patients in the future. Given the limited medical resources, it is important to modelling and efficiently allocate healthcare services. To do so, it must be able to provide quantifiable qualitative services based on PDS AI based on clinical evidence. Only then can DTx become a convincing option to guarantee the peoples health and decision when they face the blind spots of health services that health insurance has uncovered.

If AI is the important composition of PDS, the source of the AI is data. The importance of life-logs combined with clinical data to improve lifestyles for breast cancer survivors should grow. The size of the life-log data from various PDS AI-based DTx that will appear in the future is expected to be huge.

With the passage of Innovative Medical Devices Support Act, and the revision of the Data 3 Act to support the National Strategy for AI as a momentum, PDS AI-based digital therapeutics for breast cancer survivors is expected to develop in advanced rapidly by improving the quality of customizing the guidance of lifestyle of survivors and enhance the performance.

DISTRESS MANAGEMENT USING MOBILE DEVICE-BASED PLATFORM IN BREAST CANCER SURVIVORS

Il Yong Chung

Department of Surgery, ASAN Medical Center, Korea

Psychological distress is a prevailing problem in cancer survivors. Current international guidelines recommend that cancer survivors should be monitored for distress from the start of cancer diagnosis on a regular basis thereafter. However, there are many obstacles for clinicians to manage this problem. Conventional distress screening using paper questionnaires of patient-reported outcomes (PROs) is subject to recall bias and cannot reflect real-time mood change. Moreover, in busy clinics, it is not always easy for clinicians to screen and recognize distress due to restricted resources such as manpower, finances, and time.

The recent development of mobile technologies can provide breakthrough solutions for distress screening. Some previous studies showed that physical activities and sleep patterns which were obtained by a smartphone app reflected users emotional changes. As smartphones or wearable devices are easy to carry, they can be efficient ways of collecting daily physical activity data. If distress prediction algorithms using physical activity data are developed, real-time distress screening using mobile devices can be done in cancer survivors.

Recently, we have reported the results from two prospective cohort studies. One study showed the association between physical activity data collected by mobile devices including smartphone apps and smart bands, and levels of distress obtained by app questionnaires. The other interventional study indicated that a mobile app-based community can be an effective tool to decrease distress reduction and increase physical activity in breast cancer survivors. A randomized controlled study (Distress Reduction by Activity tracking and Activity enhancement by mobile support Group in ONcology, DRAAGON) is ongoing to validate these results.

In this talk, I am going to review mobile device-based approaches to distress management and introduce our efforts to develop innovative ways to screen and reduce distress in breast cancer survivors.

EXPERIENCE OF CLINICAL TRIAL USING MOBILE APPLICATIONS (SMART AFTER CARE)

Ji Sung Yoo

Department of Surgery, National Cancer Center, Korea

Physical activity is any form of movement using skeletal muscles. Physical activity represents one of the few modifiable risk factors that can be recommended for cancer risk reduction. According to The World Cancer Research Fund, strong evidence exists for an inverse relationship between physical activity and the risk of colon, breast (post-menopause) and endometrial cancers. Physical activity is a modifiable lifestyle behavior that is positively associated with weight management, cardiorespiratory fitness, fatigue, and quality of life for cancer survivors. In addition, several studies have demonstrated that physical activity is associated with a lower risk of death, all-cause mortality, cancer specific mortality and cancer recurrence, particularly among breast and colorectal cancer survivors. Therefore, cancer survivors should be more invested in maintaining an ideal body weight, a healthy diet, and a physical activity level. There are several strategies to increase physical activity: physician and/or fitness expert advice, supervised exercise program or classes, cancer survivor-specific print materials, pedometer or wearable fitness trackers, etc.

The objective of our project was to develop an after-care service center for cancer survivors and to establish a service testing environment. Additionally, we sought out to test and conduct assessment on an after-care service center. The name of the center was the Cancer & Cardiac Smart Care Center. For the development of the Smart After-Care Service which is the name of the program we created, and the establishment of a service testing environment, we developed a new application for patients and created a web-site to facilitate lifelog analysis. Also, the website conveyed relevant and useful information to medical staff. A total of five hospitals were involved in this study. The roles of the hospital were the development of the after-care rehabilitative education program per disorder, the testing and assessment of the Smart After-Care Service program for patients. NCC-Korea, served as the center for managing lung cancer and breast cancer patients. I will share our experience of clinical trial using Smart After-Care Service for breast cancer patients.

MANAGEMENT OF CIPN

Sun Kyung Baek

Department of Internal Medicine, Kyung Hee Univ. Medical Center, Korea

Chemotherapy induced peripheral neuropathy (CIPN) is the most common pain syndrome resulting from chemotherapy. A CIPN prevalence of 16.2% and 13.6% among breast cancer survivors who underwent docetaxel based-regimens, 1-1.5 years and 2.0-3.2 years after treatment, respectively. CIPN leads to a lower quality of life and dysfunction of the sensory, motor, and autonomic systems. The drugs most commonly associated with CIPN in breast cancer are taxanes such as docetaxel and paclitaxel. In some instances, polychemotherapy schedules might induce CIPN. Through their action of enhancing microtubule polymerization, leading to interference with axonal transport, antitubulin taxanes target the soma of sensory neurons as well as nerve axons. Most symptoms of CIPN by taxanes usually induces paresthesias, numbness and/or pain in a stocking-and-glove distribution. Cancer survivors with pain may benefit from pharmacotherapy with opioids and other agents such as antidepressants, anticonvulsants, and nonsteroidal anti-inflammatory drugs. However, the safety and effectiveness of long-term opioids in survivors has not been well studied. The evidence base for nonopioid analgesics in survivors is growing for CIPN. Duloxetine showed modest analgesic efficacy in CIPN. Among antidepressants, venlafaxine has been shown to reduce the incidence of CIPN, albeit with some side effects. Cannabinoids may be a new treatment option for CIPN. Although some data suggest that certain substances may prevent CIPN, no treatments have been demonstrated to prevent CIPN effectively. Neuroprotectants exhibit only very weak efficacy in terms of preventing CIPN and nutraceuticals, as alternatives to pharmacotherapeutics, have shown more promising results in the treatment and prevention of CIPN. Further studies of CIPN treatment and prevention may lead to development of more effective treatment modalities.

PREVENTION AND MANAGEMENT OF CARDIOTOXICITY

Hak Jin Kim

Branch of Cardiology, Department of Internal Medicine, National Cancer Center, Korea

Cancer treatment has markedly improved due to the development of various anticancer strategies and the number of cancer survivors increases every year. Cancer and cardiovascular disease are closely related with shared risk factors, such as age, smoking, obesity and lack of physical activity.

Cancer therapies including cytotoxic chemotherapy, targeted agents, and radiation therapy may cause a variety of cardiovascular disease (cardiotoxicity). Cancer therapy-related cardiotoxicities can be divided into several categories: left ventricular dysfunction and/or heart failure, ischemic heart disease or coronary artery disease, valvular heart disease, arrhythmias, systemic hypertension, thromboembolic disease, peripheral vascular disease, pulmonary hypertension, and pericardial disease.

Various cancer treatments currently used in patients with breast cancer are known to exacerbate existing cardiovascular disease or to develop cardiotoxicity.

The prototype of cancer therapy-related cardiotoxicity is left ventricular dysfunction and/or heart failure caused by doxorubicin. The incidence of heart failure is reported to range from 3% to 26%, depending on the cumulative dose of doxorubicin and is elevated when additional treatments, such as trastuzumab. In addition, the 5-year survival rate of doxorubicin-induced hear failure was less than 50%.

The diagnosis and treatment of cardiotoxicity is based mainly on the measurement of left ventricular ejection fraction (LVEF) by 2-dimensional echocardiography. Myocardial strain is also used for early detection of subclinical cardiotoxicity. The biomarkers (such as, troponin) is used to detect cardiotoxicity early and be used in conjunction with LVEF to help predict prognosis.

Early detection and careful monitoring of cancer treatment-related cardiotoxicity are important to avoid unnecessary interruption of essential cancer therapy and to prevent long-term cardiotoxicity in cancer survivors. Recently, cardio-oncology is rapidly becoming an important field of collaboration between oncology and cardiology to enhance survival and improve quality of life in cancer patients and survivors. Cardiologists play a key role in preventing, diagnosing, and treating cardiotoxicity in cancer patients and survivors.

I will talk about prevention and management of cardiotoxicity in breast cancer survivors.

MANAGEMENT OF PSYCHIATRIC PROBLEMS FOR BREAST CANCER SURVIVORS

Tae-Suk Kim

Department of Psychiatry, The Catholic Univ. of Korea, Seoul St. Mary's Hospital, Korea

Continuous medical advances in diagnosis and treatment of breast cancer have resulted in an increased survival rate compared to the past. Improved techniques for diagnosis and staging, interdisciplinary approach with plastic surgery, advanced radiation therapy and targeted immunotherapy have led to the prolonged life along with positive impact in terms of quality of life among breast cancer patients. Also, by establishing a supportive system with multidisciplinary collaborations, it is becoming possible for breast cancer patients suffering from various psychosocial problems to receive holistic care during active cancer treatment.

Once active treatment has finished and monitoring and/or follow-up period begins, however, emotional distress and psychosocial problems of breast cancer patients are paid less clinical attention. Breast cancer survivors are prone to various psychosocial problems even if they are not in a life-threatening condition. Long-term follow up of breast cancer survivors has revealed that the frequency of psychological distress including depression, anxiety, and insomnia would be as high as they appear in the active treatment process. Furthermore, the cancer experience frequently results in interpersonal difficulties, maladaptive behaviors, a great fear of recurrence, and often an existential crisis which causes them to question the meaning of their remaining life and existence. In addition, breast cancer patients often experience side effects associated with surgical intervention and chemotherapy such as lymphedema, fatigue, cognitive decline, and changes in appearance. A relatively high number of patients suffer from menopausal symptoms caused by chemotherapy or anti-hormone therapy.

'Clinical attention and awareness' of a variety of biopsychosocial problem of breast cancer survivors are top priorities for the proper psychiatric management. Moreover, it would be needed to do regular screening of highly frequent psychosocial problems during follow-up period so that early psychiatric intervention can be applied. Proper psychotherapy and various psychiatric medication are proven to be effective for alleviating psychiatric symptoms. Depending on the intensity or severity of the psychosocial problems, different types of psychotherapy may be offered. Some patients may benefit from yoga, mindfulness-based meditation, or even counseling, whereas others may require more intensive or specialized forms such as cognitive behavioral psychotherapy that brings about changes in thought, emotion, and behavior beyond the stabilization of psychological distress. Recently, more developed cancer centers would provide integrative supportive care services to various psychosocial problems of cancer survivors.

As saying 'It's not over until it's over,' treatment of breast cancer does not end with removal of tumor. The establishment of the integrated care model for breast cancer survivors as well as breast cancer patients would be the most desirable direction for improving the quantity and quality of life.

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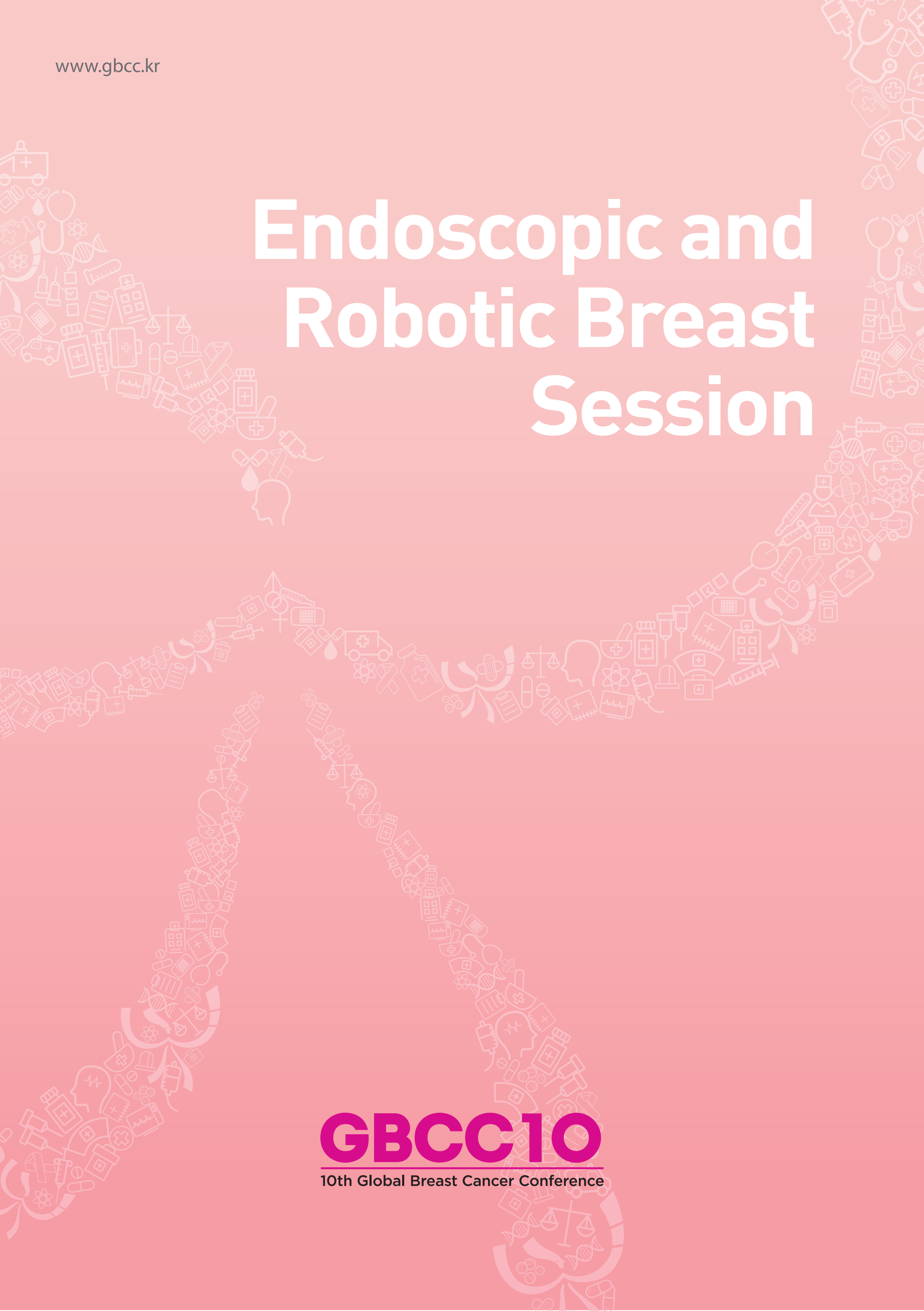
Endoscopic and Robotic Breast Session



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ROBOTIC LD FLAP AND DIEP

Jesse C. Selber

Department of Plastic Surgery, MD Anderson Cancer Center, U.S.A.

Background: The evolution of surgical technique in autologous breast reconstruction has improved perfusion reliability while simultaneously decreasing abdominal wall morbidity; however, this progress has plateaued for the open approach because of the length of the fascial incision and degree of muscular dissection required to harvest a reliable flap. The robotic approach to the DIEP represents a method of significantly decreasing disruption of the abdominal wall while maximizing pedicle length.

Methods: The authors have recently performed the first 15 robotic DIEP flaps. A description of the indications, imaging analysis, patient selection and details of the surgical technique will be described and shown. Preliminary outcomes related to fascial incision length, post-operative pain, and recovery will be presented.

Result: Fifteen flaps were attempted and successfully completed with robotic pedicle harvest. Eleven flaps were unilateral and two were bilateral. There were no flap or abdominal complications. Average robotic time was 52 minutes. Average fascial incision length was 2.7 centimeters (range 1.5-6). Average pedicle length was 13 cm. Twelve flaps were single perforator and 3 flaps included 2 perforators. The entire robotic portion of the case including access was completed by plastic surgeons.

Conclusion: The RoboDIEP allows maximum pedicle length with minimal disruption of abdominal wall structures, and may be the next logical step in the evolution of minimally invasive, autologous breast reconstruction.

BREAST RECONSTRUCTION WITH ROBOT-ASSISTED SURGERY

Dong Won Lee

Yonsei Univ. College of Medicine, Korea

Robotic surgery is currently evolving with its ergonomic instruments under the concept of minimal invasive technique which is a recent trend in surgery. In the field of breast surgery, Toesca first introduced robotic breast surgery in 2015, after which the technique has been attempted globally. To date, several studies that showed the feasibility and safety of robot-assisted nipple-sparing mastectomy (RANSM) have been reported, and many breast surgeons are interested in trying to start the RANSM. According with this, breast reconstruction should be also modified and changed, unless conventional way is available. With growing interest in robotic surgery, we have to consider where to apply the robot in the field of breast reconstruction.

When an implant or an expander is inserted under the pectoralis major with acellular dermal matrix in the setting of RANSM, we can use the robot to elevate the pectoralis major muscle, to fix acellular dermal matrix, and to recreate inframammary fold. Recently, prepectoral placement of an implant has been adopted by many plastic surgeons as the preferred method. The implant that is completely covered with acellular dermal matrix can be fixed on the pectoralis major even without using robot. If the inframammary fold is not violated by oncologic surgeons, using robot is not mandatory for prepectoral implant reconstruction.

In autologous reconstruction, the robot can be applied in flap harvest. Although deep inferior epigastric artery perforator (DIEP) flap reduces donor site morbidity when compared with conventional free transverse rectus abdominis musculocutaneous flap, violation of the anterior rectus sheath, rectus muscle, and motor nerves is inevitable. In order to further minimize tissue damage in the donor site, the use of robot for DIEP flap harvest has been suggested. Furthermore, the latissimus dorsi (LD) flap for breast reconstruction can be taken by the robot. Robotic harvest of LD flap leaves no scar on the back, while traditional method leads to a long donor scar that should be an unpleasant burden to patients.

In order to adopt the robotic technique in breast reconstruction, it is essential that a standard robotic procedure that is easily reproducible and provides advantages over the conventional method should be established. Now is the time to actually discuss robotic surgery in the field of plastic surgery.

ROBOTIC MASTECTOMY IN KOREA

Hyung Seok Park

Department of Surgery, Severance Hospital, Korea

Robotic surgical systems were first introduced in 1992. Since the RoboDoc system was successfully applied to artificial hip replacement, various surgical systems including AESOP, ZEUS, HERMES, and DaVinci systems were developed and introduced in various surgical fields. After the successful application of DaVinci systems to laparoscopic surgeries in the 2000s, robotic surgery has been widely performed in various surgical fields in Korea. The reason for the wide application of robotic surgery in Korea is mainly due to the wide application of endoscopic or laparoscopic surgeries.

Endoscopic breast surgery was introduced in the early 2000s. However, endoscopic breast surgery has not widely spread over the world because of its limitations, including longer operative time, the need for equipment and training, and difficult application for patients with larger breast volumes. Thus, endoscopic breast surgery has been mainly performed by some surgeons in a few Asian countries such as Japan, Korea, and China for decades.

In Severance Hospital, to overcome these limitations of endoscopic breast surgery, robotic mastectomy has been attempted and simulated in cadaveric labs since 2013, and then it was successfully performed for the first time in Korea in 2016. The major advantage of robotic mastectomy is the easier use of endoscopic devices in robotic surgical systems. High-resolution 3D camera and highly flexible robotic arms provide more precise movements of surgical instruments during surgery. For this reason, robotic mastectomy is receiving much attention from breast surgeons across the world.

In this lecture, the introduction and recent trend of robotic mastectomy in Korea will be discussed based on institutional experience, literature review, and experts' opinions.

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CURRENT SITUATION OF CLINICAL TRIALS IN THE JAPANESE BREAST CANCER SOCIETY

Naoki Niikura

Department of Breast and Endocrine Surgery, Tokai Univ. School of Medicine, Japan

Breast cancer in East Asia to rise year by year, but its clinical characteristics are different from Western countries. Japanese Breast Cancer Society (JBCS) oraganized Natinal Clinical Database-Breast Cacer Registry (NCD-BCR) in Japan. JBCS has analyzed and reported the nationwide breast cancer data on a annual basis. Over 90000 early breast cancer cases were registered in every year. Many research was published to use NCD-BCR. Our research to use NCD-BCR showed loss of HER2-positive status can occur after neoadjuvant treatment in patients with primary HER2-positive breast cancer. We also confirmed that in practice, differences in pCR rates between breast cancer subtypes are the same as in clinical trials. Our data strongly support the need for retest ER, PgR, HER2 of surgical sample after neoadjuvant.

Recently investigator-driven clinical trials, particularly focusing on primary and metastatic breast cancer, have been activated. There are 4 rsearch groups (JCOG, JBCRG, CSPOR, WJOG) in Japan. Several important findings have been generated by these activities.

CREATE X trial collaborate with Korea change management for non-pCR after Neoadjuvant therapy for triple negative breast cancer in world wide.

The purpose of this session is to provide an overview of the Current Situation of Clinical Trials in the Japan.

CURRENT SITUATION OF CLINICAL TRIALS IN THE KOREAN BREAST CANCER SOCIETY

Joon Jeong

Department of Surgery, Gangnam Severance Hospital, Korea

The World Health Organization defined a clinical trial as any research study that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects on health outcomes. A clinical trial is essential for developing the new interventions and improving health care services by raising standards of treatment. Also, clinical trial translates the results of basic scientific research into better ways to prevent, diagnose, or treat cancer. Ultimately, clinical trials drive the evolution of practices in various carcinomas area, including breast cancer. However, there are many hurdles to perform the clinical trial successfully: i) Organization to perform the multicenter or international trial, ii) Well-trained researchers and staff, iii) Ethical aspects, iv) Resources (Sponsor), v) Collaboration with other specialists, and so on. The Korean Breast Cancer Society (KBCS) has long sought to carry out well-designed clinical trials and overcome these challenges.

The Korean Breast Cancer Society Group (KBCSG) is a clinical trials cooperative group supported since its inception by the KBCS. We have a more than 10-year history of designing and conducting seventeen clinical trials that have changed the way breast cancer is treated. A typical example is the ASTRRA trial (KBSCG-5). Adding two years of ovarian function suppression to the standard 5-year regimen of tamoxifen could significantly improve survival compared to tamoxifen alone in patients with estrogen receptor-positive breast cancer who remained premenopausal or resumed ovarian function after chemotherapy. This trial's findings add support to recent results from the similarly designed Suppression of Ovarian Function Trial (SOFT). In addition, the Create-X trial, which was implemented in collaboration with the Japanese Breast Cancer Society (JBCS), is another symbolic case of changing the treatment paradigm in the neoadjuvant setting. Through these efforts, we expect to improve the life of patients with breast cancer in the future.

Fortunately, I had the opportunity to perform and participate in several clinical trials with KBCSG. Here, I would like to present the history and current status of clinical trials supported by KBCSG and hope to share my experiences with the audience. Moreover, I hope this session will serve as an opportunity to conduct novel clinical trials in collaboration with KBCS and JBCS.

PROGRAM FOR YOUNG DOCTORS IN KBCS AND THE FUTURE DIRECTION OF JUNIOR DOCTORS FORUM IN GBCC (KBCS)

Han-Byoel Lee

Department of Surgery, Seoul National Univ. Hospital, Korea

Breast cancer is one of the most dynamic and innovative diseases in terms of changes in principles and guidelines for diagnosis and treatment. It is very important to provide young doctors pursuing a career in the field of breast cancer with education programs offering proper and accurate information. The Korean Breast Cancer Society (KBCS) is running programs called the School of Breast Disease and Academy of Breast Clinicians, as well as regular symposiums on systemic therapy and hereditary breast cancer. School of Breast Disease, which started in 2012, covers all fields of the breast, including benign diseases and cancer. Academy of Breast Clinicians started in 2020 with the purpose of sharing practical information and experience regarding breast cancer research and bringing young researchers together to promote collaboration and harmony.

With a similar purpose, GBCC organized a special session called the Junior Doctors Forum (JDF). Since the first meeting at the GBCC 2018, many participants from Asia and around the world have actively participated in discussions, as well as social activities during and after the conference. A lot of the friends and colleagues meet together regularly at meetings all around the world.

It is imperative that breast cancer clinicians and researchers collaborate and come together to achieve a common goal - to conquer breast cancer and relieve our patients from their sufferings. Our mentors have shown an amazing example displaying unbelievable improvements in breast cancer care through collaborative research. However, there is always room for more. The change of environment involving social network services and virtual conference platforms has produced new opportunities for further partnerships. Proposals for programs and study groups to promote collaborations in Asia and expanding those relationships to the world will be suggested.

PROGRAM FOR YOUNG DOCTORS IN JBCS

Norikazu Masuda

National Hospital Organization Osaka National Hospital, Japan

In Japan, more than 90,000 patients have been diagnosed as breast cancer annually, making it the most common cancer type among women. The frequency of detection of early-stage breast cancer is increasing, due to the spread of mammography screening started in 2000 and public awareness. If she is pointed out abnormality or notices a subjective symptom such as a lump, she visits a general hospital or a clinic to get a detailed examination. Many are not depend on radiological specialists, but breast surgeons are also generally responsible for the definitive diagnosis process. Of course, breast surgical oncologists are also in charge of surgery, perioperative adjuvant treatment, postoperative follow-up, and systemic therapy for advanced metastatic disease. It is unique system that the attending physician will be like a lifelong companion of the patient.

At some high volume-quality cancer centers, it is possible to have a specialized medical care system that specializes in diagnosis, surgery, and medical therapy, benefiting from abundant human resources, but many breast specialists belong to the general hospital with 2 or 3 colleagues, are in charge of treatment about 200 new breast cancer patients annually.

In other words, many breast cancer specialists acquire their qualifications through surgical training, and they need to acquire the latest information and continue learning in the wide- variety fields such as imaging, procedure of needle biopsy, curative surgery, systemic medication for perioperative and advanced recurrence, and preventive health care.

The JBCS has three qualification systems: certified doctors, specialists, and instructors who guide them as a step-up to the specialized acquisition program. Educational seminars, imaging seminars, and pathology seminars on the latest topics are held at the annual general meeting for the purpose of disseminating the latest information, many participants are aiming to earn credits. A local assembly that divides Japan into seven blocks will be organized, and at the academic meeting, in addition to case presentation discussions, educational seminars will be conducted in parallel to share the concept of how to assemble diagnosis and treatment.

To qualify as a specialist, in addition to a certain level of case experience and achievements, they need to pass in tests including the multiple choice questions and oral presentation assessment. As its educational program, the JBCS conducts academic seminars for specialist, publish the compilation of breast cancer clinical practice guidelines and textbook on breast oncology. Qualification requires renewal every 5 years.

In addition to medical doctors which is about 80% of the JBCS members, nurses, pharmacists, medical technicians, etc. will participate in general meetings and local meetings and all learn the importance to promote team medical care. In the field of diagnosis, the Japan central Organization on Quality Assurance of Breast Cancer Screening qualifies the Mammography photography, MMG and ultrasound diagnosis. There are some external educational programs, such as ultrasound guided interventional skill by JABTS, HBOC educational program by Japanese Organization of Hereditary Breast and Ovarian Cancer (JOHBOC), breast reconstruction qualification by the Japan Oncoplastic Breast Surgery Society and so on, which are widely available in close collaboration for medical staffs.

I would like to introduce the current status of educational programs for young doctors provided by JBCS.

EXPERIENCE OF EDUCATION PROGRAM IN ASIA (JAPAN TEAM ONCOLOGY PROGRAM)

Naoto Ueno

MD Anderson Cancer Center, U.S.A.

Over the last 20 years, MD Anderson and the Japanese Faculty have made a significant effort to promote education to create highly effective multidisciplinary care. It has evolved from a virtual presentation to 1,000 members of the Japanese Society of Clinical Oncology in 2001, into three-day educational workshops under that name of Japan TeamOncology Program (J-TOP) since 2002, as well as training programs at MD Anderson (JME: Japanese Medical Exchange Program) each spring since 2003. More recently, a website explaining the institution's multidisciplinary concept in Japanese receives 100,000 hits a month.

To date, JTOP has trained more than 1200 Asian health care professionals, many of whom are in leadership positions promoting multidisciplinary care in different oncology centers in Japan, Korea, Philippines, Thailand, and Taiwan. And more than 120 of those trained at MD Anderson provide similar workshops in their medical communities.

"Our greatest, collective accomplishment, however," with great pride, "was our influence on the Japanese Diet's passage of the Cancer Act, similar to the one President Nixon signed in 1971. Initiated in spring 2007, it includes professional funding for promoting multidisciplinary cancer care in Japan and oncology professional development in 18 regional areas of the country."

What we promote for a successful leader or team members in the context of multidisciplinary care has dramatically changed over 20 years. Oncology is now a very complex field with the rapid development of diagnosis and treatment options. Therefore, the next-generation training requires intense skills for EBM, leadership, communication, diversity/inclusion, social sensitivity,/psychological safety. Further, skills to develop strategic program development with team alignment skill is a must.

The JTOP continues to be a successful off-job training that Asian oncology healthcare providers can trust and rely on.

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THE NEW PROGRESS OF MEDICAL THERAPEUTIC TREATMENT AND CLINICAL TRIALS IN BREAST CANCER IN CHINA

Qiang Liu

Sun Yat-Sen Memorial Hospital, China

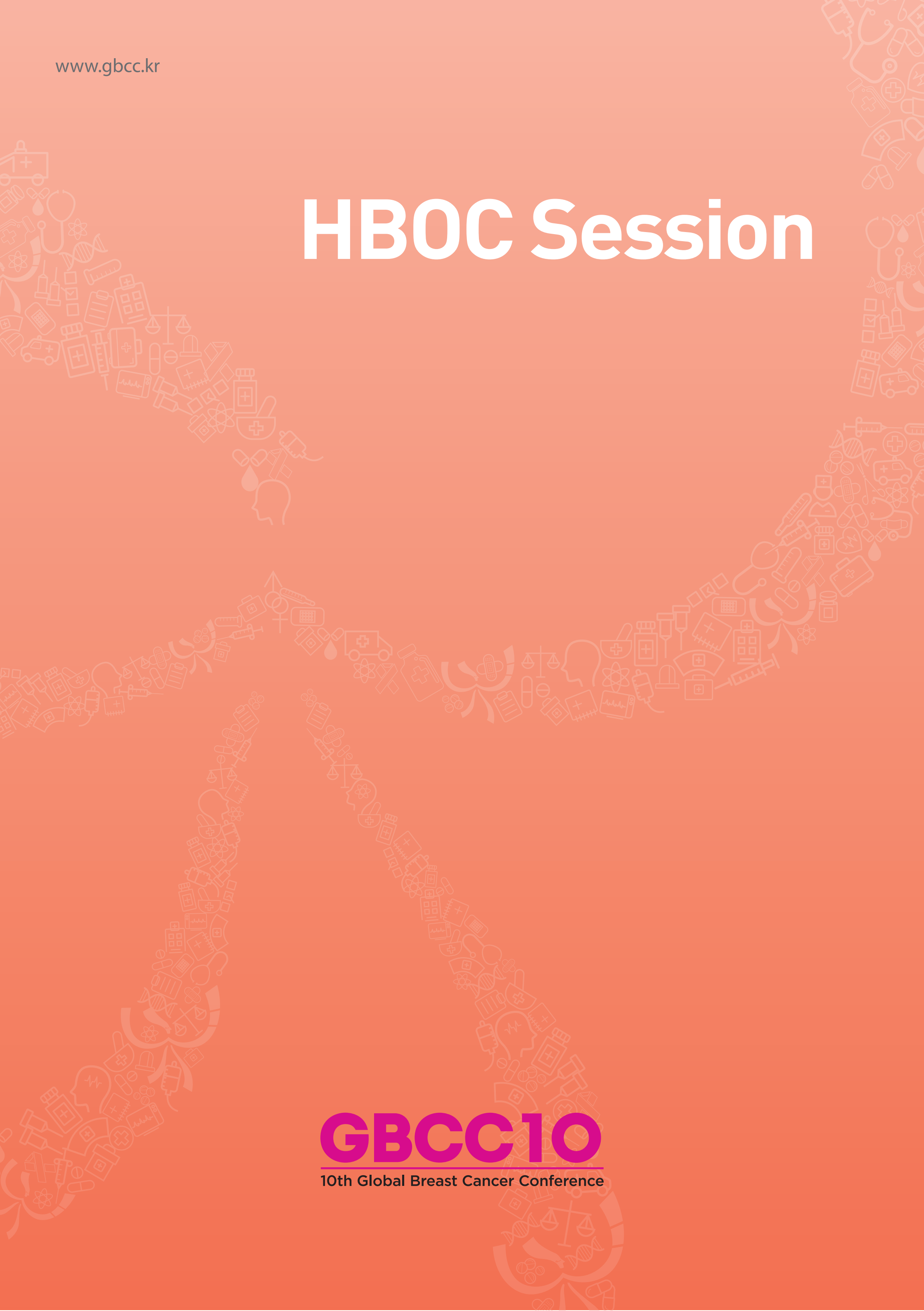
The incidence and mortality rate of breast cancer in China have grown rapidly in the past decades, presenting a huge challenge for breast cancer researchers and clinicians. With more professional management of breast cancer, the 5-year survival rate of breast cancer increased significantly in recent years. Both academic and industrial funding for clinical research in breast cancer supported the rapid growth of clinical trials in breast cancer in China, which led to many high-impact publications and the rise of several domestic pharmaceutical companies.

THE NEW PROGRESS OF MEDICAL THERAPEUTIC TREATMENT AND CLINICAL TRIALS IN BREAST CANCER IN KOREA

Hee Kyung Ahn

Gachon Univ. Gil Medical Center, Korea

HBOC Session



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CURRENT STATUS OF RISK-REDUCING MASTECTOMY

Monica Morrow

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Women with deleterious mutations in BRCA1 and BRCA2 have been recognized to be at significantly increased risk of breast cancer development for a number of years. The increasingly widespread use of gene panel testing has resulted in identification of additional women at increased risk of breast cancer development, although not necessarily at the same level as BRCA mutation carriers. Management options for women at increased risk include enhanced surveillance, endocrine chemoprevention, bilateral salpingo-oophorectomy, and bilateral mastectomy. Of these, risk reducing mastectomy (RRM) is associated with the greatest level of risk reduction, reducing the risk of both cancer development and death by 90-95%. When RRM is performed sentinel node biopsy is not necessary as a metaanalysis has shown only a 1.7% incidence of unexpected invasive cancer in RRM mastectomy specimens.

In a series of 625 contralateral prophylactic mastectomies (CPM) at MSK, invasive cancer was present in 5 (0.8%) and single patient (0.2%) had nodal metastases (King TA. Ann Surg Oncol 2011;254:2). Based on these findings, we reserve sentinel node biopsy in RRM for patients with imaging abnormalities which have not been biopsied.

BRCA mutation carriers identified at cancer diagnosis are recognized to have a risk of contralateral cancer development of 40-60%. This is modified in those with ER+ cancers receiving endocrine therapy or in premenopausal women having oophorectomy, with an approximately 50% reduction in risk. It is also now recognized that the age of onset of cancer impacts the risk of second breast cancers and risk is significantly lower in those who are not diagnosed until after age 50. In aggregate, this means that BRCA2 carriers diagnosed after age 50 with ER+ cancers can be managed with breast conservation if the patient desires this approach. If this approach is chosen, imaging should be done at 6 month intervals and includes annual MRI.

There is also interest in using nipple sparing mastectomy in BRCA mutation carriers for both RRM and treatment. There is extremely limited data on the safety of this approach, and follow-up is too short to draw conclusions on the level of risk but the need to leave behind breast tissue to give the nipple a blood supply is cause for concern.

POPULATION GENETIC TESTING FOR BREAST CANCER

Melissa Southey

Monash Univ., Australia

Background: The accumulating data from gene panel tests continue to refine risk estimates for breast cancer associated with rare variants in predisposition genes. Most of this work has been based on women selected for high risk features, such as personal or family history of breast cancer. Far fewer data are available to make inference about breast cancer risk for women unselected for family history, an important consideration of population screening.

The value of population-based case-control studies and gene panel testing have recently been illustrated by the US-based study (CARRIERS consortium), involving over 32,000 affected and 32,000 unaffected women and by the international study (BRIDGES) involving 60,000 women affected and over 53,000 women unaffected by breast cancer. These studies provided improved estimates of the prevalence and the magnitude of breast cancer risk associated with pathogenic variants in known breast cancer predisposition genes to guide genetic counselling.

The prevalence and breast cancer risk estimates associated with pathogenic rare variants identified in breast cancer predisposition gene panel tests, conducted in an Australian population-based case-control study of breast cancer (with an emphasis on early age at disease onset), involving both i) age-matched population-based controls and ii) a healthy older group of Australian women as controls will be presented.

Methods: For 1,464 women diagnosed with breast cancer and 862 age-matched controls participating in the Australian Breast Cancer Family Study (ABCFS), and 6,549 healthy, older Australian women enrolled in the ASPirin in Reducing Events in the Elderly (ASPREE) study, we tested for rare germline variants using a 24-gene panel. Odds ratios (ORs) were estimated using unconditional logistic regression adjusted for age and other potential confounders.

Results: We identified pathogenic (including likely pathogenic) variants in 162 (11.1%) of the 1,464 ABCFS case subjects, 32 (3.7%) of the 862 ABCFS control subjects and 145 (2.2%) of the 6,549 ASPREE (control) participants. The estimated breast cancer OR [95% confidence interval] was 5.3 [2.1-16.2] for BRCA1, 4.0 [1.9-9.1] for BRCA2, 3.4 [1.4-8.4] for ATM and 4.3 [1.0-17.0] for PALB2. The frequency of pathogenic variants in genes other than BRCA1 or BRCA2 was 5%.

Conclusions: Our findings provide a population-based perspective to gene panel testing for breast cancer predisposition and opportunities to improve predictors for identifying women who carry pathogenic variants in breast cancer predisposition genes other than BRCA1 and BRCA2 that are urgently needed.

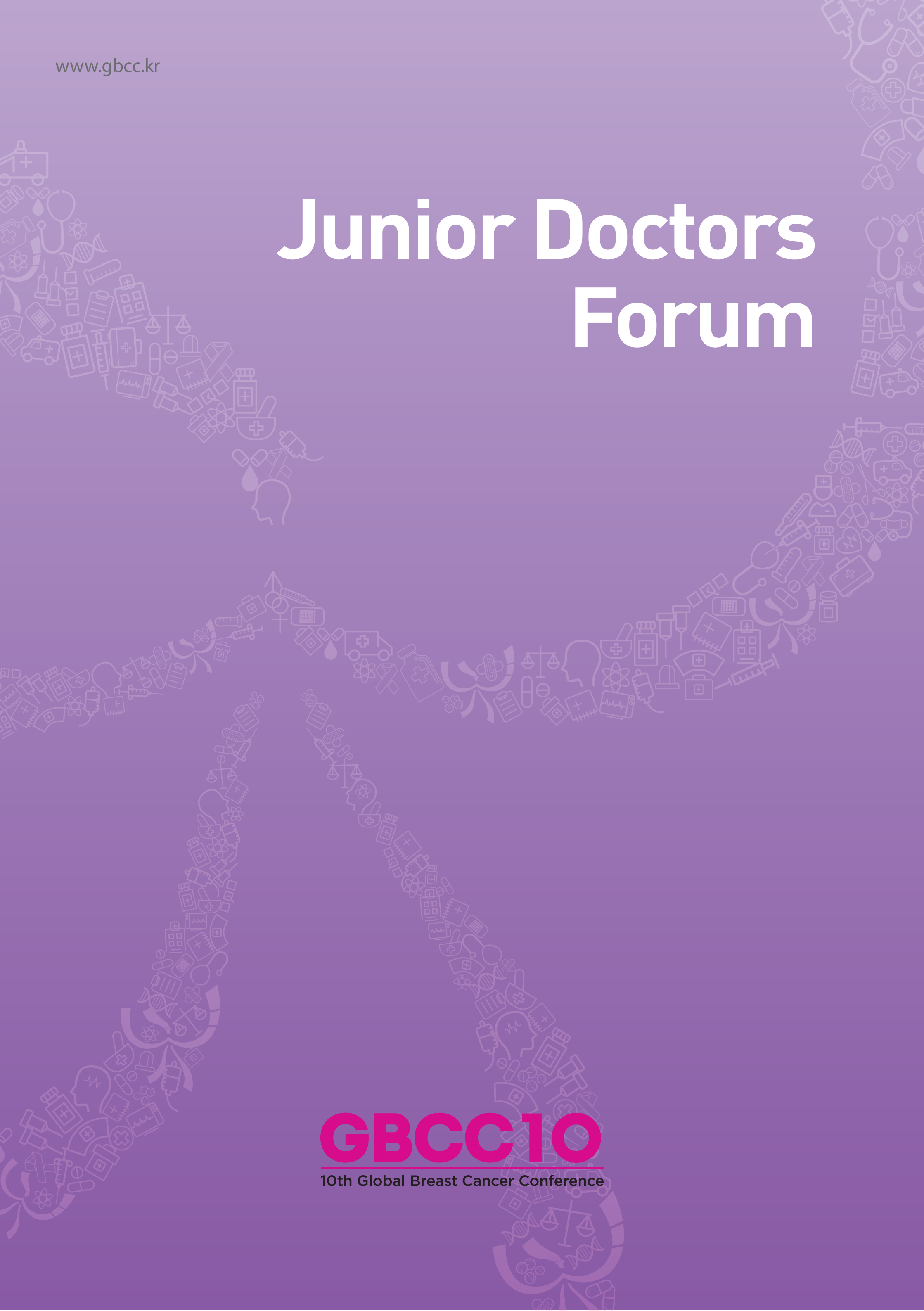
PROPORTION AND CLINICAL APPLICATION OF HEREDITARY PREDISPOSITION OF GYNECOLOGIC CANCER

Myong Cheol Lim, Yeon Jee Lee

National Cancer Center, Korea

Approximately 20% of ovarian cancers are associated with an inherited gene variation. Carriers of germline variants of BRCA1, BRCA2, RAD51D, RAD51C, BRIP1, and MMR genes including MSH2, MLH1, MSH6, or PMS2 have increased risk of ovarian cancer. About 15% of non-mucinous epithelial ovarian cancer have pathogenic variants (PV)/likely pathogenic variants (LPV) of BRCA1 or BRCA2. High-grade serous histology, family history of breast cancer, and immunohistochemical staining of aberrant BRCA1 expression could be a predictive marker of BRCA1 or BRCA2 PV/LPV.

These carriers are candidates for risk-reducing salpingo-oophorectomy (RRSO) to reduce the risk of ovarian and breast cancer. In terms of therapeutic implication for ovarian, fallopian tubal, and primary peritoneal cancer, PARP inhibitor and intraperitoneal chemotherapy could be used in this subpopulation with prolonged survival benefit. Patients with MMR gene mutation carriers could have prolonged disease control with PD-1 inhibitors.



Junior Doctors Forum

GBCC10

10th Global Breast Cancer Conference

DEVELOPING AN ACADEMIC CAREER

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Developing an academic surgical career is challenging, particularly at a time when the excitement (and funding) are centered on non-surgical subjects such as targeted therapy and immunotherapy. An academic career begins with identifying a job that has the building blocks for academic success. A minority of surgeons are surgeon scientists, but opportunities exist for career success in clinical research. In general, these arise from developing a research theme of interest to you, critically examining knowledge gaps from the clinical trials and determining which questions the resources at your institution are sufficient to allow you to address. The rapid pace of change in breast cancer means that there are new opportunities arising regularly. Avoiding a fixed mindset based upon what was learned during training is essential to take advantage of them.

THE YOUNG SURGEON AND A SCIENTIFIC CAREER : A COMIC OPERA?

Emiel Rutgers

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Do not worry, I only echo the title of the editorial from Richard Horton in the Lancet of 1996 (!). He reacted upon a paper from a group of surgeons in Italy who reported on "real world" data of the "QUART" breast conservation in a retrospective cohort, showing about the same results and local control as in the pivotal Umberto Veronesi trial. Apparently, this study was not viewed as "science". As you may understand this editorial evoked a lot of reactions, angry wronged reactions, particularly from surgeons. Nonetheless, this event was helpful to urge the surgical community to do even better clinical research. In breast cancer a long tradition of thorough clinical research science was by then the rule and is still ongoing: from bench to bedside and clinical practice. To name some important examples:
- Breast conservation and radiotherapy
- Adjuvant systemic therapy in all its aspects
- The role of ET: Tamoxifen, AI's
- The role of multi gene signatures in de-escalation/optimization of chemotherapy indications.

Particularly in breast cancer, randomized surgical trials play a crucial role in the establishment of optimal locoregional treatment, including de-escalation:
- BCT versus mastectomy
- SN trials: NASBP B-32, Z-11, AMAROS , IBSCG 23-01
- Currently: yes or no SN procedures in early breast cancer, and research to de-escalate surgery of breast and axilla after PST

So, no way surgical research in breast cancer is a Comic Opera.
What can you do to play a role in further developments, to pursue a scientific career?
- Be curious: always wonder if what you are doing is really for the good of the patient in front of you. Do not take all what is learned to you for granted.
- Identify research areas where there is a clinical unmet need. To mention a few examples:
    - ○ Biology of the breast cancer and local control: risk of local relapse fine tuning
    - ○ Interaction host (the breast) and the cancer: can stroma reaction facilitate local recurrence and distant spread?
    - ○ Is field involvement important in breast cancer development: DCIS is usually confined to a segment of the breast. How come? Clinical implication?

  - ○ Which DCIS is going to jeopardize the patient
  - ○ Ways to reduce overtreatment due to breast cancer screening
  - ○ Smarter breast cancer screening
  - ○ Upfront systemic treatment and optimizing surgical treatment of the breast and axilla
  - ○ Further reducing mastectomy morbidities.
  - ○ Improving cosmetic outcomes
  - ○ Improving breast form reconstruction (can we get rid of implants?)
  - ○ And many others..
- Identify a senior colleague who is research minded, open minded and willing to cooperate and to share (you are not the slave but the – young- partner).
- Focus on a specific issue: keep in mind the clinical relevance (unmet need)
- Make a research plan where you involve early on relevant partners: statistician, pathologist, senior surgeon, radiation and medical oncologists and basic researchers. In this plan take on board the goal / main aim. (again: the relevance).
- Working within a national / international research group is very useful: eg. EORTC/Asian research groups. Go for en defend your role as junior researcher / junior PI.
- Don't waste too much time on "Me too" research.
- Retrospective studies may be easy to do, informative and helpful. They are at most "hypothesis generating".
- Population studies (national data registries) are useful to see what is going on in the real world, disclose inequalities, and where significant improvements can be achieved by adjusting clinical practices.
- Not every question need to be addressed in randomized trials. Particularly in interventions where the risks and number of events are most likely very low (an example: pCR in Her-2+cT1/2 cN0 breast cancer and omitting post chemo SN), a prospective cohort trial with prespecified statistics, patient numbers, mile stones and stopping rules (monitored by an IDMC) may result in a practice changing outcome as well.

These are my experiences and thoughts. Good luck, clinical research is fun, hard work, many hours and in the end rewarding in most instances. Don't be afraid of setbacks and disappointments!

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Nursing Session

GBCC10

10th Global Breast Cancer Conference

POSTOPERATIVE EDUCATION FOR BREAST CANCER PATIENTS

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The objective of this report was to explain of the postoperative education for breast cancer surgery.

Cancer surgery removes the tumor and nearby tissue during an operation. Surgery is the oldest type of cancer treatment. And it is still effective for many types of cancer today. There are many reasons to have surgery: to diagnose cancer, to remove all or some of a cancer, to find out where the cancer is located, to find out if the cancer has spread or is affecting the functions of other organs in the body, to restore the body's appearance or function, to relieve side effects. Recently, breast cancer surgery has become less invasive, less complicated and more cosmetic. Surgery can be physically and psychologically stressful for patients. It is hypothesized that education before surgery reduces anxiety and enhances postoperative outcomes. Many factors may interfere with the ability of women newly diagnosed with breast cancer to cope with treatment. Nurses should be aware of patients' needs during this critical time. Breast cancer patients have a long treatment period after surgery. The probability of survival after surgery is more than 95%, But there is a risk of recurrence even after surgery.

In the early postoperative period, it is important that reducing the edema and pain of the surgical site. Lymphedema is a common side effect that may occur after lymph nodes are removed. This type of surgery is called a lymph node dissection. Lymph nodes are tiny, bean-shaped organs that help fight infection. They filter bacteria and other harmful substances from the lymphatic fluid. Lymphatic fluid is a colorless fluid containing white blood cells that travels through most tissues of the body. Sometimes, when the lymph nodes are removed, lymphatic fluid collects in the surrounding tissues and cannot drain back out. This causes the swelling known as lymphedema. Lymphedema causes discomfort and tightness in the swollen area. It can also limit the movement and function of that area, such as an arm or leg. Breat cancer patients may need specific therapy to manage this side effect.

Cancer surgery may change the way your body looks, feels, and functions. This can affect your body image. Body image can also be affected if a person did not receive the outcome he or she expected after surgery. People may have trouble coping with this change afterward. Some people may feel insecure about changes and struggle with their self-image. The emotional side effects of cancer surgery are as important to treat as the physical side effects. Patients cope with physical and psychological distress in a variety of ways. There is a difference in the level of suffering experienced by the patient depending on the psychological coping pattern of stressors of breast cancer. Oncology nurses should sympathize the suffering of the patients and provide guidance based on the most helpful coping style.

ROLE OF NURSE IN BREAST CANCER CHEMOTHERAPY

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Breast cancer is the most common cancer in women worldwide. Also in Korea, more than 20,000 new cases of breast cancer are diagnosed annually. There are various treatment methods for breast cancer, and of those, chemotherapy is importantly administered to reduce recurrence and improve survival rates. Different types of anticancer agents are used according to the tumor characteristics, and many chemotherapy regimens have proved efficacy. Chemotherapy could be classified to adjuvant, neoadjuvant and palliative chemotherapy based on the purpose of treatment.

Combination chemotherapy is known to be a more effective treatment for the breast cancer than monotherapy. However, there are more types of side effects from combination chemotherapy than monotherapy. The most common side effects are hair loss, nausea, vomiting, general weakness, neutropenia, thrombocytopenia, and early menopause. Agent-specific side effects include decreased heart function for anthracycline, which are commonly used for breast cancer, and peripheral neuropathy in 60% of patients who receive paclitaxel. These severe side effects of chemotherapy can lead to decreased quality of life. However, in cases of difficulty breathing due to metastasis to the lungs or pain due to metastasis to the bones, chemotherapy can relieve these symptoms. Additionally, conservative treatment and an improvement in drugs have allowed patients to endure these side effects.

Chemotherapy has an important role in breast cancer treatment and it has a great effect in reducing the recurrence rate and mortality rate of breast cancer. However, many patients also choose to give up chemotherapy due to the fear of suffering from the side effects. Therefore, it is important to manage chemotherapy-related adverse effects. Oncology nurses should understand about the effects and side effects of chemotherapy and provide guidelines of the most effective coping for treatment-related adverse effect to the patients, who will be administered the medications.

CARE FOR BREAST CANCER PATIENTS WITH RADIATION THERAPY

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Every year, over 20 thousand people are diagnosed with breast cancer in the Korea. Of this number, approximately 50% to 60% will be treated with curative and/or palliative radiotherapy. With the increased use of RT in the curative and palliative setting, the role of the RT nurse is even more critical.

RT nurse will need to continue to learn about combined modality treatment (CMT) and supportive care agents in addition to the technologic aspects of radiation. As well as, the increasing use of alternative and complementary medicine will also require nurses to gain more knowledge about the drug interactions and metabolism issues that could develop.

Advanced practice nurses (APN) in radiation oncology are involved in all phase from consultation to follow-up of radiotherapy. They should be able to assess physical abilities (eg, shoulder ROM) and routinely evaluate psychosocial area in breast cancer patient. In addition learning needs (eg, specific details skin care) and personal information (claustrophobia, anxiety) of breast cancer patients should be examined.

Radiation oncology advanced practice nurses manage symptoms of patients while on treatment and collaborate with radiation oncologists to provide treatment and ensure optimum patient care. They are expert patient educators, and often develop the patient education materials used to explain side effects of treatment and the self-care measures patients may use to alleviate these symptoms.

Faced with this complex environment, the role of APNs in radiation oncology has evolved and APNs are now considered important members of the interdisciplinary team. Radiation oncology nurse can make an impact on quality of patient care. Radiation oncology can perform consults manage treatment-related symptoms while patients are on active therapy, evaluate responses to treatment, and assess for treatment-related late effects or cancer recurrences in follow-ups.

Nurse in the field of RT need to be knowledgeable health care professional continues to evolve. The RT nurse who continues to learn, educate, and be an advocate for patient-centered care will be an asset to any team. In summary, the role of RN in radiation oncology is continuing to evolve.

SYMPTOM MANAGEMENT FOR ADVANCED CANCER PATIENTS: SYMPTOM CLUSTER APPROACH

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Patients with advanced cancer experience multiple symptoms. Some of the symptoms are known to co-occur and comprise a symptom cluster. Initial symptom cluster studies investigated the main symptoms that are known to occur frequently among cancer patients, such as pain, fatigue, depression and sleep disturbance. Further symptom cluster studies, which expanded list of symptoms to be included in the symptom cluster analysis, identified comparable symptom cluster findings. In an effort to identify key symptoms comprising symptom clusters, principal variable analysis (1) and network analysis (2) have been applied. Efforts to identify symptom clusters and the influential symptoms in the symptom cluster would accelerate our understanding of the mechanisms of symptom clusters and the development of more targeted interventions.

The mechanisms of symptom clusters have been considered to be closely related to inflammatory pathways. In an effort to understand the mechanisms underlying symptom clusters, studies have also identified genetic polymorphisms associated with symptom cluster (3-5).

Considering the significance of symptom clusters among advanced cancer patients, nursing interventions targeting symptom clusters need to be applied. A pilot quasi-experimental study applying a psychoeducational intervention to control the fatigue-pain-sleep disturbance symptom cluster demonstrated a reduction in symptom cluster severity, fatigue severity, fatigue interference, and sleep disturbance (6). A randomized control trial that targeted the common pain-fatigue-sleep disturbance symptom cluster among advanced cancer patients applied cognitive behavioral strategies for 9 weeks, which resulted in less symptom cluster distress at week 6 (7). Another pilot study targeting the symptom cluster of worry-insomnia-depression-fatigue among advanced cancer patients applied cognitive behavioral therapy acceptance and commitment therapy (CBT-ACT). The CBT-ACT improved worry, sleep efficiency, sleep latency, insomnia severity, and depression (8). A limited number of intervention studies targeting symptom clusters and demonstrating benefits in alleviating symptom severity, interference, and distress have been conducted to date.

Further studies are required to further understand the mechanisms of symptom clusters. The development of interventions targeting symptom clusters and the evaluation of their effectiveness are strongly recommended.

References

1. Rha SY, Park M, Lee J. Stability of symptom clusters and sentinel symptoms during the first two cycles of adjuvant chemotherapy. Support Care Cancer. 2019;27(5):1687-95.
2. Papachristou N, Barnaghi P, Cooper B, Kober KM, Maguire R, Paul SM, et al. Network Analysis of the Multidimensional Symptom Experience of Oncology. Sci Rep. 2019;9(1):2258.
3. Miaskowski C, Conley YP, Mastick J, Paul SM, Cooper BA, Levine JD, et al. Cytokine Gene Polymorphisms Associated With Symptom Clusters in Oncology Patients Undergoing Radiation Therapy. J Pain Symptom Manage. 2017;54(3):305-16 e3.
4. Doong SH, Dhruva A, Dunn LB, West C, Paul SM, Cooper BA, et al. Associations between cytokine genes and a symptom cluster of pain, fatigue, sleep disturbance, and depression in patients prior to breast cancer surgery. Biol Res Nurs. 2015;17(3):237-47.
5. Dunn LB, Aouizerat BE, Langford DJ, Cooper BA, Dhruva A, Cataldo JK, et al. Cytokine gene variation is associated with depressive symptom trajectories in oncology patients and family caregivers. Eur J Oncol Nurs. 2013;17(3):346-53.
6. Nguyen LT, Alexander K, Yates P. Psychoeducational Intervention for Symptom Management of Fatigue, Pain, and Sleep Disturbance Cluster Among Cancer Patients: A Pilot Quasi-Experimental Study. J Pain Symptom Manag. 2018;55(6):1459-72.
7. Kwekkeboom K, Zhang YZ, Campbe T, Coe CL, Costanzo E, Serlin RC, et al. Randomized controlled trial of a brief cognitive-behavioral strategies intervention for the pain, fatigue, and sleep disturbance symptom cluster in advanced cancer. Psycho-Oncology. 2018;27(12):2761-9.
8. Wells-Di Gregorio SM, Marks DR, DeCola J, Peng J, Probst D, Zaleta A, et al. Pilot randomized controlled trial of a symptom cluster intervention in advanced cancer. Psycho-Oncology. 2019;28(1):76-84.

DIGNITY IN CARING PATIENTS WITH LIFE THREATENING ILLNESS

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Introduction: When humans face the threat of life, the first thought that comes to mind is the question of death. Human dignity is to be considered most deeply in the end of life.

Dignity in caring patients with life threatening illness: The dictionary definition of dignity is high, solemn nature unable to dare(Standard Korean Dictionary), or the quality of a person that makes him or her deserving of respect, sometimes shown in behavior or appearance (Cambridge dictionary). Dignity is a major attribute of the human nature. What is the human nature that makes humans human?

There are two basic views of human nature. The first view is traditional psychological theories which originate in psychoanalysis or behaviorism. These theories consider human beings as monads and pursue normality as equal to inner equilibrium, and psychological stability is defined as preservation of the monad. Within this system, there is a multitude of influences: drives, our will, feelings, cognition, conditioning, automatic responses, creativity, spontaneity, the conscious and the unconscious. A person is healthy if he is able to satisfactorily abreact his drives, adequately meet his needs and wishes, not repress his traumas, adjust his conditioning mechanisms to his requirements, and self-actualize for himself. It can be expressed by the phraseology: Good is what is good for me,, or I remain healthy if I can get what is good for me. This view of human nature centers around the ego.

A fundamentally different approach starts from the premise that human beings are not monads, open to the world, open through the exclusively human dimension of the spirit. They are complemented by motivational forces that we reach beyond ourselves. This motivational force is called will to meaning. Meaning is the connecting link between the human being and the world. Meaning, therefore, is not just a meaning for me, but is for others. This meaning allow for self-transcendence of our uniquely human capability to go beyond drives or circumstances to go beyond our self toward something (i.e., an endeavor) or someone (a loved one) greater than our self. The question as to what we human beings are is no longer answered by a creature in pursuit of happiness, but a creature in pursuit of meaning, that is a meaning to be found in the world.

Human is a spiritual being with a will for meaning. Human nature as a spiritual being has the following characteristics: meaning of life, freedom of choice, responsibility, creativity, compassion and forgiveness, altruistic love, humor (optimism), commitment to work, gratitude, self-awareness, and awareness of finiteness of life. In addition, humans feel inner satisfaction when they live a life with a self-transcendent orientation rather than self-centeredness.

Conclusion: What does dignity mean when caring for a patient with life-threatening illness? Human beings are spiritual beings, and the nature of the spirit is transcendental rather than self-centered. In other words, the sense of inner self-satisfaction is experienced through self-transcendental meaning discovery, selfless service for others, and encounter with authenticity. When caring for a patient with a life-threatening illness, care can be taken as dignity, taking into account the nature of the human spirit.

ETHICAL ISSUES IN END OF LIFE CARE

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Various ethical issues arise in the context of the end of life care. Therefore, nurses need to be knowledgeable of the ethical issues to provide support for patients and their family and good care to them. Nurses also require having an understanding of the ethical principles that are essential doctrines to guide them in the care and decision making of patients confronting ethical issues.

Basic ethical principles

The principles underlying biomedical ethics include respect for autonomy, nonmaleficence, beneficence and justice (Beauchamp & Childress, 2013). First, respecting patients autonomy is closely related to horning for patient self-determination in terms of holding their views, making choices, and taking actions based on their values and belief. Especially, patients self-determination in health care is frequently exercised with informed consent. Nonmaleficence means that one ought not to inflict evil or harm; however, beneficence means that one ought to prevent and to remove evil or harm, and to do good. Professional malpractice can be a violation of the principle of nonmaleficence because the principle relates to the standard of nursing care practice. The principle of beneficence emphasizes the role of nurses as an advocate for what is good or beneficial for the patients. Finally, justice in bioethics is understood as fairness in delivering nursing care or health care resource.

Ethical issues in end of life care

Even though patients might have a unique experience in their disease process, several ethical issues surrounding the end of life care are generally shared among them.

Difficult decisions in end of life care

Difficult decisions in end of life care are related to the lack of patients decision making capacity, surrogates decision-making for patients in their interest, allocation of scarce resources, withholding/withdrawing of life-sustaining treatments, providing nutrition and hydration, and physician-assisted suicide, etc. Those decisions would be made in not only honoring the autonomy of patients but also pursuing the best interest for them.

Advance care planning

Effective advance care planning (ACP) can promote the autonomy of patients with a terminal illness, even though they cannot have the appropriate capability to choose for themselves (Cavalieri, 2001). A law for respecting patients right to self-determination has been regulated in several countries, which has been promoted the ACP. The ACP means all processes for horning patients wishes for end of life care during the discussion among patients, families, healthcare proxy and physicians including the appropriates use of medical order for life-sustaining treatment or advance directives.

Barriers to hospice and palliative care

Hospice and palliative care should be a choice for terminally ill patients. However, obstacles to appropriate and timely hospice referral were identified in several points: ineffective communication about a terminal prognosis, maintaining hope, patients unwilling to accept a terminal prognosis, difficulty in consenting for hospice, the patients fear of abandonment and oncologists loss of control (Daugherty, 2004).

Pain management

Most people would like to be free from pain at their end of life. Failure in pain management for terminally ill patients would violate the principles of respect for autonomy as well as of nonmaleficence because pain can diminish not only patients quality of life and ability to make a decision (Ko, Perez-Cruz, & Blinderman, 2011). Even though effective pain control is necessary for the dying, ethical issues surrounding pain management should also be considered including hastening death, the use of palliative sedation, distinguishing from physicianassisted suicide or euthanasia. Ethicists point out intention as important reasoning to ethically justify the action of pain management using the principle of double effect. However, still there are still debates on the issues (McCabe, 1997).

We face many ethical issues during caring for the dying. Most of the ethical issues can be resolved by the change of our perception at the end of life and the good communication between the patient, family, nurse, and physician.

References

1. Beauchamp, T. L., & Childress, J. F. (2013). Principles of biomedical ethics (7th ed.). New York: Oxford University Press.
2. Cavalieri, T. A. (2001). Ethical issues at the end of life. J Am Osteopath Assoc, 101(10), 616-622.
3. Daugherty, C. K. (2004). Examining ethical dilemmas as obstacles to hospice and palliative care for advanced cancer patients. Cancer Investigation, 22(1), 123-131. doi:10.1081/Cnv-120027587
4. Ko, D. N., Perez-Cruz, P., & Blinderman, C. D. (2011). Ethical issues in palliative care. Prim Care, 38(2), 183-193, vii. doi:10.1016/j.pop.2011.03.003
5. McCabe, M. J. (1997). Ethical issues in pain management. Hosp J, 12(2), 25-32. doi:10.1080/0742-969x.1997.11882854

INTRACTABLE WOUND CARE OF ADVANCED BREAST CANCER

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Malignant wounds are a complication of cancer and occur when the cancer or metastasis infiltrates into the skin, blood and lymph vessels. Accurately ascertaining the prevalence of malignant wounds is difficult. Because there is no register that monitors their incidence. Malignant wounds are commonly presented in the breast (49%), followed by the neck (21%), the chest (18%), the extremities (17%), genitals (17%), head (13%) and other areas (2%).

Malodour, exudate, pain, bleeding, pruritus and local or systemic infection are the most frequent symptoms. In addition, the healing of malignant wounds is difficult and in many cases impossible, causing significant distress to patients, caregiver and health care professionals. Therefore, treatment of malignant wounds includes symptom management (controlling exudate and odor, protecting surrounding skin, preventing infection, minimizing pain and bleeding) promotion of comfort and enhancement of quality of life.

In conclusion, malignant wounds rarely heal and, therefore, the mainstay of treatment is symptom alleviation within a palliative care model.

BREAST CANCER RELATED LYMPHEDEMA AND PRECAUTIONARY BEHAVIORS

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Breast cancer is the most common cancer among Korean women. By 2017, there are about 217,203 breast cancer prevalences in Korea, increasing every year. Treatment of breast cancer includes surgery, chemotherapy, and radiation therapy. Lymphedema is the most common chronic complication of breast cancer treatment. Although it varies depending on the literature, the incidence rate is about 7-30%. Lymphedema can have a negative impact on overall quality of life, including depression, limited daily life, and loss of employment, resulting in financial burdens. In order to prevent lymphedma in breast cancer patients, the clinician recommends avoiding trauma, skin infection, blood pressure measurement, blood collection, injection, etc. According to this recommendation, patients are not allowed to use the surgical arm, and they have to receive medical treatments on the opposite arm or leg(such as blood pressure measurement, blood collection, and injection). They experience pain and discomfort. The burden and stress of medical staff is also increasing. In addition, breast cancer survivors are increasing due to improved breast cancer treatment results, and both breast cancer patients are also increasing, and the number of patients experiencing discomfort and pain is increasing. And, when patients do not follow these guidelines, they experience unnecessary high levels of anxiety.

Recently, the proportion of patients undergoing sentinel lymph node biopsy to check the status of lymph nodes is increasing, and the risk of lymph edema is decreasing. Despite these advances, there has been no change in the prophylactic actions to reduce the risk of lymphedema after treatment.However, these guidelines, which are generally recommended in the clinic, are mostly based on information from case reports, cohort studies, or single organ report studies involving a small number of patients, are customarily use to prevent lymphedema.

Recent studies on risk factors for breast cancer lymphedema do not have scientific evidence showing the effectiveness of theses precautions. Although there is not much literature, however, in most of the literature, blood pressure measurements on the affected arm after breast cancer surgery did not increase the risk of lymphedema. In addition, blood collection and intravenous injection in the affected arm had no effect or low risk of increasing lymphedema. However, if an infection occurs in the blood collection or intravenous injection area, the risk of lymphedema is increased, so careful observation and prevention education are important. Several studies have educated patients to recognize lymphedema rather than prevent it, and recommended using personalized risk reduction strategies.

FOLLOW-UP EXAMINATION FOR RECURRENCE OF BREAST CANCER PATIENTS

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Traditionally, follow-up examination of breast cancer patients has been felt to facilitate early detection and improve survival. Health provider should recommend regular follow-up care to patient who provide who have been treated for breast cancer. However, recent literatures suggest that routine intensive follow up studies for asymptomatic breast cancer patients after primary treatments, showed no survival benefit. Also, there is controversy between aggressive and minimal policy for breast cancer patients follow up after primary treatment still exist. But patients should undergo regular surveillance for breast cancer recurrence, including evaluation with a cancer-related history and physical examination, and should be screened for new primary breast cancer. We should counsel patients about the importance of maintaining a healthy lifestyle, monitor for post-treatment symptoms that can adversely affect quality of life, and monitor for adherence to endocrine therapy. Recommendations on surveillance women who have been treated for breast cancer for second primary cancers, assessment and management of physical and psychosocial long-term and late effects of breast cancer and its treatment, health promotion, and care coordination/practice implications are made. The multiplicity of guidelines or recommendations may reflect that socioeconomic conditions, mostly financial causes such as insurance policies, vary among patients and institutions. To prevent breast cancer recurrence and breast cancer-related mortality, nurses should encourage breast cancer survivors to engage surveillance.

CHANGES WITHIN FAMILY LIFE 1: DISTRESS AND QUALITY OF LIFE OF SPOUSES OF WOMEN WITH BREAST CANCER

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An individual doesnt get cancer, a family does. (Terry Tempest Williams)

Approximately 17 million Americans with a history of cancer are alive today. Three out of four families have at least one member who is a cancer survivor. We know that a cancer diagnosis affects the entire family. Also in Korea, Breast cancer accounts for 20% of female cancer survivors in 2015. In particular, the characteristic of breast cancer in Korea, unlike in the West, is that women in their 40s and 50s are diagnosed with breast cancer. Diagnosis and treatment of breast cancer in these middle-aged women can lead to a crisis in the family of breast cancer patients. We need to understand more about the effects of cancer on diverse aspects of the life and quality of life of family members.

The primary supporters of breast cancer patients are their husband, spouse, therefore, the problem experienced by breast cancer patients is not the experience of individual patients, but the common experience of a spouse who interacts with the patient very closely.

What about problems with families of breast cancer patients, especially their spouses? The spouses of breast cancer patients are very important person to the patients and they are significant others of patients, and the quality of life of male spouses of partners with breast cancer may determine the support they are able to give their wives. But unfortunately, little is known about the distress, quality of life and factors associated with their quality of life.

For breast cancer patients, the patients' spouse is responsible for much of the responsibility for patient care. As the primary caregiver who plays the most important role in the patient, the individual's well-being of spouses means the patients' well-being.

According to previous studies, breast cancer patients and survivors are reported experiencing a variety of physical and psychological difficulties during or after treatment, such problems due to the diagnosis and its related treatment also enhances caregiver burden. Family members often become caregivers at the time of cancer diagnosis, and accompany patients in their journey to cancer survivorship. The quality of life of male spouses of partners with breast cancer may determine the support they are able to give their wives. Little is known about the factors associated with their quality of life.

Husbands of patients with breast cancer experience as much as or even more distress than patients. Husbands who report persistent domestic role strain are at high risk for continued psychological distress following their wives' breast cancer treatment. Spouses in particular often experience greater burden, strain, or distress than other family caregivers and non-caregiving spouses, which may amplify their risk of adverse health outcomes. Facing a breast cancer diagnosis, couples may experience psychosocial distress, which might also affect their individual and dyadic functioning. Coping with cancer from a couple-based perspective as a dyadic stressor can profoundly influence psychosocial adjustment as well as individual and dyadic functioning of patients and spouses. Dyadic coping allows a better matching of needs, sharing of worries, and mutual support, resulting in higher relationship satisfaction. According to research to describe the psychosocial impact on caregivers of caring for women with advanced breast cancer, cancer caregivers have been assumed great responsibility for providing care. Caregiving becomes more complex with each additional life role of the caregiver. Spouse caregivers have reported that have two advantages: (1) living with the patient facilitates caregiving and (2) patterns of decision making that were established previous to the illness facilitated shared decision making between the patient and spouse caregiver.

Less is known about their spiritual, practical, and physical needs and their distress and quality of life. Very little research has explored nursing interventions and supportive care needs of spouse caregiver. A diagnosis of breast cancer is a distressing time for both women and their spouses. Ongoing research and the development of interventions are necessary to help spouses cope with the stress throughout the illness so that they may support their wives.

Health care providers should monitor husbands' caregiver burden regularly. Providing couples with resources to reduce domestic role strain (such as social support and communication training) may prevent or alleviate psychological distress in these husbands. And also, I would like to propose the development and practical application of a stepwise intervention program according to the cancer journey for breast cancer patients and their spouses.

CHANGES WITHIN FAMILY LIFE 2: EXPERIENCES OF MOTHERS WITH BREAST CANCER AND THEIR CHILDREN

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The purpose of this phenomenological study was to explore the experiences of mothers with breast cancer and their children and examine their meanings by focusing on the mother-child relationship and communication. The study revealed the reciprocal aspects of the experiences that mothers and children go through in the face of life crisis and challenge brought about by maternal breast cancer as well as the meanings of these experiences.

To this end, in-depth interviews were held with four mother-child pairs. Collected data was analyzed using Max van Manens interpretative phenomenological analysis, through which six main themes and thirty-three subthemes were identified. The main themes are occurrence of breast cancer, acceptance of breast cancer, concerns and conflicts during breast cancer treatment, coping with difficulties posed during breast cancer treatment, communication about breast cancer, and changes in interaction: reestablishment of relationship.

A summary of the findings are as follows: First, under occurrence of breast cancer, both mothers and children attributed the cause of cancer to stress rather than biological factors. As a result, the children engaged in a cognitive distortion that they were the cause of the cancer.

Second, with regards to accepting breast cancer, mothers associated the loss of their breast a phenomenon unique to breast cancer with their nurturing capacity and thus hid their scar from their children for a long time as they felt apologetic. However, the children accepted the scar as evidence of survival. Also, in relation to the subtheme of the image of cancer cells from childrens point of view, the children went through the process of gradually accepting mothers breast cancer by projecting their perception and emotions on the cancer cells.

Third, in relation to concerns and conflicts during breast cancer treatment, the study showed that the experiences of the mothers and the children were reciprocal. Mothers experiences were characterized by the unchanging responsibilities of parenting, dilemma between their role as a mother and as a patient, self-examination regarding their anger towards children, blaming oneself for changes in their children, anxiety over possible recurrence, metastasis and death, and fear of the cancer being hereditary. Childrens experiences were categorized as witnessing, being attentive, recognizing, tolerating, and hiding.

Fourth, the study observed the experiences of mothers and children regarding coping with difficulties during breast cancer treatment. Mothers experiences were relying on their children, changes in parenting: drawing the line between complete tolerance and reasonable tolerance on certain types of behaviors, living my life for myself. Childrens experiences were looking up breast cancer, engaging in creative activities, and becoming independent and spending time together at the same.

Fifth, communication about breast cancer was examined. Experiences under this theme were communication about breast cancer and the treatment process, communication about scars, communication about loss of breast and the feminine body, communication about emotions, communication about health and lifestyle, and communication about death.

Lastly, experiences under the theme of changes in interaction: reestablishment of relationship were slight distancing: taking some time off from each other, mothers reflection on the relationship with her own mother: generational transference of relationship, caring for deprivations in the relationship, and affection for each other: coexistence and reconciliation. A gradual increase of reciprocity could be observed in the mother-child relationship over time.

Based on these findings, the study interpreted the meanings that these experiences have on mothers with breast cancer and their children by addressing the following: how to talk to the children about breast cancer, changed perspective on each other: self-reflection and integration, changed perspective on life: transcending death, and communication, growth and liberation.

By focusing on the experiences of mothers with breast cancer and their children and conducting a phenomenological exploration of those experiences based on the mother-child relationship and communication, this study provided significant implications. Its findings can hopefully become a cornerstone for building a strong social support system for mothers with breast cancer and their children in the future.

SURVIVORSHIP CARE PLANNING: SELF-MANAGEMENT SUPPORT INTERVENTION FOR BREAST CANCER SURVIVORS

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With higher survival rates than ever before, women with breast cancer have faced a wide spectrum of health-related challenges to late and long-term effects of treatment and a burden that survivors need to maintain their health by themselves. Previous studies reported that self-management interventions improve the quality of life by encouraging self-care, psychosocial support, and management of medical compliance.

In recent years, digital health care is increasingly being used for cancer care and there is a growing number of digital tools and services that support cancer patients' self-management. More specifically, mobile apps have the potential to help patients manage health and support behavioral change. A recent review has found that mobile apps have played a key role in providing survivors a dynamic platform to deliver survivorship care such as symptom tracking, survivorship education, information-sharing with family and/or caregivers, scheduling follow-up visits, personal alerts and reminders, and social networking. Also, several studies showed that mobile apps have also positively influence self-efficacy, empowerment of chronic disease for self-management.

However, currently, there is a lack of a clinical health care system and resources for digital health care that meets endorsed survivorship care of breast cancer for self-management. Nevertheless, digital health solutions continue to grow in both quality and value with ongoing development for the better part of self-management of cancer patients. Besides, as self-management of health is necessary for women to live breast cancer, we need to consider whether breast cancer survivors ready for digital health service being deprived of the opportunity to receive effective new digital intervention in understanding and skills about how to use health information and how to manage their health and well-being. Along with the emergence of digital health, this presentation will examine the state of digital health focus on self-management support, and explore their effects on survivorship care intervention for breast cancer survivors.

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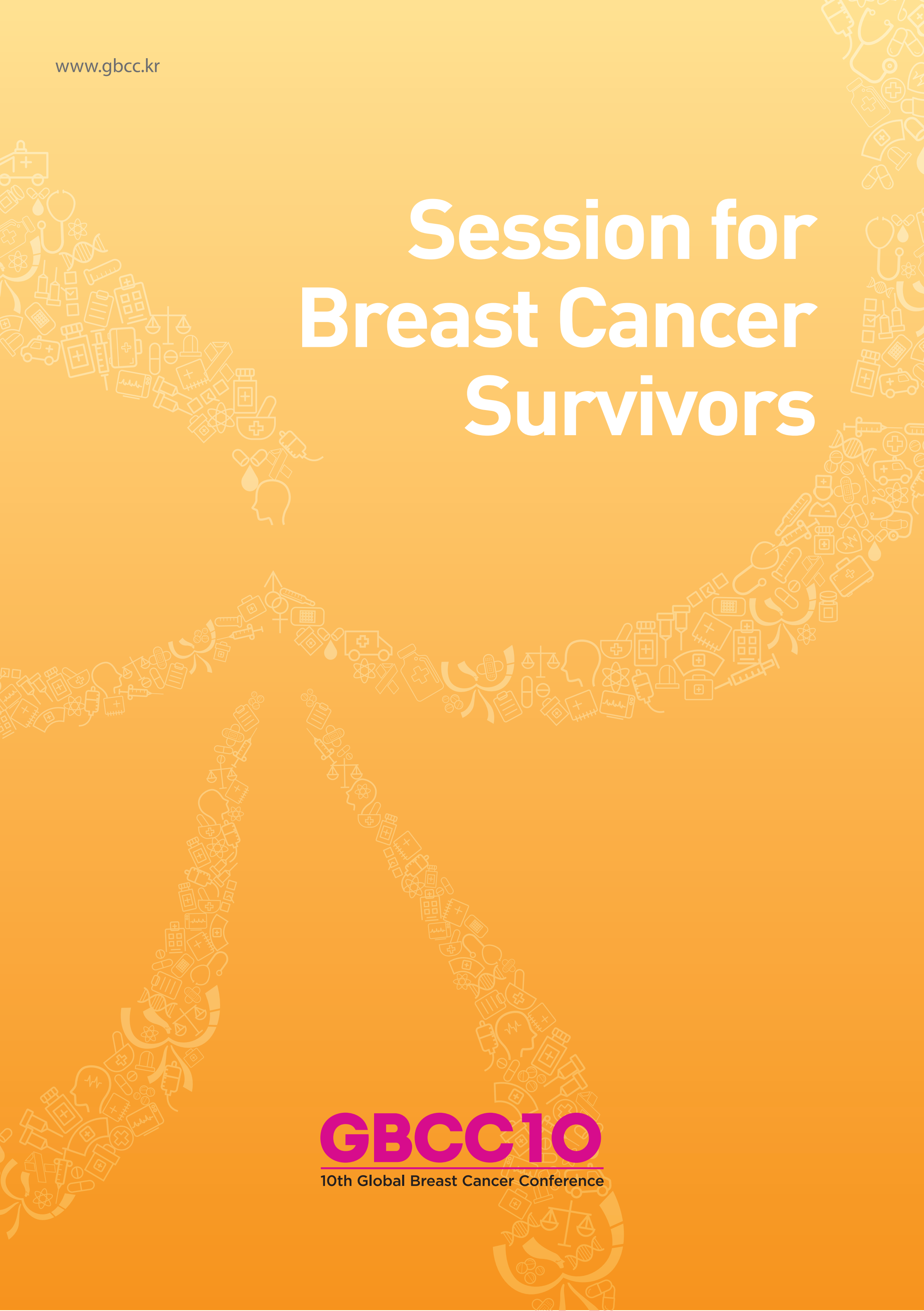

Session for Breast Cancer Survivors

GBCC10

10th Global Breast Cancer Conference

CAUSES AND INCIDENCES OF BREAST CANCER

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Overall, the burden of cancer incidence and mortality is rapidly growing worldwide. Breast cancer is now the first leading cause of global cancer incidence in 2020, with an estimated 2.3 million new cases, representing 24.5% of female cancer causes. Korea is one of the countries with a high incidence of cancer as it is classified as a country with a high human development index (HDI) along with other advanced countries (USA, Europe, Australia, New Zealand, Japan). Breast cancer occurs in 59.8 cases per 100,000, making it the highest incidence group among Asian countries. According to the report on the National Cancer Registration Project, the number of new breast cancer patients was 23,647, accounting for 20.5% of all female cancers in 2018. The elevated incidence rates in higher HDI countries reflect increased detection through organized or opportunistic mammographic screening as well as a longstanding higher prevalence of reproductive and hormonal risk factors and lifestyle risk factors.

The exact cause of breast cancer remains unclear, but some risk factors make it more likely. Among the known risk factors are increased age, gender, genetic factors, individual history of breast cancer, family history of breast cancer, certain previous abnormal breast biopsy, menstrual history (menarche before age 12 or menopause after age 55), reproductive history (Having your first child after age 30 or never having a full-term pregnancy), and dense breasts. These are factors we cannot change, but some risk factors are preventable. Being overweight after menopause increases your breast cancer risk. Alcohol is linked to breast cancer, compared with nondrinkers, those who are moderate drinkers (2 to 3 drinks a day) have about a 20% higher risk. Hormone replacement therapy (HRT) increases the risk of breast cancer, depending on the type and duration of use. Combination HRT (estrogen and progesterone) increases breast cancer risk by about 75%, even when used for only a short time. Breast cancer risk increases the most during the first 2 to 3 years of taking combination HRT. Higher-dose combination HRT increases breast cancer risk more than lower-dose combination HRT. Breast cancer risk goes back down to average about 2 years after you stop taking combination HRT. Estrogen-only HRT increases the risk of breast cancer, but only when used for more than 10 years. Recent oral contraceptive (birth control pills) use slightly increases a woman's risk of breast cancer, but only for a limited period. Women who stopped using oral contraceptives more than 10 years ago do not have any increased breast cancer risk. Lack of exercise is another risk factor for breast cancer development. Research shows a link between exercising regularly at a moderate or intense level for 4 to 7 hours per week and a lower risk of breast cancer.

Breast cancer is the most common cancer in women, but knowing the risk of breast cancer and changing the lifestyle of some risk factors can reduce the breast cancer experience. In addition, since breast cancer has a relatively high survival rate compared to other cancers of the same stage, I think that a good survival rate can be expected if you receive regular checkups for early detection and receive appropriate treatment after diagnosis.

IMAGING DIAGNOSIS OF BREAST CANCER

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Screening mammography is used to detect breast cancer in asymptomatic women. The average recall rate for screening mammography is about 8% to 10%. Of these recalls, only about 15% will prove to be suspicious after diagnostic workup and require biopsy. Of the biopsies, about one third will yield a diagnosis of cancer.

The diagnostic patient population is composed primarily of three groups of patients. Those who require additional evaluation of potential abnormalities detected on their screening mammograms, patients presenting with signs and symptoms possibly reflecting the presence of breast cancer, and women who have a history of lumpectomy and radiation therapy.

Diagnostic evaluations involve the use of additional mammographic views, such as spot compression and magnification, and other breast evaluation techniques, such as ultrasound, physical exam, and ductography, to analyze potential abnormalities identified on screening mammography and to evaluate symptomatic patients. A diagnostic study is directed and supervised by a radiologist, and patients are given their results at the conclusion of the examination.

The Breast Imaging Reporting and Data System (BI-RADS) lexicon is a classification scheme used to help standardize the description and disposition of breast lesions seen on mammography, ultrasound, and MRI. BI-RADS categories 1 and 2 are used to describe a negative study and a study in which there are benign findings, respectively. Category 3 is used to describe probably benign findings, with a less than 2% chance of malignancy, which can be followed in 6 months. Patients with new or enlarging solid masses or increasing clustered microcalcifications that are not classically benign require biopsy. Category 4 is used to describe suspicious findings (greater than 2% chance of malignancy) that require biopsy. BI-RADS category 5 lesions are highly suspicious findings, having a 95% or higher likelihood of malignancy. Category 6 is used in patients with a known breast cancer who are undergoing neoadjuvant chemotherapy or additional imaging studies.

Another primary role of diagnostic workups is to evaluate symptomatic patients. Commonly evaluated complaints include palpable lumps, an area of thickening, pain, and nipple discharge. The use of ultrasound in combination with mammography is extremely important in the symptomatic patient because some breast cancers may not be detected mammographically. Real-time evaluation by the radiologist is often necessary to detect subtle cancers. The negative predictive value of a negative mammography and ultrasound is estimated to be 95% to 99%. However, despite this high negative predictive value, a biopsy may still be warranted in the setting of a suspicious clinical finding.

Dynamic contrast-enhanced (DCE) MRI of the breast has been shown to be extremely sensitive in the detection of invasive breast cancer and is not limited by breast tissue density. Current indications include high-risk screening, evaluation for an unknown primary carcinoma, preoperative evaluation in patients with known breast cancer, evaluating response to neoadjuvant therapy, and suspected recurrence. However, the utility of DCE MRI has been limited by its variable sensitivity for ductal carcinoma in situ (DCIS). In general, the role of DCE MRI as a problem-solving tool in the evaluation of suspicious imaging or clinical findings is unclear. A negative MRI should not be used to avoid biopsy of suspicious findings on mammography or ultrasound or of a suspicious clinical finding.

PATHOLOGIC DIAGNOSIS AND SUBTYPES OF BREAST CANCER

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Final pathologic diagnosis of breast cancer is based on American Joint Committee on Cancer (AJCC) staging manual and World Health Organization (WHO) classification of tumors of the breast. Recently, Breast Pathology Study Group of the Korean Society of Pathologists has proposed a standardized pathology reporting form for breast cancer. Of the reporting form, standard data elements, which are basic pathologic features for prognostication of breast cancer patients, include breast specimen types, histologic type, tumor focality, tumor size, tumor extension, histologic grade, carcinoma in situ component, resection margin, regional lymph node metastasis, lymphovascular invasion, and pathologic stage classification. Basic biomarkers, which are essential for subtyping of breast cancer and treatment include estrogen receptor (ER), progesterone receptor (PR) and human epidermal growth factor receptor-2 (HER2) and they are evaluated by the current American Society of Clinical Oncology/College of American Pathologists (ASCO/CAP) guidelines.

Breast cancer is a heterogeneous disease with different biological characteristics and clinical behaviors. Four major molecular subtypes (luminal A, luminal B, HER2+ and triple-negative) have been identified by comprehensive gene expression profiling and expression of surrogate markers, and are associated with different clinical outcomes. Luminal A breast cancers express hormone receptor, have favorable outcomes and can be treated by endocrine therapy. Luminal B breast cancers also express hormone receptor but usually in low level, show high proliferation index and have aggressive features. HER2+ breast cancer, which shows overexpression of HER2 and/or amplification of the HER2 gene, is identified in 1520% of breast cancers, and was associated with poor prognosis. However, after introduction of HER2 targeted therapy including trastuzumab, lapatinib, and pertuzumab, clinical outcomes have improved substantially. Triple-negative breast cancer (TNBC) is characterized by the absence of expression of ER, PR and HER-2, accounting for 10-20% of all breast cancers and have a poorer prognosis than other subtypes of invasive breast cancer. Now, poly adenosine diphosphate-ribose polymerase (PARP) inhibitor and immune checkpoint inhibitor are indicated in a subset of TNBC.

BREAST CONSERVING SURGERY

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Modern surgery for breast cancer was initiated by the radical mastectomy attempted by William Halsted in 1894. This surgery was a method of resecting wide range of tissues including breast, overlying skin, chest muscle and axillary contents. So, radical mastectomy was accompanied by many complications with external defects. After then, modified radical mastectomy was devised to overcome these problems, and there was no difference in treatment outcomes between two surgical methods. Recently, several clinical trials have shown that breast conserving surgery with radiation therapy in eligible patients was not different from modified radical mastectomy in the aspect of treatment outcomes. According to the Korean Breast Cancer Society's breast cancer registration data, breast conserving surgery was performed in about 20% of all breast cancer patients in the early 1990s, but it increased to about half of all breast cancer surgeries by the mid-2000s and is currently on the rise. We would like to talk about the development of these surgical methods, the procedures and indication of breast conserving surgery.

MASTECTOMY AND RECONSTRUCTION

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Definition of mastectomy is complete removal of the tissue of the breast, including skin, areolar, and nipple. Although, breast conserving surgery has been used more widely, mastectomy is one of option for the surgical treatment of breast cancer.

Patients want to preserve their breast, there are several contraindications for breast conserving surgery.

- Multicentric disease with two or more primary tumors in separate quadrants of the breast.
- Diffuse suspicious microcalcifications on mammography such that the extent of disease is not clearly evident.
- Inflammatory breast cancer (IBC)
- Inability to clear persistently positive resection margins after reasonable attempts at re-excision.
- Large tumor size in relation to breast size
- A history of prior therapeutic radiation-would result in an excessively high total radiation dose to the chest wall.
- Pregnancy is an absolute contraindication to the use of breast irradiation,

And, some patients may choose a mastectomy because they do not want post-operative radiation therapy or they have high risk genetic mutations.

As the techniques of breast cancer evolved, surgeons can use several mastectomy methods include modified radical mastectomy, simple total mastectomy, skin-sparing mastectomy, and nipple-areolar sparing mastectomy. Besides the technique, the timing of reconstruction can be chosen, such as reconstruction at the same time or some years after the cancer treatment. The timing of the planned reconstruction has important implications on the choice of mastectomy techniques.

- Modified radical mastectomy: a complete removal of the entire breast tissue and the level I and II axillary lymph nodes.
- Simple mastectomy: a complete removal of the entire breast tissue without axillary lymph node dissection
- Skin sparing mastectomy: a surgical technique which can remove entire breast tissue and the nipple areolar complexes with preserving the natural breast skin envelope
- Nipple sparing mastectomy: compared with skin sparing mastectomy, not only natural breast skin envelope but also nipple areolar complex is preserved

Reconstruction can be performed using a breast expander/implant, or using autologous tissues, or a combination of expander/implant and autologous reconstruction.

Because there are several options of mastectomy and reconstruction methods and timing, patients and doctors should discuss deeply about the operation methods depend on the patient's disease status, general condition and patient's preference.

SURGERY FOR AXILLARY LYMPH NODES

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Axillary lymph node dissection (ALND) which was an essential part of breast cancer treatment and the gold standard in evaluation of the status of axillary lymph node had notorious with increased arm morbidity and reduction of quality of life. Sentinel lymph node biopsy (SLNB) accurately stages the axilla in early breast cancer and ALND is omitted in patients with negative SLNB. Even in patients with positive SLNB, ALND could be spared in the breast-conservative surgery-treated patients with 1 or 2 positive SLNs based on the ACOSOG-Z0011 trial [1]. Limited axillary surgery is expanding to the node-positive patients. In patients with metastatic SLNs, AMAROS trial showed non-inferiority of radiotherapy compared to ALND [2]. For node-positive patients undergoing neoadjuvant systemic chemotherapy, ALND could be also omitted in the selected patients [3]. Currently, in the clinically-node negative patients, the prospective trial is underway to evaluate an effect of no axillary surgery [4]. Axillary surgery still has an integral role in staging work-up but will evolve as a limited form for more breast cancer patients with different stages.

References

1. Giuliano AE, Hunt KK, Ballman KV et al (2011) Axillary dissection vs no axillary dissection in women with invasive breast cancer and sentinel node metastasis: a randomized clinical trial. Jama 305(6):569-575. doi:10.1001/jama.2011.90
2. Donker M, van Tienhoven G, Straver ME et al (2014) Radiotherapy or surgery of the axilla after a positive sentinel node in breast cancer (EORTC 10981-22023 AMAROS): a randomised, multicentre, open-label, phase 3 non-inferiority trial. Lancet Oncol 15(12):1303-1310. doi:10.1016/s1470-2045(14)70460-7
3. Boughey JC, Suman VJ, Mittendorf EA et al (2013) Sentinel lymph node surgery after neoadjuvant chemotherapy in patients with node-positive breast cancer: the ACOSOG Z1071 (Alliance) clinical trial. Jama 310(14):1455-1461. doi:10.1001/jama.2013.278932
4. Gentilini O, Veronesi U (2012) Abandoning sentinel lymph node biopsy in early breast cancer? A new trial in progress at the European Institute of Oncology of Milan (SOUND: Sentinel node vs Observation after axillary UltraSouND). Breast 21(5):678-681. doi:10.1016/j.breast.2012.06.013

CHEMOTHERAPY

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Surgical resection remains the mainstay of the treatment of breast cancer. Adjuvant therapy is the treatment given in addition to the surgery to increase the cure rate. Adjuvant therapy include radiation therapy and systemic therapy. Systemic therapy for breast cancer comprises of chemotherapy, hormonal therapy, and targeted therapy. Physicians make the treatment plan based on many factors such as the subtype and stage of breast cancer and the general health status of the patient. Systemic therapy can also be given before the surgery, which is called neoadjuvant therapy. I will review the concepts and basic principles of systemic chemotherapy for general understanding of breast cancer survivors.

HORMONE THERAPY (ENDOCRINE THERAPY)

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Some breast cancer can be affected by hormones in the blood. These hormones are made naturally in the body. The ovaries, body fat, liver and muscle produce the hormones estrogen and progesterone.

Around two-thirds of breast cancers are hormone receptor (estrogen receptor, progesterone receptor) positive breast cancer, which have receptors that attach to estrogen, which help them grow. Hormone therapy lower the levels of estrogen or progesterone in the body, or block their effect.

Hormone therapy is often used after surgery to help reduce the recurrence or metastasis of breast cancer. This is called adjuvant treatment. It is usually used for at least 5 years or 10 years according to stage. Sometimes, treatment before surgery is called neoadjuvant treatment.

There are several different types of hormone therapy, which use different ways to keep estrogen form helping the cancer grow.

First, treatments that block hormones from attaching to cancer cells are tamoxifen, toremifene, fulvestrant. Tamoxifen is one of the most commonly used hormone therapies for breast cancer. Tamoxifen is appropriate for both premenopausal women and postmenopausal women.

Second, treatments that lower estrogen levels are aromatase inhibitors. Aromatase inhibitors are drugs that stop estrogen production. Aromatase inhibitors are only used in women after menopause.

Third, ovarian ablation is generally used in women with advanced breast cancer. Treatment options may include oophorectomy, luteinizing hormone-releasing hormone (LHRH) analogs, chemotherapy, and radiation. Side effects of hormone therapy for breast cancer vary from drug to drug. Main side effects are associated with menopausal symptom. Less common, more-serious side effects are osteoporosis, vein thrombosis, endometrial cancer, and heart disease.

In conclusion, the selection of hormone therapy depends on individual circumstances (menopausal status, cancer stage, and side effect of drug).

TRAGETED THERAPY

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Breast cancer is currently considered as most favorable because of a variety of effective targeted agents in combination with chemotherapeutic and endocrine agents. Development in molecular science has been able to identify the cancer specific “target” molecules which play an important role in cancer development and progression. The targeted agents specifically affect cancer cells via these target molecules without damaging normal cells and thus do not have chemotherapy-related toxicities.

Breast cancer is not a single disease but can be divided into several subtypes based on the specific molecule expressions, such as estrogen/progesterone receptor (ER/PR) and HER2. For the ER/PR-expressing tumor (i.e. hormone-responsive type), a lot of hormone agents, such as tamoxifen or aromatase inhibitors have been developed to decrease relapse after surgery or increase survival for advanced cancer patients. In fact, these hormone or endocrine therapeutic agents are now considered as targeted agents. Recently, new target agents have been introduced to potentiate anti-tumor effect of these hormone agents and increased survival in breast cancer patients with incurable disease. For HER2-expressing tumor (HER2-overexpressing type), anti-HER2 agents have shown its efficacy for both early and metastatic cancers. These agents have minimal adverse events compared with toxic chemotherapeutic agents and can be combined with chemotherapy without additional serious toxicity. However, there is still challenge for the tumors without ER/PR/HER2 expression. Recently, a series of newer target agents have been developed such as PARP inhibitor or immune modulating agents. With these effective targeted agents, breast cancer patients can expect more favorable results without severe toxicity and furthermore, will see more effective target agents in near future which are currently under development in the clinical trials.

DIAGNOSIS AND MANAGEMENT OF LYMPHEDEMA

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Breast cancer-related lymphedema (BCRL) is a chronic, debilitating condition with a variety of causes that restricts the flow of lymphatic fluid. During the initial stages of lymphedema, the edema may be soft with pitting, and the severity of the condition is reflected by limb volume change. If left untreated, a reaction to the tissue injury induces the accumulation of inflammatory cells, a hallmark of a pathophysiological skin event.

Early assessment and intervention may be important to correct subtle subclinical lymphedema that, if left untreated, may progress to chronic and severe lymphedema. Previous studies suggested that regular surveillance of upper-body morbidities such as lymphedema should be integrated into the routine postoperative care of women with breast cancer, as early diagnosis potentially contributes to more effective management, and prevention of progression of troublesome conditions.

In my lecture, I will introduce a surveillance program for lymphedema management (SLYM) and lifestyle modification for breast cancer patients with risk of lymphedema.

EXERCISE

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Exercise is an effective intervention to improve quality of life, cardiorespiratory fitness, physical functioning and fatigue in breast cancer patients and survivors. How much of physical activity is recommended? WHO updated its guidelines for physical activity recently. The key points of new recommendations are: 1) some physical activity is better than nothing at all, 2) become more active throughout the day in relatively simple ways to achieve the recommended activity levels, 3) people who are sedentary can have up to 30-percent increased risk of early death compared to those who are active. Despite this strong recommendation, globally, about 25% of adults don't meet the recommended levels of physical activity. What is the barrier of daily exercise? And What do they need for daily exercise? In my lecture, I will suggest the several practical tips and recommendations for the breast cancer survivors and related experts as follows ;

1. Never do exercise for your health. Stop work out for burning your fat.
- You believe that exercise can defeat your cancer. Lay down your belief. Instead, listen to your body, and focus on your muscles such as hip, shoulder and chest.

2. Start walking in your daily life.
- Don't run on the treadmill as like a hamster. Outdoor activities are more helpful than indoor. Moving your body in the natural environment can lead you to recognize the world and connect yourself to the others.

3. Breath properly.
- Every day we walk and every time we breath. Walking and breathing are two core elements of the daily life. There are several techniques of breathings in the world. Find the proper breathing method for you and try that every day. The right breath could bring you to the better life.

4. Keep good posture.
- To make your body in good posture, you should understand your muscles and joints. Training your body properly every seconds.

DIET AND NUTRITION

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In Korea, the incidence of breast cancer is highest in women. The age-standardized incidence rate of breast cancer has steadily increased, reaching 55.6 per 100,000 in 2017, with an average annual increase of 4.4% from 2007 to 2017. However, the incidence rate in Korea remains lower than that of Western countries. The age-standardized incidence rates of breast cancer (per 100,000) were 105.0 in Denmark, 95.0 in the U.K., 92.9 in the U.S.A, and 86.0 in Australia in 2012. This large international variation, with incidence lower in developing countries than in Western countries, and the rapid upward trend in parts of Asia suggests the important roles of dietary factors in breast cancer development.

Early detection, treatment improvement, and social support have contributed to enhanced breast cancer outcomes. Survival statistics based on the Korea Central Cancer Registry data linked to mortality data from the Ministry of the Interior reported that five-year survival rates for Korean breast cancer patients improved from 79.2% in 1993-1995 to 93.2% in 2013-2017. Survival improvements emphasize the importance of supportive care, diet, and quality of life for breast cancer survivors. Although there is limited evidence, several studies support that maintaining a healthy weight and healthy eating and engaging in regular physical activity improve breast cancer prognosis.

This talk will summarize current guidelines and knowledge for breast cancer survivors including scientific research findings. Selected topic includes diet in early life, weight loss, healthy dietary pattern, soy products, fats and supplementation.

RADIATION AFTER BREAST CONSERVING SURGERY

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Newly diagnosed, non-metastatic breast cancer is treated with multimodal treatment including surgery, radiation treatment, and systemic treatment. For patients with early-stage breast cancer, breast conservation has been a standard alternative to mastectomy. The aim of breast conserving surgery (BCS) is to remove all cancerous lesion and as much microscopic disease as possible while maintaining cosmesis. Possible residual microscopic disease may then be treated with postoperative radiotherapy. In patients undergoing BCS, radiotherapy has been traditionally administered to the entire breast tissue. The combination of BCS and whole breast radiation therapy (WBRT) has been successful in matching the long-term survival as mastectomy. Randomized prospective clinical trials have confirmed that BCS and WBRT are associated with equal long-term survival as mastectomy for patients with early-stage breast cancer. WBRT reduces the locoregional recurrence, with a nearly 50% reduction in the 10-year risk of recurrence compared with BCS alone (19% versus 35%, respectively; relative risk [RR] 0.52). The reduction in locoregional recurrence by WBRT results in a reduction in the 15-year risk of breast cancer death (21% vs. 25%; RR 0.82) [1]. Given the effectiveness WBRT, more than 60% of early breast cancer is treated with BCS [2].

WBRT is usually given with conventional fractionation, which is delivered to the entire breast in 1.8 to 2 Gy daily fractions over 4.5 to 5 weeks to a total dose of 45 to 50 Gy. Recently, a shorter fractionation (hypofractionation) schedule has been adopted as WBRT regimen. Hypofractionated WBRT delivers more radiation dose per fraction, but the overall treatment duration is shorter than conventional fractionation. A total radiation dose of 40 to 42.5 Gy in approximately three to five weeks is typically chosen as hypofractionated WBRT regimen. There have been studies reporting that breast cancer-specific survival, radiotherapy-related toxicities, and cosmesis was equivocal between hypofractionated and conventional schedules [3]. Therefore, in patients requiring WBRT without regional lymph node irradiation (RNI), either hypofractionated or conventionally fractionated schedule can be chosen. However, more studies are needed in applying hypofractionated schedule in patients requiring RNI or undergoing combined treatment with other systemic therapies (i.e, chemotherapy or immunotherapy).

Instead of WBRT, accelerated partial breast irradiation (APBI) can be given to patients with low-risk of recurrence. APBI delivers a higher dose of radiotherapy per day to a limited volume of tissue, encompassing the lumpectomy bed with a certain margin over a shorter period of time. Since APBI leads to potentially fewer breast symptoms and late skin side effects [4], it may be reasonable options for selected patients. Patients who are appropriate candidate for APBI are those with old age, small size tumor, negative lymph node metastasis, hormone-receptor positive, and negative resection margin. Further studies with long-term follow-up are needed to further refine equivalence between APBI and WBRT.

For patients with high-risk of regional recurrence, WBRT and RNI should be performed. In RNI, supraclavicular nodes and internal mammary lymph nodes are included in radiation field. Patients with axillary lymph node metastasis, large tumor size (T3 or T4 tumor), and T2 tumor with risk factors are thought to be candidates for RNI. The addition of RNI to WBRT confers to improved disease-free survival in patients with early stage or lymph node-positive breast cancer [5,6].

After radiotherapy following BCS, patients may experience complications. Such possible complications include fatigue, radiation dermatitis, alterations in the cosmetic appearance of the breast and local soft tissue symptoms. These may occur in the weeks during or after radiation. Improvements in radiotherapy technique have fortunately led to a decrease in the incidence of many of these complications in patients treated today compared with those treated in the past with old techniques.

RADIATION AFTER MASTECTOMY

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Although the proportion is quite different across the world, significant number of breast cancer patients still undergo mastectomy and high-risk patients require radiotherapy after surgery, that is, post-mastectomy radiotherapy (PMRT), which has been known to decrease breast cancer recurrence and death.

Traditionally, high-risk group is defined as tumors greater than 5 centimeters and/or the number of axillary lymph node metastasis greater than 3. Recently, the indication of PMRT tends to be broaden to cases with the number of axillary lymph node metastasis of 1 to 3. In patients receiving chemotherapy before surgery, the optimal indication and extent of PMRT is still controversial and the results of a clinical trial are awaited.

PMRT is usually given to the mastectomized site (chest wall), axillary lymph node, and the neck area above the collarbone (supraclavicular lymph node). In addition, internal mammary lymph node (inside the chest around the breastbone) is treated more often than before. The radiation therapy is given 5 times a week, Monday to Friday. The total number of treatments is usually 25-28 times over 5-5.5 weeks.

MANAGEMENT OF COMPLICATIONS IN RADIATION TREATMENT

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Radiation therapy (RT) has played important role in the treatment for breast cancer patients to improve oncologic and functional results. But radiation can cause several complications during and after it. They can be categorized according to the timing of manifestation and the characteristics of affected organs. Acute complications including radiation dermatitis and/or edema/pain can be easily managed during and after RT. The symptoms of subacute complication such as radiation pneumonitis tend not to be severe, and can be easily managed with appropriate supportive care. Breast-cancer-related-lymphedema can be reduced by using appropriate definition of RT target volume using CT simulation. And It can be managed by preemptive and comprehensive physical therapy. As the dose-response relationship are known between cardiac toxicity and irradiated heart dose, much effort was made to reduce cardiac dose, so radiation-induced cardiac toxicity was preventable by using several modern RT techniques. Besides physical complications, many patients suffer from emotional distress during RT. Customized team approach can help patients to endure the psychosocial troubles. Appropriate medical and supportive care also can help patients to finish the entire treatment courses.

MANAGEMENT OF MENOPAUSAL SYMPTOMS

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In patients with young breast cancer, menopausal symptoms caused by the adjuvant systemic therapy are troublesome problems. However, it is often neglected or underestimated by healthcare provider as its relatively low level of severity. In addition, the standard duration of adjuvant endocrine therapy is getting longer based on the proven effectiveness in many clinical trials. Therefore, many of the young women with breast cancer in these days are enduring the menopausal symptoms for a long time without proper management. Maybe, it is the time we could not postpone anymore the careful consideration about how to reduce or avoid the menopausal symptoms caused by the active treatment of early breast cancer.

The menopausal symptoms in patients with early breast cancer could be caused by adjuvant chemotherapy and/or adjuvant endocrine therapy. Chemotherapy could damage the ovary and induces amenorrhea. In adjuvant endocrine therapy, the estrogen depletion therapy such as aromatase inhibitor or gonadotrophin-releasing hormone agonist cause menopausal symptoms, such as vasomotor symptoms including hot flush and night sweats, vulvo-vaginal atrophy, sexual dysfunction, or joint and musculoskeletal symptoms. Also depressive symptoms and mood changes, or changes in cognitive function might be a problem. The management of the menopausal symptoms is difficult task because the traditional treatment of menopausal symptoms the difficulty of using hormone replacement therapy. As a result, nonpharmacological therapies could be a first choice to reduce the symptoms. Although it sounds somewhat boring, the lifestyle changes including proper diet changing, exercise, weight control, cessation of smoking and alcohol use, and improving sleep hygiene is an effective way without concerns about drug-interaction. If the symptoms are not subsided by nonpharmacological therapies, non-hormonal pharmacological therapy carefully could be tried.

Hot flush is the most bothersome menopausal symptom. It is reported affecting up to 85% of menopausal women. Selective serotonin reuptake inhibitors (SSRIs) and selective serotonin-norephrine reuptake inhibitors (SNRIs) reduces hot flushes intensity and frequency up to 65%. Although SSRIs and SNRIs shows positive result in many reports, the drug interaction with tamoxifen should be considered when it is prescribed. Some SSRIs and SNRIs can inhibit CYP2D6 enzyme and could decrease the effect of tamoxifen. Therefore, only selective drugs such as venlafaxine and desvenlafaxine are recommended for the patients who are being treated by tamoxifen. Other drugs such as gabapentin, pregabalin, or clonidine reported that they may have mild benefit, but the adverse effects should be weighed. Compounded bioidential hormone are not recommended.

Vulvo-vaginal atrophy cause vaginal dryness, irritation, itching, infection, discomfort, and painful sense during the intercourse. Vaginal moisturizers or lubricants would be helpful. If symptoms are not relieved by that, low-dose topical vaginal estrogen can be considered in women who treated by tamoxifen. However, in women who treated by aromatase inhibitor, it should not be used due to concern systemic absorption.

Musculoskeletal symptoms could be improved by exercise, or locally delivered NSAIDs as first-line measure. Depressive symptoms, mood changes, or fatigue are sometimes results of sleep disturbance. Because the menopausal symptoms are the complex response of multi-organ to depletion of estrogen, a multidisciplinary approach might provide the better management of menopausal symptoms without interference of the breast cancer treatment strategies. If the symptoms are severe and are not relieved by these managements, the endocrine therapy regimen could be changed to less estrogen depleted regimens, such as from aromatase inhibitor combination with GnRH agonist to tamoxifen combination with or without GnRH agonist.

MANAGEMENT OF MOOD AND COGNITIVE FUNCTION

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Emotional distress and cognitive impairment are common complaints in breast cancer patients during anti-cancer treatment and even after treatment. They often negatively affect their quality of life and adjustment to their new life after the diagnosis of cancer. The clinical feature of emotional and cognitive difficulties in breast cancer patients and management, especially how to promote psychological well-being, will be discussed.

About twenty to forty percent of cancer patients have significant distress during their illness. Anxiety is one of the most common emotional symptoms in cancer patients. It may be affected by various multidimensional factors such as previous history, cancer stage, type of anti-cancer treatment, coping style, and social support. Patients with early-stage breast cancer usually experience the highest level of anxiety at the diagnostic phase and initiation of the first anti-cancer treatment, which gradually diminishes over the time. Some patients could struggle with fear of recurrence after the termination of treatment even though their high level of curative chance. In contrast, patients with advanced stage can face anxiety from uncertainty issue throughout their anti-cancer therapy. Depression is also common and untreated depression could be related to hopelessness, demoralization, and unwillingness to seek treatment. In a cohort study, while depressive symptoms gradually declined after the diagnostic phase, they showed different trajectory regarding depressive symptoms. Younger age, comorbid disease and perceived lower socioeconomic status were related to more severe depressive symptoms. Appropriate management to enhance psychological adjustment and monitor clinically significant distress should be considered according to the severity of emotional problems and a patient's preference.

Over half of breast cancer patients reports cognitive impairment after chemotherapy, which called 'cancer-related cognitive impairment (CRCI)'. Although the prevalence of objective cognitive decline is lower compared to subjective complaint, it can impact on quality of life and occupational function. A series of study indicate that multiple factors contribute to CRCI including aging, fatigue, genetic susceptibility, psychological burden, impact of cancer and anti-cancer treatments, and comorbid disease. Evidence of effective intervention or guideline regarding CRCI is lack until now. Behavioral intervention, physical activity, compensatory strategies, cognitive training, and pharmacotherapy would be addressed.

UNDERSTANDING OF BREAST CANCER FAMILY HISTORY

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If I have breast cancer, how likely is my daughter to get breast cancer? Many breast cancer patients are concerned about whether their children will be safe from disease. To be more specific about this risk, if a mother, daughter, or sister who is a first-degree family member of a woman has breast cancer before age 50, the probability of developing breast cancer in that woman is twice that of no family history. The factors that significantly affect a person's lifetime risk of developing breast cancer are the number of family members with breast cancer and the age at which they were diagnosed with breast cancer. This risk is lower with more births and lowers with the younger the first birth. It is reduced when menopause is early and slightly higher when hormone replacement therapy is performed after menopause. The lifetime risk of breast cancer is estimated to be 7.8% with no family history, 13.3% with one family history of breast cancer, and 21.1% with two family histories with breast cancer. If multiple breast cancers are diagnosed in the family, what is the cause? When a genetic mutation is confirmed as the cause, it is called hereditary breast cancer. Genetic predisposition is an important risk factor for breast cancer, accounting for 5% to 10% of all breast cancer cases. Sporadic breast cancer with no family history accounts for 75-85% of breast cancer, and familial breast cancer caused by exposure to the same environment and risk factors accounts for 10-15% of total breast cancer. BRCA1 and BRCA2 genes are genes that make proteins that play a role in correcting errors in the gene replication process in our body, and mutations in these genes cause proteins to be distorted. Because the wrong protein cannot correct errors, the errors are accumulated, and cancer develops at a young age. This genetic variation is passed down to children with a 50% probability, regardless of gender. In this case, there are several breast cancer patients in the family, people with breast cancer at a young age, bilateral breast cancer, and various types of cancer in one person, or triple-negative breast cancer. In addition to breast cancer, the risk of ovarian cancer, pancreatic cancer, and prostate cancer is increased when the BRCA1/2 mutation is present. Therefore, it is important to find people with a high probability of having these mutations and to provide intensive management that effectively meets the increased risk. Other clinical clues are known because you are already ill, but family history is a meaningful clue that can help you to find genetic alteration before you get sick. It is of utmost importance to grasp a significant family history, to know individual risks, and to find appropriate screening and prevention methods.

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References 1. 입랜스® 제품설명서 (최종변경허가일: 2020년 05월 21일) **2.** Rugo H, et al. Palbociclib plus letrozole as first-line therapy in estrogen receptorpositive/human epidermal growth factor receptor 2-negative advanced breast cancer with extended follow-up. Breast Cancer Res Treat. 2019;174(3):719-729. **3.** Finn RS, et al. The cyclin-dependent kinase 4/6 inhibitor palbociclib in combination with letrozole versus letrozole alone as first-line treatment of oestrogen receptor-positive, HER2-negative, advanced breast cancer(PALOMA-1/TRIO-18): a randomised phase 2 study. Lancet Oncol 2015;16:25-35. **4.** Cristofanilli M, et al. Fulvestrant plus palbociclib versus fulvestrant plus placebo for treatment of hormone-receptor-positive, HER2-negative metastatic breast cancer that progressed on previous endocrine therapy (PALOMA-3): final analysis of the multicentre, double-blind, phase 3 randomised controlled trial. Lancet Oncol. 2016;17(4):425-439. **5.** Rugo H, et al.Palbociclib plus endocrine therapy in older women with HRþ/HER2e advanced breast cancer: a pooled analysis of randomised PALOMA clinical studies. Eur J Cancer. 2018;101:123-133. **6.** Loibl S, et al. Palbociclib Combined with Fulvestrant in PremenopausalWomen with Advanced Breast Cancer and Prior Progression on Endocrine Therapy: PALOMA-3 Results. Oncologist. 2017;22(9):1028-1038. **7.** Turner NC, et al.Overall Survival with Palbociclib and Fulvestrant in Advanced Breast Cancer. N Engl J Med. 2018;379(20):1926-1936.**8.** Turner NC, et al. Clinical considerations of the role of palbociclib in the management of advanced breast cancer patients with and without visceral metastases. Ann Oncol. 2018;29(3):669-680. **9.** Taylor-Stokes G, et al. Treatment patterns and clinical outcomes among patients receiving palbociclib in combination with an aromatase inhibitor or fulvestrant for HRþ/HER2-negative advanced/metastatic breast cancer in realworld settings in the US: Results from the IRIS study. Breast. 2019 Feb;43:22-27. **10.** Harbeck N, et al.Quality of life with palbociclib plus fulvestrant in previously treated hormone receptor-positive, HER2- negative metastatic breast cancer: patient-reported outcomes from the PALOMA-3 trial. Ann Oncol. 2016;27(6):1047-1054. **11.** Rugo HS, et al.Impact of palbociclib plus letrozole on patient-reported health-related quality of life: results from the PALOMA-2 trial. Ann Oncol. 2018;29(4):888-894. **12.** Dieras V, et al. Long-term Pooled Safety Analysis of Palbociclib in Combination With Endocrine Therapy for HR1/HER2- Advanced Breast Cancer. J Natl Cancer Inst. 2019;111(4):419-430. **13.** Verma S, et al. Palbociclib in Combination With Fulvestrant inWomen With Hormone Receptor-Positive/HER2-NegativeAdvancedMetastaticBreast Cancer: Detailed Safety Analysis From aMulticenter, Randomized, Placebo-Controlled, Phase III Study (PALOMA-3). Oncologist. 2016;21:1165-1175.

AI = aromatase inhibitor; ET = endocrine therapy; HR+/HER2- = hormone receptor-positive, human epidermal growth factor receptor 2-negative; LHRH = luteinising hormone-releasing hormone; mBC = metastatic breast cancer; SmPC = summary of product characteristics.

[안전성 정보[1]] 임상시험에서 가장 빈번하게 보고된 이상반응은 호중구 감소증이었으며, 주기적인 혈액검사가 필요합니다. 호중구 감소증과 관련된 자세한 용량 조절 정보는 제품설명서를 참고해주세요.

[제품정보] 입랜스®캡슐 75mg, 100mg, 125mg **[유효성분]** 팔보시클립 **[효능·효과]** 이 약은 호르몬 수용체(HR)-양성 및 사람상피세포성장인자수용체2(HER2)-음성인 진행성 또는 전이성 유방암 치료에 아래와 같이 병용한다: 폐경 후 여성에서 일차 내분비 요법으로서 아로마타제 억제제와 병용 또는 내분비요법 후 질환이 진행된 여성에서 풀베스트란트와 병용 **[용법·용량]** 1. 권장용량 및 투여일정 이 약의 권장용량은 28일을 전체 주기로 하여, 1일 1회 125mg 캡슐을 21일간 연속하여 경구투여하고, 7일간 휴약한다. 이 약은 음식물과 함께 복용해야 한다. 이 약을 아로마타제 억제제와 투여할 경우, 아로마타제 억제제의 권장용량을 투여한다(투여할 아로마타제 억제제의 허가사항 참조). 이 약과 풀베스트란트를 투여 시, 풀베스트란트의 권장용량은 1일 1회 500mg을 1일, 15일차, 29일차에 투여하며, 그 이후로는 한 달에 1번 투여한다(풀베스트란트 허가사항 참조). 환자가 매일 같은 시간에 이 약을 복용하도록 독려해야 한다. 환자가 이 약 복용 후 구토를 하거나 복용을 잊은 경우, 이 약 추가용량을 투여해서는 안 된다. 다음 용량의 투여는 예정된 복용시간에 이루어져야 한다. 이 약은 통째로 삼켜야 한다(씹거나 으깨지 말 것, 삼키기 전 캡슐을 열지 말 것). 캡슐이 부서지거나 금이 가는 등 온전하지 않은 경우, 복용해서는 안된다. 이 약과 내분비 요법을 병용하는 폐경 전 및 폐경이행기(perimenoposal) 여성은 임상진료지침(local clinical practice)에 따라 황체형성호르몬분비호르몬 (LHRH) 작용제를 투여 받아야한다. **[사용상의 주의사항]** 1. 경고 1) 호중구감소증 이 약의 임상시험에서 호중구 수 감소가 관찰되었다. 이 약과 레트로졸(임상시험 1(PALOMA-1) 및 임상시험 2(PALOMA-2)) 또는 이 약과 풀베스트란트(임상시험 3(PALOMA-3))를 병용투여한 환자에서, 3등급 및 4등급의 호중구 수감소가 각각 56.1% 및 10.6%로 보고되었다. 3건의 무작위 임상시험에서 등급에 상관없이 호중구감소증의 첫 사례가 나타나기까지의 중앙값은 15일(12일-700일)이었고, 3등급 이상의 호중구감소증이 나타난 기간의 중앙값은 7일이었다. 이 약 투여를 시작하기 전, 각 투여주기의 시작 시, 처음 두 주기의 각 15일차 및 임상적으로 필요한 경우 전혈구 수를 모니터링 한다. 처음 6주기에서 최대 1등급 또는 2등급의 호중구감소증을 경험한 환자는 이 후의 주기에서 임상적으로 필요한 경우, 투여주기의 시작 전 및 매 3개월 마다 전혈구 수를 모니터링 한다. 각 투여 주기의 시작단계에서 투여 중단, 용량감소 또는 투여 지연은 3등급 또는 4등급의 호중구감소증이 나타난 환자에서 권장된다. 임상시험 3에서 호중구감소성 패혈증으로 인한 1건의 사망사례가 있었다. 의사는 환자가 모든 발열 증상을 즉시 보고하도록 교육해야 한다. 2) 배아-태아 독성 동물시험 및 이 약의 작용기전에 근거할 때, 이 약은 임부에 투여 시 태아에게 유해할 수 있다. 동물의 생식독성시험에서, 임신한 랫드 및 토끼에 이 약을 투여 시(기관형성기에 AUC근거 사람 임상노출의 4배 이상 수준의 모체노출농도), 배태자 독성이 나타났다. 태아에 대한 잠재적 위험성을 임부에게 알린다. 가임 여성에게 이 약의 투여기간 및 마지막 용량 투여 후 최소 3주동안은 효과적인 피임법을 사용하도록 권고한다. 3) 간질성 폐질환(Interstitial Lung Disease, ILD)/폐렴(pneumonitis) 이 약을 비롯한 사이클린-의존성 키나아제4/6(CDK 4/6) 억제제와 내분비요법을 병용할 경우, 중증의 생명을 위협하거나 치명적인 간질성 폐질환 및/또는 폐렴이 나타날 수 있다. 임상시험(PALOMA-1, PALOMA-2, PALOMA-3, n=872) 통합 분석에서, 이 약을 투여받은 환자의 1.4%가 간질성 폐질환/폐렴을 경험하였으며, 이 중 3등급은 0.1%이었고, 4등급 이상이거나 치명적인 경우는 보고되지 않았다. 시판 후 조사에서 간질성 폐질환/폐렴이 추가로 관찰되었으며, 사망사례가 보고되었다. 간질성 폐질환/폐렴의 증상(저산소증, 기침, 호흡곤란 등)이 있는지 환자를 모니터링한다. 새로운 또는 악화된 호흡기 증상이 있는 경우와 간질성 폐질환/폐렴의 발생이 의심되는 환자에서, 즉시 이 약 투여를 중단하고 검사를 실시한다. 중증 간질성 폐질환 또는 폐렴환자의 경우, 이 약 투여를 영구 중단한다. **[최종변경허가일]** 2020년 05월 21일 **※제품에 대한 자세한 정보는 최신의 제품설명서를 참고하시길 바라며 홈페이지(www.pfizer.co.kr)를 통해 확인하실 수 있습니다.**

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OPTIMAL TREATMENT FOR HR+/HER2- METASTATIC BREAST CANCER PATIENTS: CDK 4/6 INHIBITORS BASED ON REAL-WORLD PRACTICE

Giuseppe Curigliano

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The harnessing in clinical practice of cyclin-dependent kinases 4/6 inhibitors, namely palbociclib, ribociclib, and abemaciclib, has substantially changed the therapeutic approach for hormone receptor-positive metastatic breast cancer (BC). Phase II–III clinical trials evaluating the addition of these agents to standard endocrine therapy reported consistent improvements in response rates and progression-free survival as well as manageable toxicity profiles and excellent impact on patients' quality of life. Hence, pivotal trials provided comparable results among different cyclin-dependent kinases 4/6 inhibitors, there is an increasing interest in finding substantial differences in order to implement their use in clinical practice. The aim of my presentation is to summarize the current evidences raised from preclinical and clinical studies on cyclin-dependent kinases 4/6 inhibitors in BC, focusing on differences in terms of pharmacological properties, toxicity profile, and patients' quality of life. We will also report on the important results of real world data.

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이전에 항암화학요법 치료 경험이 있는 gBRCA 변이 HER2-음성 전이성 유방암 성인 환자의 치료. 환자는 수술 전 보조요법, 수술 후 보조요법, 또는 전이성 조건에서 항암화학요법을 받았을 수 있다.[1]

Reference 1. Lorusso D, et al. Spotlight on olaparib in the treatment of BRCA-mutated ovarian cancer: design, development and place in therapy. Drug Des Devel Ther. 2018 May 29;12:1501-1509. **2.** 린파자®정 제품설명서 (개정년월일 2019년 10월 29일)

린파자®정150미리그램/100밀리그램(올라파립) 전문의약품 **[성분함량]** 린파자정100밀리그램 1정 (414 mg) 중 유효성분: 올라파립(별규) 100mg 첨가제: 만니톨, 무수콜로이드성이산화규소, 오파드라이노란색(03B220046), 코포비돈, 푸마르산스테아릴나트륨 린파자정150밀리그램 1정 (618 mg) 중 유효성분: 올라파립(별규) 150mg 첨가제: 만니톨, 무수콜로이드성이산화규소, 오파드라이초록색(03B21726), 코포비돈, 푸마르산스테아릴나트륨 **[성상]** 린파자정 100밀리그램: 노란색 내지 어두운 노란색의 양면이 볼록한 타원형의 필름코팅정 린파자정 150밀리그램: 초록색 내지 회녹색의 양면이 볼록한 타원형의 필름코팅정 **[효능·효과]** **난소암** • 1차 백금 기반 항암화학요법에 반응(부분 또는 완전반응)한 새로 진단된 진행성 BRCA 변이 고도 상피성 난소암, 난관암 또는 일차 복막암 성인 환자의 유지 요법 • 2차 이상의 백금기반요법에 반응(부분 또는 완전반응)한 백금민감성 재발성 고도 상피성 난소암(난관암 또는 일차 복막암 포함) 성인 환자의 단독 유지요법 **유방암** 이전에 항암화학요법 치료 경험이 있는 gBRCA 변이 HER2-음성 전이성 유방암 성인 환자의 치료. 환자는 수술 전 보조요법, 수술 후 보조요법, 또는 전이성 조건에서 항암화학요법을 받았을 수 있다. **[용법·용량]** 이 약은 300 mg (150 mg 2정)씩 1일 2회 경구투여한다(1일 총 용량 600 mg). **투여 기간** 진행성 BRCA 변이 고도 상피성 난소암, 난관암 또는 일차 복막암은 2년간 또는 질병이 진행될 때까지 치료를 지속할 수 있다. 2년차에 완전 반응(방사선적 질병 증거가 없음)을 나타내는 환자들은 투여를 중단한다. 2년차에 질병의 증거가 있으나, 주치의가 치료를 지속함으로써 추가적 이익을 나타낼 수 있다고 판단하는 환자는 2년 이후에도 치료를 받을 수 있다. 백금민감성 재발성 고도 상피성 난소암, 난관암 또는 BRCA 변이 HER2-음성 전이성 유방암 환자들의 경우, 기저 질환의 진행시까지 치료를 지속하는 것이 권장된다. 린파자 캡슐(50 mg)과 린파자 정제(100mg 및 150mg)는 각 제형의 용량 및 생체 이용률에 차이가 있으므로 밀리그램 대 밀리그램 기준으로 린파자 캡슐(50mg)을 린파자 정제(100mg 및 150mg)와 대체하여 사용해서는 안 된다. **투여 누락** 만약 환자가 이 약의 투여를 누락한 경우, 환자는 예정된 시간에 다음 정상 용량을 복용해야 한다. **용량 조절** 이상반응이 발현되는 경우 이상반응을 관리하기 위하여 투약이 중지될 수 있으며, 감량이 고려될 수 있다. 권장되는 감량 용법은 250 mg(150mg 정제 1정과 100mg 정제 1정)씩 1일 2회(총 일일 용량 500mg에 해당)이다. 추가적인 감량이 필요한 경우, 200mg(100mg정제 2정)씩 1일 2회(총 일일 용량 400mg에 해당)로 감량하는 것이 권장된다. CYP3A 억제제와 병용하는 경우 강한 또는 중등도의 CYP3A 억제제와의 병용 투여는 권장되지 않으며, 대체 치료법을 고려한다. 만약 강한 CYP3A 억제제의 병용 투여가 꼭 필요한 경우, 이 약의 용량은 100mg(100mg 정제 1정)씩 1일 2회 (총 일일 용량 200mg에 해당)로 감량하는 것이 권장된다. 만약 중등도 CYP3A 억제제의 병용 투여가 꼭 필요한 경우, 이 약의 용량은 150mg(150mg 정제 1정)씩 1일 2회 (총 일일 용량 300mg에 해당)로 감량하는 것이 권장된다 (4. 상호작용 항 참고). **투여 방법** 이 약은 통째로 삼켜야 하며, 씹거나, 부수거나, 녹이거나 분할해서는 안 된다. 이 약은 음식 섭취 여부와 관계없이 투여할 수 있다. 진단 새로 진단된 진행성 난소암의 유지 요법: 환자는 이 약의 투여를 시작하기 전 유방암 감수성 유전자(BRCA) 변이가 확인되어야 한다 (배선 또는 종양 검사에 의해 확인). BRCA 변이 상태는 숙련된 실험실에서 검증된 시험법을 사용하여 확인되어야 한다. 전이성 HER2-음성 유방암: 환자는 이 약의 투여를 시작하기 전 배선(g)BRCA 변이가 확인되어야 한다. BRCA 변이 상태는 숙련된 실험실에서 검증된 시험법을 사용하여 확인되어야 한다. **[사용상주의사항] 1. 경고** 1) 골수이형성 증후군/급성 골수성 백혈병 장기간 생존 추적조사를 포함하여 임상시험에서 이 약 단독요법으로 치료한 환자의 골수이형성 증후군/급성 골수성 백혈병 발생률은 1.5% 미만이었으나 대부분의 사례는 치명적 결과를 가져왔다. 모든 환자는 이전에 백금기반 항암화학요법을 투여 받아 골수이형성 증후군/급성 골수성 백혈병 발생에 대한 잠재적 기여 인자를 가지고 있었다. 또한 많은 환자가 DNA를 손상시킬 수 있는 다른 치료를 받았다. 대부분의 보고는 gBRCA 변이(germline BRCA mutation)를 동반한 환자들에게서 나타났고, 일부 환자들은 하나 이상의 원발성 암 또는 골수 이형성 병력이 있었다. 이 약 투여 중 골수이형성 증후군 또는 급성 골수성 백혈병이 확인된 경우, 이 약을 중단하고 환자를 적절히 치료해야 한다. 추가적인 항암 요법이 권장되는 경우 이 약을 중단해야 한다. 2) 폐렴 폐렴은 임상시험에서 이 약 단독요법으로 치료받은 환자의 1.0% 미만에서 나타났다. 폐렴에 대한 보고는 일관된 임상 양상을 나타내지 않았고, 다수의 선행요인(폐의 암 및/또는 전이, 기저 폐질환, 흡연 이력, 및/또는 이전의 화학요법 및 방사선요법)에 의해 교란되었다. 임상 시험에서 이 약을 다른 요법과 병용하였을 때, 치명적 결과를 나타낸 사례가 있었다. 환자에게 호흡곤란, 기침 및 열과 같은 호흡기 증상이 새로이 나타나거나 악화된 경우, 또는 비정상적인 흉부 방사선 소견이 관찰된 경우, 이 약의 투여를 중단하고 즉시 검사를 시작하여야 한다. 폐렴이 확인된 경우, 이 약 치료를 중단하고 적절하게 환자를 치료해야 한다. 3) 배태자 독성 이 약의 약물 기전(PARP 저해)에 의해, 이 약을 임신한 여성에게 투여 시 태아에게 해를 끼칠 수있다. 랫트를 대상으로 수행한 비임상시험에서 올라파립은 인체 권장용량에서 예상되는 노출량 1일 2회 300mg 이하 용량 투여 시 배태자 생존에 유해한 효과를 보이고 주요한 태자 기형을 유발하였다. 이 약은 임신 중 사용해서는 안 된다. 만약 환자가 이 약을 투여 받는 동안 임신을 하면, 환자에게 이 약이 태아에 미칠 수 있는 잠재적 위험을 알려야 한다. 가임여성은 이 약의 투여기간 및 투여 완료 후 1개월 동안 효과적인 피임법을 사용하도록 권고한다. 남성 환자와 가임여성 파트너는 이 약 투여 기간 및 투여 완료 후 3개월간 효과적인 피임법을 사용하도록 권고한다. **문헌개정연월일:** 2019년 10월 29일 이 첨부문서의 개정연월일 이후 변경된 내용은 폐사의 홈페이지 (http://www.astrazeneca.co.kr)를 방문하시거나 전화번호 02-2188-0800으로 문의하셔서 확인하실 수 있습니다. 의약품 용어설명 및 기타 자세한 의약품정보는 온라인의약도서관(http://drug.mfds.go.kr) 의약품 정보를 참조하시기 바랍니다. **수입(수입자):** 서울시 강남구 영동대로 517 아셈타워 21층

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OPTIMIZING TREATMENT SEQUENCE WITH OLAPARIB IN gBRCAm METASTATIC BREAST CANCER

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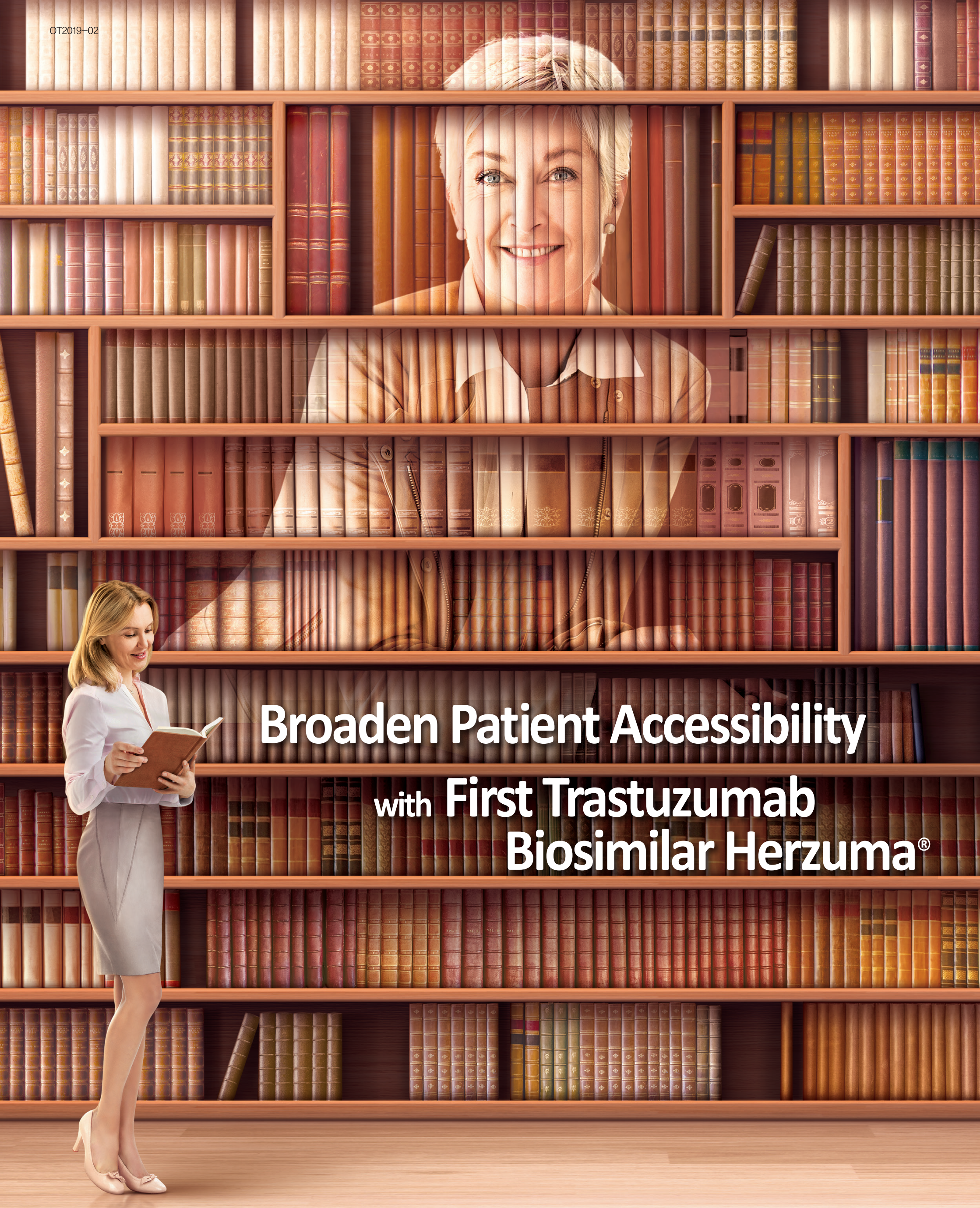
Germline mutations are not frequent in breast cancer overall with an incidence of only about 5% but are recognized as important. Young persons with breast cancer have a higher incidence of germline mutations with greater than 30% risk of a BRCA mutation being present in a woman in her 30s with triple negative cancer (TNBC). Many women have no family history and these persons are not identified through our standard criteria, resulting in the need for different strategies, such as tumour testing, being important to recognize these persons. The breast cancer that occurs in persons with germline mutations is often more aggressive and may benefit from different treatments in both the early and late settings. Tumours with germline mutations may be more sensitive to chemotherapy. As well, Platinum agents and PARP inhibitors are of benefit in the treatment of tumours with germline BRCA. The first Phase I studies showed responses in breast cancer and this was later shown in a Phase II study reported by Tutt showing a 44% response rate in advanced cancer with BRCA mutations. Subsequent studies confirmed this finding. The OLYMPIAD study randomized patients to receive either Olaparb or treatment of physician choice and showed a 3 month improvement in progression free survival for Olaparib. The improvement was seen in TNBC as well as hormone positive cancers and BRCA1 and BRCA2. Patients with CNS metastases also benefited to the same degree. Overall survival was not improved for the overall patient cohort but was significantly better for those persons receiving Olaparib in the first line setting. Toxicity was manageable with anemia and GI toxicity as common but very manageable. Nausea is most common in the first cycle and then often improves significantly. The time to response was the same for both the treatment of physicians choice and olaparib. There is a question about where Olaparib fits in the sequencing of treatments for advanced breast cancer and it seems that this is not the same for ER negative and ER+ tumours. For ER- patients, many may want to avoid chemotherapy and an oral well tolerated treatment may be ideal. If they are potential candidates for immune therapy, this may be an option but does require chemotherapy. For hormone sensitive tumours, the CDK 4/6 inhibitors are standard first line but olaparib may be used second line or in some cases earlier. Olaparib is being combined with numerous other agents to improve its activity and provide potentially longer respnoses. A discussion about the sequencing of treatments, the role of PARP inhibitors, the mechanisms of resistance and the future of olaparib will be presented.

OT2019-02



[제품명] 허쥬마®주 150mg, 440mg(트라스투주맙) (단클론항체, 유전자재조합) **[주성분]** 트라스투주맙(단클론항체, 유전자재조합) **[효능 · 효과]** HER2(Human Epidermal growth factor Recepotr 2 protein) 양성 조기 유방암 · 전이성 유방암 · 전이성 위암 **[용법 · 용량]** 트라스투주맙 치료를 시작하기 전 HER2 시험이 필수적이다. 트라스투주맙은 자격을 갖춘 전문 의료인에 의해 투여되어야 한다. 투여 전 투여하려는 제형이 환자에 처방된 것이 맞는지 제품라벨을 확인하여야 한다. 이 약은 정맥주사용이다. 투약 오류를 방지하기 위해 조제해 투여하는 약이 캐싸일라(트라스투주맙엠탄신)가 아닌 트라스투주맙이 맞는지 바이알 라벨을 확인해야 한다. **유방암 • 전이성 유방암** : HER2 양성 전이성 유방암 환자 치료에 다음과 같이 투여한다. 이 약 단독요법 및 파클리탁셀, 도세탁셀, 아로마타제 억제제와의 병용요법 시 이 약의 권장용량은 다음과 같다. **1) 1주 요법** : 초기부하용량 : 권장 초기부하용량은 4mg/kg이다. 유지용량 : 권장 유지용량은 매주 2mg/kg이며 초기부하용량 투여 1주일 후부터 투여를 시작한다. **2) 3주 요법** : 초기부하용량 : 권장 초기부하용량은 8mg/kg이다. • 유지용량 : 권장 유지용량은 6mg/kg이며 초기부하용량 투여 3주 후부터 투여를 시작한다. **도세탁셀과 파클리탁셀의 병용요법** : 이 약의 최초 투여시에는 이 약 투여 다음날에 파클리탁셀 또는 도세탁셀을 투여한다. 최초 투여에 내약성이 우수한 경우, 이후 투여시에는 이 약 투여후 즉시 파클리탁셀 또는 도세탁셀을 투여할 수 있다. **아로마타제 억제제와의 병용요법** : 이 약과 아로마타제 억제제는 첫날에 모두 투여한다(투여순서는 상관없음). 조기 유방암 : 다음의 2가지 투여요법중 선택하여 투여할 수 있다. **1) 3주 요법** : 초기 부하용량으로 8mg/kg을 투여하고 이후 매 3주마다 유지용량으로 6mg/kg을 투여한다. **2) 1주 요법** : 안트라싸이클린과 싸이클로포스파미드 병용 화학요법실시후, 초기부하용량으로 4mg/kg을 투여하고 이후 1주 마다 2mg/kg을 유지용량으로 투여한다. 이때는 파클리탁셀과 병용투여한다. **전이성 위암 • 3주 요법** : 초기 부하용량으로 8mg/kg을 투여하고 이후 매 3주마다 유지용량으로 6mg/kg을 약 90분에 걸쳐 점적주입 한다. 초기 부하 용량에 내약성이 우수한 경우 유지용량은 30분에 걸쳐 주입할 수 있다. **유방암(조기 유방암 및 전이성 유방암) 및 전이성 위암** : 전이성 유방암이나 전이성 위암환자는 질병진행시까지 이 약을 투여한다. 조기 유방암의 경우는 1년 동안 또는 질병재발까지 이 약을 투여해야한다. 조기 유방암 치료를 1년 넘게 지속하는 것은 권장되지 않는다. **[사용상의 주의사항]** 이 약은 허셉틴주(트라스투주맙)(단클론항체, 유전자재조합)를 대조약으로 한 동등생물의약품이다. **1. 경고** 1) 심기능 장애(Cardiac dysfunction): 트라스투주맙 투여 시 울혈성 심부전[뉴욕심장학회(NYHA) 2–4등급] 또는 무증상 심기능 장애의 위험이 증가한다. 심질환 위험성이 큰 환자(고혈압, 입증된 관상동맥질환, 울혈성 심부전, 이완기 장애, 55% 미만 LVEF, 고령자) 투여 시 주의를 기울여야 한다. 2) 주입관련 반응, 알러지양 반응 및 과민 반응 3) 폐 이상사례 4) 벤질알코올은 미숙아에게서 치명적인 가쁜 호흡증상과 연관이 있는 것으로 보고되었다.(허쥬마주 440mg에 한함) **2. 다음 환자에는 투여하지 말 것** 1) 트라스투주맙, 설치류 유래 단백 또는 이 약의 구성성분에 과민반응 병력이 있는 환자 2) 진행성 악성종양에 의한 중증 안정 시 호흡곤란 또는 산소보충이 필요한 환자 3) 신생아, 미숙아(벤질알코올을 함유하고 있다, 허쥬마주 440mg에 한함) **※셀트리온 제약 홈페이지 www.celltrionph.com 또는 전화 080–850–3611(~2)에서 확인하실 수 있습니다.**

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QUALITY ATTRIBUTE OF MONOCLONAL ANTIBODY BIOSIMILARS: CONSISTENCY AND VARIATION

Stanley Seungsuh Hong

Celltrion Healthcare, Korea

Monoclonal Antibody (mAb) has been very innovative therapeutic options for immunology and oncology area over past two decades. Because this is the target therapy, many patients have gotten the benefits of low toxicity and high efficacy. But they have been very expensive options, and then healthcare budgets have had very huge burden. Biosimilar development was a good solution because the patents of major mAbs was expired starting 2010.

mAb has too complicated structure and function to develop Biosimilars such as oligosaccharide structure (glycosylation patterns), charge variation, high order structure and biological activities etc. But analytical methods were well developed recently, and then mAb Biosimilars have been successfully developed and supplied over past 7 years. This made huge contribution to lower the price of this expensive pharmaceutical products.

This presentation will cover the definition of mAb Biosimilar, key quality attributes including variation, how to develop and the case study of Trstuzumab Biosimilar.

ARE ALL CDK 4/6 INHIBITORS CREATED EQUALLY?

Yen-Shen Lu

National Taiwan Univ. Hospital, Taiwan

Conventionally, endocrine therapy is the treatment of choice for patients with HR+ HER2- advanced breast cancer unless for patients with visceral crisis or aggressive disease mandate rapid response. After failing several lines of endocrine therapies, patients will need chemotherapy treatment eventually. In recent years, major progress has been achieved on the development of novel targeted therapy for this disease. By adding targeted agents such as CDK 4/6 inhibitors or mTOR inhibitors to endocrine therapy, we can successfully prolong the progression free survival and objective response rate as compare with the backbone endocrine therapy alone. Currently, three CDK4/6 inhibitors are available for the treatment of ER+HER2- advanced breast cancer. Many experts believe that there is class effect among these 3 CDK4/6 inhibitors, mainly base on the similar effect on progression free survival prolongation. However, for the effect on overall survival prolongation in advanced breast cancer and effect improvement of recurrence free survival in early breast cancer, the data are not consistence among these 3 drugs. In this talk, the speaker will review the current data of CDK4/6 inhibitors, and delineate the difference between these CDK4/6 inhibitors.

Verzenio®
abemaciclib

For women with HR+, HER2-

advanced/metastatic breast cancer[*], You have Verzenio[1]

* HR+, HER2- advanced/metastatic breast cancer women에서 버제니오의 투여 적응증[1]

1) 호르몬 수용체(HR)-양성 및 사람 상피세포 성장인자 수용체 2(HER2)-음성인 진행성 또는 전이성 유방암이 있는 폐경 후 여성의 치료를 위한 일차 내분비 기반 요법으로서 아로마타제 억제제와 병용

2) 내분비 요법 후 질병이 진행된 호르몬 수용체(HR)-양성 및 사람 상피세포 성장인자 수용체 2(HER2)-음성인 진행성 또는 전이성 유방암 여성의 치료에 풀베스트란트와 병용[†]

[†] 이 약과 풀베스트란트를 병용 투여 받은 폐경 전 및 폐경 이행기 여성들은 현재 임상진료지침(clinical practice standards)에 따라 생식샘자극 분비 호르몬 작용제를 투여 받아야 한다.

The first and the only CDK 4&6 inhibitor to significantly extend OS

in combination with fulvestrant regardless[*] of menopausal status (as of Feb.2021) [2-6]
(Median OS 46.7 vs 37.3 months; HR=0.757; 95% CI, 0.606-0.945; p = 0.01)

Consistent OS benefit in **primary ET resistance** and **visceral disease in combination with fulvestrant**[2,4]

[1.**Primary ET resistance:** Median OS 38.7 vs 31.5 months; HR = 0.686 (95% CI, 0.451-1.043)
2.**Visceral disease:** Median OS 40.3 vs 32.2months; HR = 0.675 (95% CI, 0.511-0.891)]

The only CDK inhibitor with **continuous dosing**[1,2,7,8]

(as of Feb.2021)

*pre- or perimenopausal women received a gonadotropin-releasing hormone agonist

Safety profile At the MONARCH2 analysis, the most common adverse events in the abemaciclib versus placebo arms were diarrhea (86.4% versus 24.7%), neutropenia (46.0% versus 4.0%), nausea (45.1% versus 22.9%), and fatigue (39.9% versus 26.9%).[3] At the MONARCH 3 interim analysis, the safety profile was consistent with previous reports. The most frequent grade ≥ 3 adverse events in the abemaciclib versus placebo arms were neutropenia (23.9% versus 1.2%), diarrhea (9.5% versus 1.2%), and leukopenia (8.6% versus 0.6%). Abemaciclib plus a nonsteroidal AI was an effective initial treatment with an acceptable safety profile for HR+, HER2- ABC.[9]

HR = Hormone receptor, **HER2** = Human epidermal growth factor receptor type 2, **CDK** = Cyclin dependent kinase, **OS** = Overall survival, **ITT** = Intention to treat, **ET** = Endocrine therapy

References 1. 버제니오 식약처 허가사항 (식약처 의약품통합정보시스템 https://nedrug.mfds.go.kr/) [Approved on 01-May-2019]. **2.** Verzenio Summary of Product Characteristics. Eli Lilly Nederland B.V., Papendorpseweg 83, 3528BJ Utrecht, The Netherlands. 2020. **3.** Sledge GW *et al, J Clin Oncol.* 2017;35(25):2875-2884. **4.** Cardoso F, *et al. Ann Oncol.* 2017;28(1):16-33. **5.** Sledge GW Jr, *et al. JAMA Oncol.* 2020;6(1):116-124. **6.** Slamon DJ, *et al. N Engl J Med.* 2020;382:514-524. **7.** Patnaik A, *et al. Cancer Discov.* 2016;6(7):740-753. **8.** Verzenio[package insert].Indianapolis, IN. Eli Lilly and Company;2020. **9.** Goetz MP, *et al. J Clin Oncol.* 2017;35:3638-3646.

[제품명] 버제니오정 50/100/150 밀리그램(아베마시클립)

[원료약품 및 그 분량]
1정(144.2밀리그램) 중 아베마시클립 50.00밀리그램, 1정(291.2밀리그램) 중 아베마시클립 100.00밀리그램
1정(432.6밀리그램) 중 아베마시클립 150.00밀리그램

[효능 · 효과]

- 호르몬 수용체 (HR)-양성 및 사람 상피세포 성장인자 수용체 2(HER2)-음성인 진행성 또는 전이성 유방암이 있는 폐경 후 여성의 치료를 위한 일차 내분비 기반 요법으로서 아로마타제 억제제와 병용
- 내분비 요법 후 질병이 진행된 호르몬 수용체 (HR)-양성 및 사람 상피세포 성장인자 수용체 2(HER2)-음성인 진행성 또는 전이성 유방암 여성의 치료에 풀베스트란트와 병용

[용법 · 용량]

1. 권장 용량 및 용법

- 풀베스트란트 또는 아로마타제 억제제와의 병용요법에서 이 약의 권장 용량은 150 mg을 1일 2회 경구 투여하는 것이다.
- 이 약과 병용 투여 시 사용되는 아로마타제 억제제의 권장 용량은 허가 사항을 참고한다.
- 이 약과 병용 투여 시 풀베스트란트의 권장 용량은 제 1일, 제 15일, 제 29일에 그리고 그 이후 한 달에 한 번 500 mg 투여이다. 풀베스트란트에 대한 허가사항을 참고한다. 이 약과 풀베스트란트를 병용 투여 받은 폐경 전 및 폐경 이행기 여성들은 현재 임상진료지침(clinical practice standards)에 따라 생식샘자극 분비 호르몬 작용제를 투여 받아야 한다.

질병 진행 또는 허용될 수 없는 독성이 나타날 때까지 치료를 계속한다. 이 약은 음식 섭취와 관계없이 투여할 수 있다.
매일 거의 동일한 시간에 이 약을 투여하도록 환자를 지도한다.
환자가 이 약을 토하거나 투여를 잊은 경우, 다음 계획된 시간에 다음 용량을 투여하도록 환자를 지도한다.
환자가 이 약 정제를 통째로 삼키게 하고 삼키기 전 정제를 씹거나, 부수거나 분할하지 않도록 지도한다. 환자가 깨졌거나 금이 갔거나, 온전하지 않은 이 약의 정제를 투여하지 않도록 지도한다.

2. 용량 조절

이상반응에 따른 용량 조절 이상반응에 따른 권장되는 이 약의 용량 조절은 표 1~5에 제시하였다. 환자가 50 mg 1일 2회 용량에 내약성을 나타내지 못하는 경우 이 약 투여를 중단한다.

표 1: 이상반응에 대한 이 약의 용량 조절

용량 수준	풀베스트란트 또는 아로마타제 억제제와 병용 시 이 약의 용량
권장되는 시작 용량	150 mg 1일 2회
1차 용량 감소	100 mg 1일 2회
2차 용량 감소	50 mg 1일 2회
3차 용량 감소	해당사항 없음

표 2: 이 약의 용량 조절 및 관리 — 혈액학적 독성[a]

이 약 투여를 시작하기 전, 처음 2개월간 2주마다, 다음 2개월간 매달, 그리고 임상적으로 필요할 때마다 완전 혈구수를 모니터링한다.

CTCAE 등급	이 약 용량 조절
1 또는 2 등급	용량 조절이 필요하지 않다.
3 등급	2 등급 이하로 독성이 소실될 때까지 투여를 보류한다. 용량 감소는 필요하지 않다.
3 등급 재발 또는 4 등급	2 등급 이하로 독성이 소실될 때까지 투여를 보류한다. 다음 낮은 용량으로 투여를 재개한다.

약어: CTCAE = Common Terminology Criteria for Adverse Events(이상반응에 대한 공통 용어 기준).

[a] 혈구 성장 인자가 필요한 경우, 혈구 성장 인자의 마지막 투여 후 최소 48시간 동안 그리고 독성이 등급 2 이하로 소실될 때까지 이 약의 투여를 보류한다.
성장 인자의 사용으로까지 이어진 독성에 대해 이미 실시된 경우가 아니라면 그다음 낮은 용량으로 재개한다. 성장 인자 사용은 현재 치료 가이드라인을 따른다.

표 3: 이 약의 용량 조절 및 관리 — 설사

무른 변의 징후가 처음 나타날 때 지사제 투여를 시작하고, 음료 섭취를 늘린다.

CTCAE 등급	이 약 용량 조절
1 등급	용량 조절이 필요하지 않다.
2 등급	24시간 이내에 독성이 1 등급 이하로 소실되지 않으면, 소실될 때까지 투여를 보류한다. 용량 감소는 필요하지 않다.
최선 지지 치료에도 불구하고 동일한 용량을 재개한 후 지속되거나 재발한 2 등급	1 등급 이하로 독성이 소실될 때까지 투여를 보류한다. 다음 낮은 용량으로 투여를 재개한다.
3 또는 4 등급 또는 입원을 요하는 경우	1 등급 이하로 독성이 소실될 때까지 투여를 보류한다. 다음 낮은 용량으로 투여를 재개한다.

표 4: 이 약의 용량 조절 및 관리 — 간 독성

이 약 투여를 시작하기 전, 처음 2개월간 2주마다, 다음 2개월간 매달, 그리고 임상적으로 필요할 때마다 ALT, AST 및 혈청 빌리루빈을 모니터링한다.

ALT 및 AST에 대한 CTCAE 등급	이 약 용량 조절
1 등급 (>ULN-3.0 x ULN) 2 등급 (>3.0-5.0 x ULN), 총 빌리루빈이 >2 x ULN로 상승하지 않음	용량 조절이 필요하지 않다.
지속적 또는 재발성 2 등급, 또는 3 등급 (>5.0-20.0 x ULN), 총 빌리루빈이 > 2 x ULN로 상승하지 않음	독성이 베이스라인 또는 1 등급 수준으로 소실될 때까지 투여를 보류한다. 다음 낮은 용량으로 투여를 재개한다.
AST 및/또는 ALT >3 x ULN의 상승과 총 빌리루빈 >2 x ULN 상승, 단, 담즙 정체는 없음	이 약 투여를 중단한다.
4 등급 (>20.0 x ULN)	이 약 투여를 중단한다.

약어: ALT = 알라닌 아미노전이효소, AST = 아스파르테이트 아미노전이효소, ULN = upper limit of normal(정상범위 상한).

표 5 : 간질성 폐질환(Interstitial Lung Disease, ILD)/간질성 폐렴(pneumonitis)에 대한 이 약 용량 조절

CTCAE 등급	이 약 용량 조절
1 또는 2 등급	용량 조절이 필요하지 않다.
최선 지지 치료에도 7일 이내에 베이스라인 또는 1 등급으로 소실되지 않는 지속적 또는 재발성 2 등급 독성	독성이 베이스라인 또는 1 등급 이하로 소실될 때까지 투여를 보류한다. 다음 낮은 용량으로 투여를 재개한다.
3 또는 4 등급	이 약 투여를 중단한다.

표 6 : 기타 독성[a]에 대한 이 약 용량 조절 및 관리

CTCAE 등급	이 약 용량 조절
1 또는 2 등급	용량 조절이 필요하지 않다.
최선 지지 치료에도 7일 이내에 베이스라인 또는 1 등급으로 소실되지 않는 지속적 또는 재발성 2 등급 독성	독성이 베이스라인 또는 1 등급 이하로 소실될 때까지 투여를 보류한다. 다음 낮은 용량으로 투여를 재개한다.
3 또는 4 등급	독성이 베이스라인 또는 1 등급 이하로 소실될 때까지 투여를 보류한다. 다음 낮은 용량으로 투여를 재개한다.

[a] 설사, 혈액학적 독성, 간독성 및 간질성 폐질환(Interstitial Lung Disease, ILD)/간질성 폐렴(pneumonitis) 제외
병용 투여되는 아로마타제 억제제 또는 풀베스트란트에 대한 용량 조절 및 기타 관련된 안전성 정보는 허가사항을 참고한다.

강력한 및 보통의 CYP3A 억제제 사용시 용량 조절
강력한 CYP3A 억제제인 케토코나졸의 병용 사용은 피한다.
권장되는 시작 용량이 150 mg 1일 2회인 환자들에서 케토코나졸 이외의 강력한 CYP3A 억제제의 병용 사용 시, 이 약의 용량을 100 mg 1일 2회로 줄인다. 이상반응으로 인해 용량을 100 mg 1일 2회로 줄였던 환자들의 경우, 이 약의 용량을 50 mg 1일 2회로 더 줄인다. 이 약을 투여 중인 환자가 CYP3A 억제제를 중단하는 경우, 이 약의 용량을(억제제의 3-5 반감기 경과 후) 강력한 억제제를 시작하기 전에 사용한 용량까지 증량한다. 보통의 CYP3A 억제제를 병용 사용할 경우, 이상 반응에 대하여 모니터링하고 필요한 경우, 표 1에 제시된 바와 같이 이 약의 용량을 50 mg씩 감소시킬 것을 고려한다.

중증 간 장애 환자에 대한 용량 조절
중증 간 장애 (Child Pugh-C) 환자의 경우, 이 약의 투여 빈도를 1일 1회로 줄인다.
중증 간 장애에 대한 병용 투여되는 아로마타제 억제제 또는 풀베스트란트에 대한 용량 조절 요건은 허가사항을 참고한다.

[경고] 1) 호중구 감소증 호중구 감소증은 MONARCH 3에서 이 약과 아로마타제 억제제를 병용 투여 받은 환자의 41%, MONARCH 2에서 이 약과 풀베스트란트를 병용 투여 받은 환자의 46%에서 발생하였다. 3 이상 등급의 호중구 수 감소(실험실 결과에 근거)는 MONARCH 3에서 이 약과 아로마타제 억제제를 병용 투여 받은 환자의 22%, MONARCH 2에서 이 약과 풀베스트란트를 병용 투여 받은 환자의 32%에서 발생하였다. MONARCH 3에서 3 이상 등급의 호중구 감소증의 첫 번째 발현까지 걸린 시간의 중앙값은 33일이었고, MONARCH 2에서는 29일이었다. MONARCH 3에서 3 이상 등급의 호중구 감소증 기간의 중앙값은 11일이었고, MONARCH 2의 경우 15일이었다. 이 약 투여를 시작하기 전 처음 2개월간 2주마다, 다음 2개월간 매달, 그리고 임상적으로 필요할 때마다 전혈구 수를 모니터링한다. 3 또는 4 등급의 호중구 감소증을 나타내는 환자에 대해서는 투여의 일시 중단, 용량 감소 또는 치료 주기 시작의 연기가 권장된다. 발열성 호중구 감소증은 MONARCH 시험들에서 이 약에 노출된 환자의 1% 미만에서 보고되었다. MONARCH 2에서 호중구 감소성 패혈증으로 인한 사망이 2건 관찰되었다. 환자가 발열이 나타나는 경우 담당 의료인에게 즉시 보고하도록 지도한다.
2) 배태자 독성 동물 시험으로부터의 결과 및 작용 기전에 근거할 때 이 약은 임신한 여성에게 투여 시 태아에게 유해할 수 있다. 동물 생식 독성 시험에서 기관 형성 기간에 임신한 랫드에게 아베마시클립을 투여한 결과 인체 최대 권장 용량에서의 곡선하 면적(AUC)에 근거한 인체 임상 노출과 유사한 모체 노출에서 최기 형성 및 태자 체중 감소를 나타내었다. 임신한 여성에게 태아에 대한 잠재적 위험을 알린다. 생식능력이 있는 여성에게 이 약을 투여하는 동안 그리고 마지막 투여 후 최소 3주 이상 효과적인 피임법을 사용하도록 지도한다.
3) 간질성 폐질환(Interstitial Lung Disease, ILD)/간질성 폐렴(pneumonitis) 이 약 또는 다른 CDK 4/6 억제제로 치료받은 환자들에게 중증, 생명을 위협하거나 치명적인 간질성 폐질환(ILD) 또는/및 간질성 폐렴(pneumonitis)이 발생할 수 있다. 임상시험(MONARCH 1, MONARCH 2 및 MONARCH 3)에서 이 약으로 치료받은 환자들 중 3.3%가 모든 등급의 간질성 폐질환 및 간질성 폐렴을 경험하였고, 0.6%가 3 또는 4등급, 그리고 0.4%가 치명적인 결과를 나타내었다. 시판 후 조사에서 간질성 폐질환 및 간질성 폐렴의 추가 사례들이 관찰되었고, 사망 사례들이 보고되었다. 간질성 폐질환 및 간질성 폐렴을 나타내는 폐 증상이 있는지 관찰하여야 한다. 증상은 저산소증, 기침, 호흡곤란, 방사선 검사상 간질성 침윤물 등을 포함할 수 있다. 이러한 증상들에 있어서 감염성, 종양성, 그리고 그 밖의 원인들은 적절한 조사에 의해 제외되어야만 한다.
지속적 또는 재발성 2등급의 간질성 폐질환 및 간질성 폐렴을 나타내는 환자들에 대해서는 투여의 중단 또는 용량 감소가 권장된다. 3등급 또는 4등급의 간질성 폐질환 또는 간질성 폐렴을 나타내는 모든 환자들은 영구적으로 이 약의 투여를 중단하여야 한다.

[다음 환자에게는 투여하지 말 것] 이 약은 유당을 함유하고 있으므로, 갈락토오스 불내성(galactose intolerance), Lapp 유당분해효소 결핍증(Lapp lactase deficiency) 또는 포도당-갈락토오스 흡수장애(glucose-galactose malabsorption) 등의 유전적인 문제가 있는 환자에게는 투여하면 안 된다.

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[신중투여] 1) 간질성 폐질환이 있는 환자 또는 간질성 폐질환 기왕력이 있는 환자(간질성 폐질환이 악화될 가능성이 있음)

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CONTINUING ADVANCE IN METASTATIC BREAST CANCER: ROLE OF THE NEW CDK 4/6 INHIBITOR IN METASTATIC BREAST CANCER TREATMENT

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Therapeutic strategies in HR-positive HER2-negative metastatic breast cancer (MBC) have substantially evolved over the last decade based on new drugs that have truly transformed the way we see this disease today. Availability of CDK 4/6 inhibitors has changed the treatment sequence and postponed chemotherapy for most patients. Except for life-threatening situations, patient should receive endocrine-based therapy. For all three internationally available CDK 4/6 inhibitors (abemaciclib, palbociclib, ribociclib) plus endocrine therapy, phase III studies demonstrated substantial prolongation of PFS compared to endocrine therapy alone either in untreated patients or in those who had progressed on prior endocrine therapy.

Up to now, several CDK 4/6i trials have presented a significant and substantial improvement in OS compared to endocrine therapy alone. Patient management and toxicity profiles differ between the three CDK 4/6i. While palbociclib and ribociclib have neutropenia as their most frequent side effect, abemaciclib has less hematological but more GI toxicity. At ESMO 2019, first overall survival results for abemaciclib were presented from the phase III Monarch2 trial (n = 669; abemaciclib+fulvestrant vs. placebo+fulvestrant) after a median follow-up of 47.7 months. Patients in the abemaciclib arm hat a median 9.4 months OS benefit (46.7 vs. 37.3 months; HR 0.757; $p = 0.0137$). While the trial showed an OS benefit for all patients, the OS benefit was also seen in patients with difficult to treat MBC such as those with visceral metastases or with primary endocrine resistance. Time to first post-study chemotherapy was substantially prolonged in the abemaciclib arm (50.2 vs. 22.1. months; HR = 0.625; $p > 0.0001$). Long-term safety was consistent with previously reported data.

Given its activity in luminal disease, abemaciclib has also been explored in luminal HER2-positive MBC. In the phase II monarcHER trial, abemaciclib+fulvestrant+trastuzumab significantly improved PFS and ORR compared to trastuzumab+chemotherapy while no new safety signals were detected. These are encouraging data that underline the importance of further trials in this setting.

In luminal MBC, post CDK 4/6i therapy is not standardized. Everolimus and exemestane or a monochemotherapy are effective therapy options after progression on CDK 4/6i. For PIK3CA mutated tumors, the SOLAR-1 trial recently demonstrated efficacy of alpelisib, an alpha-specific PI3K inhibitor. Lastly, for patients with a gBRCA mutation, a PARP inhibitor also represents an effective therapy option.

In conclusion, due to endocrine-based highly effective therapy with CDK 4/6i in MBC, patients have a chance to live longer with this disease. Moreover, chemotherapy will continue to play a less important role in HR+ HER2- metastatic breast cancer.

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*CMF: Cyclophosphamide, Methotrexate, and Fluorouracil

1. **STUDY SUMMARY :** An open-label, randomized controlled pilot study to evaluate the safety and efficacy of leuprorelin 11.25 mg subcutaneously administered every-3-months for 2 versus 3 or more, up to 5 years, together with daily tamoxifen for 5 years in premenopausal endocrine-responsive breast cancer patients. Primary endpoints were disease-free survival (DFS) and safety. Adjuvant leuprorelin treatment for 3 or more years with tamoxifen showed a survival benefit and safety profile similar to that for 2 years in premenopausal endocrine-responsive breast cancer patients.
2. **Study summary :** A randomized phase III trial was performed to compare the Leuplin 3 month (n=299) and chemotherapy with CMF (n=300) in pre- or perimenopausal patients with ER-positive, node-positive breast cancer. The primary study objective was to compare RFS between both treatment groups. With a median follow-up of 5.8 years, recurrence-free survival was similar for patients treated with Leuplin 3M or CMF (hazard ratio [HR], 1.19; 95% CI, 0.94 to 1.51; P=0.15) Chemotherapy-related adverse effects were more common with CMF, whereas symptoms of estrogen suppression were initially more pronounced with LAD-3M.
3. **Study summary :** A crossover trial was conducted to compare patient comfort and tolerability between two commonly used LH-RH analogues: goserelin acetate and leuprorelin acetate. A total of 50 patients were randomised into two groups, each receiving 6-monthly injections of leuprorelin acetate (a liquid presentation) and goserelin acetate (a depot pellet) and crossing over between treatments. Patients completed a simple visual analogue score for the discomfort felt from the injections. An analysis of variance model was used, and the results found that patients do tolerate leuprorelin acetate (0.589) better than goserelin acetate (1.343) (P <0.001).

PRESCRIBING INFORMATION

루프린주 (Vial) 3.75 mg / 루프린 디피에스주 (DPS) 3.75 mg, 11.25 mg, 22.5 mg (류프로렐린아세트산염) [유효성분] 류프로렐린아세트산염 (JP) **[효능·효과] 1~2: 22.5 mg DPS / 1~5: 3.75 mg vial, 3.75 mg DPS, 11.25 mg DPS** / 1. 진행성 전립선암 2. 폐경전 유방암 3. 자궁내막증 4. 과다월경, 하복통, 요통 및 빈혈 등을 수반한 자궁근종에서 근종핵의 축소 및 증상의 개선 5. 중추성 사춘기 조발증 **[용법·용량] 1. 진행성 전립선암 2. 폐경전 유방암:** 보통 성인에는 류프로렐린아세트산염으로서 4주 1회3.75 mg/12주 1회 11.25 mg/24주 1회 22.5 mg을 피하주사한다. **3. 자궁내막증:** 보통 성인에는 4주 1회 3.75 mg (루프린주 3.75 mg: 체중 50 kg 미만의 환자에게는 1.88 mg을 투여)/12주 1회 11.25 mg을 피하주사하며, 초회투여는 월경주기 1~5일째에 한다. **4. 자궁근종:** 보통 성인에는4주 1회1.88 mg 피하주사한다. (루프린주 3.75 mg에 한함) 단, 체중과다 환자, 자궁종대가 고도인 환자에는 4주 1회 3.75 mg/12주 1회 11.25 mg을 투여하며, 초회투여는 월경주기 1~5일째에 한다. **5. 중추성 사춘기 조발증** 1) 3.75 mg vial 보통 4주 1회 체중 kg당 30 μg을 피하주사하며, 증상에 따라 체중 kg당 90 μg까지 증량할 수 있다. 2) 3.75 mg DPS 보통 4주 1회 류프로렐린아세트산염으로서 체중 kg당 30 μg을 피하주사한다. 또한 증상에 따라 체중 kg당 90 μg까지 증량할 수 있다. 단, 이 제제는 1/2 시린지 용량 또는 1 시린지 용량 투여가 필요한 경우에 한하며, 남은 현탁 주사액은 폐기할 것 3) 11.25 mg DPS 용법용량은 개인별로 조절되어야 하며, 권장 초기용량은 체중에 따라 조절한다. -체중 20 kg 이상의 소아: 1 mL (11.25 mg 류프로렐린아세트산염) 현탁액을 3개월마다 1회 피하주사한다. -체중 20 kg 미만의 소아: 이러한 드문 경우에는 중추성 사춘기 조발증의 임상적 활성도에 따라 다음의 용량을 투여한다. 0.5 mL (5.625 mg) 현탁액을 3개월마다 1회 피하주사하며, 남은 현탁 주사액은 폐기한다. 체중 증가를 관찰하여야 한다. **[사용상의 주의사항] • 경고** 1. 전이성 척추 손상이나 요로폐쇄증을 수반한 환자는 치료 초기 몇 주 동안 세심하게 관찰하여야 한다. 2. 남성환자에서 심근경색, 급성심장사, 뇌졸중으로의 발생위험의 증가가 GnRH 작용제의 사용과 연관 있음이 보고되었다. 3. 앰플주사제는 용기 절단 시 유리 파편이 혼입되어 부작용을 초래할 수 있으므로 사용 시 유리 파편 혼입이 최소화될 수 있도록 신중하게 절단 사용하되, 특히 어린이, 노약자에게 사용 시에는 각별히 주의할 것 (루프린주3.75 mg에 한함) **• 다음 환자에는 투여하지 말 것** 1. 이 약의 성분, GnRH 유사약물에 대해 과민반응의 병력이 있는 환자 2. 임부 또는 임신하고 있을 가능성이 있는 여성 및 수유부 3. 호르몬 비의존성 전립선암 환자 4. 양쪽 고환 절제술을 받은 후, 이 약에 의해 더 이상 테스토스테론의 감소를 기대할 수 없는 환자 5. 진단된 뇌하수체 샘종 환자 6. 자궁내막증, 자궁근종, 중추성사춘기조발증: 원인불명의 질출혈이 있는 환자 (루프린디피에스주 22.5 mg 제외) 7. 진행성 뇌종양 소아 환자 (루프린주 3.75 mg에 한함) 8. 소아 (루프린디피에스주 22.5 mg에 한함) **• 다음 환자에는 신중히 투여할 것** 1. 자궁내막증, 자궁근종, 폐경전 유방암: 자궁에 점막하 근종이 있는 환자 2. 당뇨병 환자 3. 고혈압 환자 4. 우울증의 병력이 있는 환자 5. 젤라틴 함유제제 또는 젤라틴 함유 식품에 대해서 쇽, 아나필락시양 증상 (두드러기, 호흡곤란, 구진부종, 후두부종 등) 등의 과민반응의 병력이 있는 환자 (단, 과민반응의 원인이 젤라틴인 것이 명확한 경우에는 투여해서는 안 됨) (루프린주 3.75 mg에 한함) **[저장방법]** 밀봉용기, 실온 (1~30℃) 보관 **[수입자]** 한국다케다제약 주식회사/서울특별시 강남구 테헤란로 98길 8, 12층 **[제조자]** Takeda Pharmaceutical Company Limited/Hikari Plant (Japan) **※ 이 내용은 허가사항을 요약한 것으로 자세한 정보는 제품의 첨부문서 또는 의약품통합정보시스템 (https://nedrug.mfds.go.kr)를 확인하십시오.**

References **1.** Shiba E, *et al.* A randomized controlled study evaluating safety and efficacy of leuprorelin acetate every-3-months depot for 2 versus 3 or more years with tamoxifen for 5 years as adjuvant in premenopausal patients with endocrine-responsive breast cancer. *Breast Cancer.* 2016 May;23(3):499-509. **2.** Schmid P, *et al.* Leuprorelin Acetate Every-3-Months Depot Versus Cyclophosphamide, Methotrexate and Fluorouracil As Adjuvant Treatment in Premenopausal Patients With Node-Positive Breast Cancer : The TABLE Study. *J Clin Oncol.* 2007 Jun 20;25(18):2509-15. **3.** Okada H. One-and three-month release injectable microspheres of the LH-RH super agonist leuprorelin acetate. *Adv Drug Deliv Rev.* 1997 Oct 13;28(1):43-70. **4.** Williams G *et al.* Randomised crossover trial to assess the tolerability of LHRH analogue administration. *Prostate Cancer Prostatic Dis.* 2003;6(2):187-9.

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ROLE OF OVARIAN FUNCTION SUPPRESSION IN PREMENOPAUSAL BREAST CANCER PATIENTS

Il Yong Chung

ASAN Medical Center, Korea

Since luteinizing hormone-releasing hormone (LHRH) agonist was developed, the role of ovarian function suppression (OFS) in the management of breast cancer have been evolving. OFS has become a major treatment option in premenopausal women with hormone receptor (HR)-positive breast cancer. OFS has shown the survival benefits in adjuvant settings. Updated results from the Suppression of Ovarian Function Trial (SOFT) and the Tamoxifen and Exemestane Trial (TEXT) showed that the addition of OFS to tamoxifen or exemestane significantly increased both disease-free and overall survival compared to tamoxifen alone in premenopausal women.

However, it should be noted that there was a heterogeneity of OFS effect according to HER2 status. In subgroup analysis by HER2 status, the addition of OFS to tamoxifen showed potentially greater benefit in HR+/HER2+ subgroup. Although HER2 positivity has been known to be associated with endocrine therapy resistance, a recent unplanned retrospective analysis of data from the Adjuvant Lapatinib and/or Trastuzumab Treatment Optimization trial indicated that treatment-related amenorrhea was significantly associated with increased survival in HR+/HER2+ breast cancer. In HR+/HER2- breast cancer, the addition of OFS to exemestane showed potentially greater benefit in freedom from distant recurrence, and overall survival data was not mature at the time of analysis. To identify patients benefited most from OFS in HR+/HER2- breast cancer, ‘composite risk’ based on clinical factors was calculated, and absolute improvements in survival rates were investigated using subpopulation treatment effect pattern plot methodology with Kaplan-Meier estimates. Under the circumstances where none of genomic assays can be used for selection of endocrine therapy, the selection based on clinical factors is our best option.

In metastatic settings, the combination of CDK 4/6 inhibitor and endocrine treatment as first-line therapy has shown a survival benefit in premenopausal women with HR+/HER2- breast cancer. Ribociclib with OFS and either a nonsteroidal aromatase inhibitor or tamoxifen significantly increased overall survival compared to endocrine alone. However, in prespecified subgroup analyses by endocrine therapy, overall survival in patients treated with tamoxifen was not different between the two groups. Moreover, in patients treated with tamoxifen, more cases of QT-interval prolongation were reported, and the investigators suggested that tamoxifen should not be combined with CDK 4/6 inhibitor. Therefore, OFS or ovarian ablation is an integral part of combined therapy with CDK 4/6 inhibitor and aromatase inhibitor.

Although OFS is known to preserve ovarian function during chemotherapy, there has been a long-standing debate on whether OFS can preserve fertility. Recent two meta-analyses showed different results about the role of OFS in fertility preservation. More research is needed to establish a strategy to increase fertility rates in young breast cancer patients.

In this talk, I am going to review the role of ovarian function suppression in premenopausal breast cancer patients and discuss future direction of OFS research.

Prescription Information

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THE ARRIVAL OF BIOSIMILAR MONOCLONAL ANTIBODY IN MEDICAL ONCOLOGY
: THE TRUTH OF TRASTUZUMAB BIOSIMILAR

Ji-Yeon Kim

Samsung Medical Center, Korea

Biologic drugs have revolutionized the treatment for several disease including cancer, rheumatoid disease, and other rare diseases. Especially, in breast cancer, human epidermal growth factor 2 (HER2) targeting biologic drugs increase quality of life (QoL) of patients and survival rate. However, biologic drugs like trastuzumab are expensive to treat, so many people cannot access to treatment by economic burden. Also, the high cost of treatment has increased pressure on healthcare budgets on society.

For recent years, biosimilars regarding off-patent biologics have entered markets. Competition among off-patent biologics and biosimilars in markets may expand access to treatment, improve cost-effectiveness of treatment, and stimulate an incremental therapeutic innovation. Some examples show that biosimilars can increase the drug uptake and decrease the total cost of the treatment.

What is a biosimilar? Biosimilar is a highly similar product in terms of quality, safety and efficacy with reference product. Each country has their own regulations and define the biosimilars, and operate own regulatory pathway. Regulators require extensive investigation to demonstrate that the biosimilar and reference product are sufficiently similar and current regulation for biosimilars is based on the concept of totality-of-evidence, which includes holistic evaluation of analytical, non-clinical, and clinical data. To develop biosimilars, pharmaceutical companies use a step-wise approach to build 'totality of evidence' to demonstrate biosimilarity to the reference product, not to independently establish safety and effectiveness of the proposed biosimilar. Extensive characterization studies should be applied to demonstrate that the quality of the biosimilar is comparable to the reference product. Relevant non-clinical studies also be performed before initiating clinical trials.

For clinical studies, pharmaceutical companies and regulatory agencies (EMA and FDA) continuously communicate and set the clinical considerations such as statistical design, study population, and study endpoint. In clinical comparability exercise, pharmacokinetics, and/or pharmacodynamics, efficacy, safety and immunogenicity should be included. The goal of the clinical program is not to independently re-establish safety and effectiveness of biosimilars, but to demonstrate biosimilarity. Since biosimilars are not identical to their reference products, Phase I and Phase III comparative clinical trials are generally required. Identifying the most sensitive and feasible endpoints is particularly challenging for oncology biosimilar clinical trials.

When a biosimilar is approved, there is an expectation that there will be no clinically meaningful differences in safety, immunogenicity, and efficacy. Biosimilars can get approvals from other indications with extrapolation. Extrapolation is based upon knowledge of the reference product, totality of evidence, and scientific justification. Some of trastuzumab biosimilar real world experience has been published and presented in recent congresses. Real-word evidence (RWE) complemented and helped to validate the safety and efficacy data generated by the registration trials. Also, confidence of clinicians and patients towards biosimilars is much higher if evidence is generated from real world data coming from their clinical practice.

After biosimilars enter the market, the evidence acquired over 10 years of clinical experience shows that biosimilars approved through agency can be used as safely and effectively in all their approved indications as their reference products.

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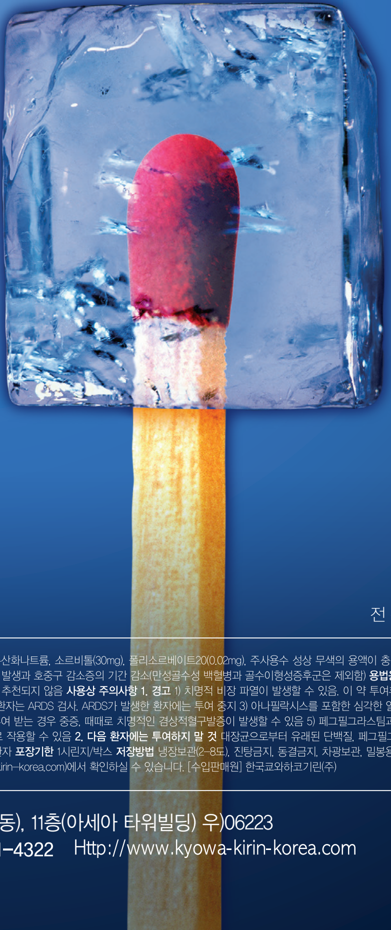

전문의약품

원료의약품 및 분량 1시린지(0.6밀리리터)중 (주성분) 페그필그라스팀(별규) · · · 6mg, (첨가제) 빙초산(글라시알아세틱에시드), 수산화나트륨, 소르비톨(30mg), 폴리소르베이트20(0.02mg), 주사용수 **성상** 무색의 용액이 충진 된 주사침이 달린 투명한 유리프리필드시린지 주사제 **효능효과** 악성종양에 대한 세포독성 화학요법을 투여 받는 환자의 발열성 호중구 감소증의 발생과 호중구 감소증의 기간 감소(만성골수성 백혈병과 골수이형성증후군은 제외함) **용법용량** 이 약 6mg을 항암화학요법 이후 약 24시간 후에 피하주사 *소아에 대한 사용 제한 *말기 신장애 환자를 포함한 신장애 환자에게 용량 변경은 추천되지 않음 **사용상 주의사항 1. 경고** 1) 치명적 비장 파열이 발생할 수 있음. 이 약 투여후 좌측 상복부, 어깨 통증이 있는 환자는 비장비대, 비장파열 검사 2) 급성 호흡곤란 증후군(ARDS)가 발생할 수 있음. 열, 폐 침윤, 호흡곤란이 있는 환자는 ARDS 검사. ARDS가 발생한 환자에는 투여 중지 3) 아나필락시스를 포함한 심각한 알러지 반응이 발생할 수 있음. 심각한 알러지 반응이 발생한 환자에는 투여를 영구 중지 4) 겸상적혈구질환 환자가 필그라스팀, 페그필그라스팀을 투여 받는 경우 중증, 때때로 치명적인 겸상적혈구발증이 발생할 수 있음 5) 페그필그라스팀과 필그라스팀이 작용하는 G-CSF수용체가 암세포에서 발견됨. 페그필그라스팀이 골수성 암과 골수이형성증을 포함한 암 종류를 증가시키는 요소로 작용할 수 있음 **2. 다음 환자에는 투여하지 말 것** 대장균으로부터 유래된 단백질, 페그필그라스팀, 필그라스팀 등에 과민증이 알려진 환자 **3. 다음 환자에는 신중히 투여할 것** 1) 약물 과민증의 병력이 있는 환자 2) 알레르기 소인이 있는 환자 **포장기한** 1시린지/박스 **저장방법** 냉장보관(2–8도), 진탕금지, 동결금지, 차광보관, 밀봉용기 **사용기한** 외부포장재에 표시된 사용기한 내에 사용 *제품에 대한 자세한 정보는 제품설명서를 참조해주시기를 바라며, 홈페이지(www.kyowa-kirin-korea.com)에서 확인하실 수 있습니다. [수입판매원] 한국쿄와하코기린(주)

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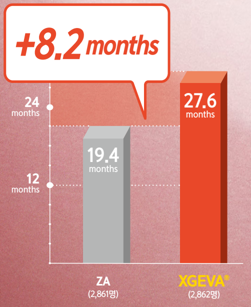
PROPHYLACTIC FEBRILE NEUTROPENIA MANAGEMENT OF BREAST CANCER PATIENTS

Kyung-Hun Lee

Seoul National Univ. Hospital, Korea

Maintaining optimal dose intensity is critical for the efficacy of cancer chemotherapy. Neutropenia is a major cause of delays and reduced dose of chemotherapy. Prophylactic G-CSF effectively prevents febrile neutropenia and helps to maintain adequate dose in a timely manner. I will review the principles of cytotoxic chemotherapy and present practical tips especially fitted for practicing physicians in Korea.



XGEVA®는 zoledronic acid 대비 골격계 증상(SRE)을 8.2개월 지연시켰습니다.[1†]

SREs, skeletal-related events; **ZA,** zoledronic acid.

References 1. Lipton A, *et al. Eur J Cancer*. 2012; 48: 3082–3092.

[†] XGEVA®는 대조약(zoledronic acid)과 비교 시 골격계 증상(SRE)이 처음 나타나는 시간을 평균 8.21개월까지 유의하게 지연시켰고, 골관련 증상 위험도 17% 감소시켰음. (HR 0.83 [95% CI, 0.76-0.90] ; $P< 0.001$) 이 데이타는 유방암, 전립선암, 기타 고형암 환자를 포함한 임상 3상 시험의 통합분석한 결과임.[1]

엑스지바®주 제품 요약정보(개정년월일 2019.10.23.)

[제품명] 엑스지바®주(데노수맙120밀리그램) **[효능효과]** 1. 다발성 골수종 및 고형암의 골전이 환자에서 골격계 증상 발생 위험 감소. 골격계 증상은 병리학적 골절, 뼈에 대한 방사선 조사, 척수압박, 뼈 수술을 말함. 2. 성인 및 골 성숙이 완료된 청소년에서 절제가 불가능하거나 수술적 절제가 중증의 이환을 일으킬 가능성이 있는 골거대세포종 치료. **[용법용량]** 이 약 1 바이알을 매 4주 간격으로 상완, 허벅지 위쪽 또는 복부에 피하 주사. 정맥내, 근내, 피내 투여되어서는 안된다. 필요시, 저칼슘혈증 치료 및 예방을 위해 칼슘과 비타민 D를 함께 복용. 골거대세포종의 경우 치료 첫 번째 달의 제8일째와 제15일째에 120mg을 추가로 투여한다. **[경고]** 턱뼈 괴사가 발생할 수 있다. **[다음 환자에게는 투여하지 말 것]** 이 약의 주성분 및 다른 성분에 대해 과민반응이 있는 환자, 중증의 치료받지 않은 저칼슘혈증 환자 **[약물이상반응]** [고형암의 골전이] 이 약을 투여 받은 환자에서 나타난 가장 흔한 약물이상반응(≥25%)은 피로/무력증(45%), 저인산혈증(32%), 구역(31%). 이 약을 투여 받은 환자에서 나타난 가장 흔한 중대한 약물이상반응은 호흡곤란. 이 약의 투여를 중단하게 한 가장 흔한 약물이상반응은 뼈괴사와 저칼슘혈증. [다발성골수종] 가장 흔한 약물이상반응(≥10%)은 설사, 구역, 빈혈, 등통증, 혈소판감소증, 말초 부종, 저칼슘혈증, 상기도 감염, 발진 및 두통. 가장 빈번하게 보고된 중대한 이상사례(어느 투여군에서든 ≥2%)은 폐렴, 형질세포 골수종, 발열, 열성 호중구감소증, 급성 신장 손상, 패혈증, 빈혈. 이 약의 투여를 중단하게 한 가장 흔한 약물이상반응(≥1%)은 턱뼈 괴사. [골거대세포종] 가장 흔한 약물이상반응(≥10%)은 관절통, 두통, 구역, 등 통증, 피로 및 사지통. 가장 흔하게 나타난 중대한 약물이상반응은 턱뼈 괴사와 골수염(발생률 0.7%)와 치아농양 또는 치아 감염(발생률 0.7%). **[일반적 주의]** 이 약 투여 중 프롤리아 프리필드시린지를 투여하면 안된다. 과민반응, 저칼슘혈증, 턱뼈 괴사, 비정형 전자하부 및 골간 대퇴골 골절, 뼈 성장 환자의 치료중단에 따른 고칼슘혈증, 치료 중단 후 다발성 척추 골절의 가능성이 있으므로 칼슘 수치 모니터링, 칼슘 및 비타민 D 섭취, 구강 검진, 통증 등의 골절의 징후 및 증상, 임신 여부 등을 모니터링하고, 필요시 치료 중단 등의 의학적 조치를 고려한다. **[보관 및 취급상의 주의사항]** 동결을 피하여 차광 냉장 (2-8℃) 보관. **[수입판매원]** 암젠코리아유한회사 (서울특별시 중구 을지로5길 19 페럼타워 20층). **※ 제품을 처방하시기 전 상세 제품설명서를 참고하여주시기 바랍니다.**

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* 폐경기전 및 주폐경기 여성의 유방암
** 폐경기후 여성의 유방암

† Study design: phase IIIb, open-label, multicenter trial conducted across 271 international centers. postmenopausal women with HR-positive were randomly assigned 1:1 to receive either adjuvant letrozole (2.5 mg) or anastrozole (1 mg) once per day until disease recurrence/relapse or for a maximum of 5 years.

REFERENCES

1. Harold J. Burstein, et al. J Clin Oncol 34: 1689-1701, 2016
2. Ian Smith, Denise Yardley, et al., J Clin Oncol 35, 2017

전문의약품

PRODUCT INFORMATION

졸라덱스 데포주사 (초산고세렐린)【성분 • 함량】1실린지 중: 유효성분: 초산고세렐린 (별규) 3.78mg (고세렐린으로서 3.6mg)첨가제: 락타이드/글리콜라이드 공중합체 18.0mg 프리필드시린지 **【성 상】**1회용 실린지 어프리케이터속에 살균된 백색–크림색의 원주형 데포가 들어있으며 이 속에 초산고세렐린(고세렐린으로서 3.6mg)이 생체내에서 분해되는 매트릭스에 분산되어 있다. **【효능 • 효과】**• 호르몬요법이 적합한 전립선암 • 호르몬요법이 적합한 폐경기전 및 주폐경기 여성의 진행성 유방암 • 조기유방암의 보조요법: 에스트로겐 수용체(ER) 양성인 폐경기전 및 주폐경기 여성의 조기 유방암에 대한 표준 화학 요법의 대체요법 • 자궁내막증 • 자궁내막조직의 퇴축: 자궁내막 제거나 절제전에 자궁내막을 얇게 함을 목적으로 투여함 • 자궁근종: 자궁근종을 가진 빈혈환자에서 수술전 철분요법과 병행하여 환자의 혈액상태를 개선함을 목적으로 투여함 • 보조생식술: 배란촉진 과정시 뇌하수체 억제 목적 **【용법 • 용량】** 성인: 고세렐린으로서 3.6mg을 28일 간격으로 전방복벽에 피하주사한다. 신장애, 간장애 환자나 고령자의 경우에도 용량을 조절할 필요는 없다. 1. 전립선암, 유방암: 호르몬요법이 적합한 전립선암 또는 유방암의 관리에 고세렐린으로서 3.6mg 1데포를 28일마다 전방복벽에 피하주사한다. 국소진행 전립선암에 있어서 방사선요법과 병용하는 보조 호르몬요법의 경우 36개월로 사용이 제한된다. 2. 자궁내막증: 자궁내막증을 이 약으로서 6개월 이상 치료한 임상자료가 없으므로 치료기간은 6개월 이하가 되도록 한다. 뼈 무기질 밀도의 감소 우려가 있으므로 반복적인 치료는 하지 않도록 한다. 이 약 투여시 호르몬 대체요법(에스트로젠 및 프로게스테론 제제)을 병행하면 뼈 무기질 밀도 감소 및 혈관운동성 증상이 감소된다. 3. 자궁내막조직의 퇴축: 자궁내막의 퇴축을 목적으로 투여할 때는 4주 혹은 8주간 치료한다. 자궁의 크기가 큰 환자에게 투여 시 또는 적당한 수술 일정을 결정하기 위해서 2번째 데포를 투여할 수 있다. 4. 자궁근종: 자궁근종에 의한 빈혈이 있는 여성에게는 고세렐린으로서 3.6mg에 철분을 보충하여 수술 전 3개월까지 투여할 수 있다. 5. 보조생식술: 에스트라디올 농도가 초기 황체기 수준이(약 150pmol/ℓ) 되도록 뇌하수체를 억제하기 위해 고세렐린으로서 3.6mg 1데포를 투여한다. 이는 7~21일 사이에 일어난다. 뇌하수체가 억제되면 생식샘자극호르몬(gonadotrophin)으로 배란을 촉진시킨다. 이 약에 의한 뇌하수체 억제는 일정하여 일부 경우, 성선자극호르몬 요구량이 증가될 수 있다. 적당한 시기의 황체기에 성선자극호르몬을 중지하고 사람융모성생식샘자극호르몬(hCG)을 투여하여 배란시킨다. 치료관찰, 난자 회수 및 임신기법은 각 병원의 일반적 방법에 따른다. **【사용상의 주의사항】**1. 경고 전이성 척추 손상(metastatic vertebral lesion)이나 요로폐쇄증을 수반한 환자는 치료 초기 몇 주 동안 세심하게 관찰하여야 한다. 2. 다음 환자에는 투여하지 말 것. 1) 이 약의 성분 및 LHRH 유사약물에 대하여 과민반응 환자 2) 임부 및 수유부 3) 호르몬 비의존성 전립선암 환자 4) 양쪽 고환 절제술을 받은 후, 이 약에 의해 더 이상 테스토스테론의 감소를 기대할 수 없는 환자 5) 원인 불명의 질 출혈 환자 6) 소아 7) 진단된 뇌하수체 샘종 환자 3. 다음 환자에는 신중히 투여할 것. 보조생식술의 경우: 다낭포성 난소 환자 **【저장방법】**25℃ 이하 실온보관, 밀봉용기 **【포장단위】**1프리필드시린지 ※ 만약 구입시 사용기한이 경과되었거나 변질, 변패 또는 오손된 제품인 경우에는 구입처를 통하여 교환하여 드리며, 공정거래위원회 "소비자분쟁해결기준"에 의거 소비자의 정당한 피해는 보상하여 드립니다. 의약품 부작용 발생 시 한국의약품안전관리원에 피해구제를 신청하실 수 있습니다. 문헌개정연월일: 2019년 5월 1일 이 첨부문서의 개정연월일 이후 변경된 내용은 폐사의 홈페이지 (http://www.astrazeneca.co.kr)를 방문하시거나 전화번호 02–2188–0800으로 문의하셔서 확인하실 수 있습니다. 의약품 용어설명 및 기타 자세한 의약품정보는 온라인의약도서관(http://drug.mfds.go.kr) 의약품 정보를 참조하시기 바랍니다. 수입자: 한국아스트라제네카 서울시 강남구 영동대로 517 아셈타워 21 층 전화: (02) 2188–0800

aZOL20190429

전문의약품

PRODUCT INFORMATION

아리미덱스 정(아나스트로졸) Arimidex tablet (Anastrozole)【성분 • 함량】1정(약 103mg)중 주성분 : 아나스트로졸 (별규) 1.0mg **【성상】**백색의 원형 필름코팅정 **【효능 • 효과】**1. 폐경기 이후 여성의 진행성 유방암의 치료(이 요법 이전의 타목시펜 치료시 임상반응을 나타내지 않는 에스트로겐 수용체 음성인 환자에서, 이 약의 유효성은 입증되지 않았다.) 2. 호르몬 수용체 양성인 폐경기 이후 여성의 조기 유방암의 보조 치료. 조기 유방암의 보조 요법으로 2~3 년간 타목시펜을 투여 받아온 호르몬 수용체 양성인 폐경기 이후 여성 환자의 조기 유방암의 보조 치료. **【용법 • 용량】** • 성인 : 아나스트로졸로서 1일 1회 1mg을 경구투여한다. • 소아 : 18세 이하 소아에게는 투여하지 않는다. • 신장애 환자 : 경증 또는 중등도의 신장애 환자는 용량을 변경할 필요가 없다. 중증 신기능장애 환자(크레아티닌청소율이 30 mL/min 이하인 환자)에서는 이 약을 투여하지 않는다. • 간장애 환자 : 경증의 간장애 환자는 용량을 변경할 필요가 없다. 중등도 이상의 간장 질환자에서는 이 약을 투여하지 않는다. **【사용상의 주의사항】**1. 경고 1) 이 약은 폐경기 이전의 여성에게는 안전성 및 유효성이 입증되지 않았기 때문에 사용하지 않아야 한다. 폐경기 상태가 의심스러운 경우 폐경기 여부를 생화학적으로 확인 하여야 한다. 2) 이 약은 중등도 또는 중증의 간장애 및 중증의 신장애 환자(크레아티닌 클리어런스가 30mL/min 이하)에 대해서는 시험되지 않았다. 3) 이 약은 순환 에스트로겐을 낮추므로 골무기질 밀도를 감소시켜서 골절의 위험을 증가시킬 수 있다. 4) 골다공증 및 골다공증 위험이 있는 환자에게 치료 시작 및 그 후 일정한 간격으로 골밀도에 대하여 시험(예. DEXA scanning)하여야 한다. 골다공증 치료 및 예방법이 적절하게 시행되어야 하고 주의 깊게 모니터링 해야 한다. 5) LHRH 계열과 아나스트로졸 병용에 대한 연구가 이루어지지 않았다. 이 병용요법을 임상에서 사용해서는 안된다. 2. 다음의 환자에는 투여하지 말 것. 1) 폐경기 이전의 여성 2) 임부 또는 임신하고 있을 가능성이 있는 여성, 수유부 3) 중증의 신장애 환자 (크레아티닌청소율이 30mL/min 이하인 환자) 4) 중등도 이상의 간장애 환자 5) 이 약 또는 이 약의 구성성분에 과민반응이 있다고 알려진 환자 6) 타목시펜 병용투여 환자 또는 에스트로겐을 함유하는 요법중인 환자(이 약의 약리작용을 감소시키기 때문에 병용해서는 안된다.) 7) 이 약은 락토오스를 포함하고 있다. 드물게 나타나는 갈락토오스 불내성(galactose intolerance), Lapp유당분해효소 결핍증(Lapp lactase deficiency) 또는 포도당–갈락토스 흡수장애(glucose–galactose malabsorption) 등의 유전적인 문제가 있는 환자에게는 투여하면 안 된다. **【저장방법】**밀폐용기, 30℃ 미만에서 보관 수입자 : 한국아스트라제네카

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KR-4532

AstraZeneca

알보젠코리아주식회사 서울특별시 영등포구 국제금융로 10, 13층 **www.alvogenkorea.com 02-2047-7700**

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1. Lee KH, *et al. Support Care Cancer* 2016;24:1709-17.

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레트로졸 치료가 필요한 모든 환자에게...

브레트라

(레트로졸/letrozole)

폐경후 여성*의 국소적으로 진전된 또는 전이성 유방암에서 **1차 치료**

*에스트로겐 또는 프로게스테론 수용체 양성이거나 또는 수용체 상태가 알려지지 않은 폐경후 여성

항에스트로겐 요법후 재발된 자연적 또는 인공적으로 폐경이 된 여성의 **진전된 유방암**

5년동안 타목시펜 보조요법 이후 **연장 보조요법***

*에스트로겐 또는 프로게스테론 수용체 양성이거나 또는 수용체 상태가 알려지지 않은 폐경후 여성의 침습성 조기 유방암에서

호르몬수용체 양성인 폐경후 여성의 **침습성 조기 유방암**에서의 보조요법

브레트라 정 [성분/함량] 레트로졸 2.5mg **[보험코드(KD코드)/약가]** 648501310 [A00307321] / 2,909/1정(2020.01.01) **[효능,효과]** 1.에스트로겐 또는 프로게스테론 수용체 양성이거나 또는 수용체 상태가 알려지지 않은 폐경후 여성의 국소적으로 진전된 또는 전이성 유방암에서 1차 치료 2.항에스트로겐 요법 후 재발된 자연적 또는 인공적으로 폐경이 된 여성의 진전된 유방암 3.에스트로겐 또는 프로게스테론 수용체 양성이거나 또는 수용체 상태가 알려지지 않은 폐경후 여성의 침습성 조기 유방암에서 5년동안 타목시펜 보조요법 이후 연장 보조요법 4.호르몬수용체 양성인 폐경후 여성의 침습성 조기 유방암에서의 보조요법 **[용법,용량]** 성인 및 고령자 : 권장용량은 식사와 상관없이 레트로졸로서 1일 1회 2.5 mg을 경구투여한다. 복용을 잊은 경우, 생각난 즉시 복용한다. 하지만 다음 복용시간에 가까운 경우는 복용을 생략하고 정해진 스케줄대로 복용한다. 권장용량인 2.5 mg를 넘지 않도록 두배용량을 복용해서는 안된다. 전이성 질환 환자인 경우에는 암의 진행이 확인될 때까지 투여를 계속한다. 보조요법 및 타목시펜 보조요법 이후의 연장보조요법의 경우 5년 동안 투여할 수 있으며, 투여 중 암이 재발하면 투약을 중지한다(타목시펜 보조요법 이후의 연장보조요법의 경우, 장기간 투여와 관련한 최적의 치료기간은 확립되어있지 않다.) 간장애 환자 : 간경변으로 인한 중등도의 간기능저하를 갖고 있는 환자에서 이 약의 혈액농도가 약간 증가하나 경증 ~ 중등도 간기능 저하 환자의 경우 용량조절은 필요하지 않다. 그러나 중증의 간기능장애 환자(Child-Pugh score C)에게 이 약을 사용할 경우 지속적이고 세심한 감독이 이루어져야 한다. 신장애 환자 : 크레아티닌청소율 10 mL/min 이상인 신장애 환자에 대한 용량조절은 필요하지 않다. **[금기]** 1.이 제제의 구성성분에 대한 과민반응이 있는 환자 2.폐경 전 내분비 상태인 여성 3.임부, 수유부 **[주의]** 1.크레아티닌 클리어런스가 10mL/min미만인 여성환자에 대한 연구는 시행되지 않았다. 그러므로 이러한 환자에 대한 이 약 치료의 잠재적 유익성 및 위험성을 투여 전에 신중히 고려해야 한다. 2.심한 간부전환자(Child-Pugh score C)에서 전신 노출 및 소실 반감기는 건강한 사람의 약 두 배이다. 그러므로 이러한 환자에서는 세심한 관찰하에 투여되어야한다. 반복투여에 대한 임상경험은 없다. **[이상반응]** 식욕부진,식욕증가, 고콜레스테롤혈증, 우울증, 두통, 어지러움, 구역, 구토, 소화불량, 변비, 설사, 탈모증, 발한 증가, 발진, 관절통, 안면홍조, 피로, 말초 부종, 체중 증가 등

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10th Global Breast Cancer Conference

DIAGNOSTIC PERFORMANCE OF AUTOMATED BREAST ULTRASOUND AND HANDHELD ULTRASOUND IN WOMEN WITH DENSE BREASTS

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Background: Ultrasound as an adjunct to mammography can improve the detection of breast cancer in women with dense breasts. We aimed to evaluate the diagnostic performance of automated breast ultrasound system (ABUS) and handheld ultrasound (HHUS) in the same population with dense breasts in Chinese women for the first time.

Methods: This is a multi-center clinical research study. 958 women with dense breasts underwent ABUS, HHUS, and mammography at one of 5 tertiary-care hospitals. The diagnostic performance of ABUS and HHUS were evaluated in combination with mammography, or separately in women with mammography-negative dense breasts. The percent agreement between ABUS and HHUS in breast cancer detection was also assessed.

Result: The sensitivity of the combination of ABUS or HHUS with mammography was 99.10% (221/223), the specificities were 86.39% (635/735) and 84.22% (619/735), respectively. The area under curve was 0.93 for ABUS combined with mammography and 0.92 for that of HHUS combined with mammography. Statistically significant agreement between ABUS and HHUS in breast cancer detection was observed (percent agreement = 0.94, kappa = 0.84). The incremental cancer detection rate in mammography-negative dense breasts was 44.4 per 1,000 ultrasound examinations in our study.

Conclusions: Both ABUS and HHUS as adjuncts to mammography can significantly improve the breast cancer detection rate in women with dense breasts, and there is a strong correlation between them. Given the high prevalence of dense breasts and the multiple advantages of ABUS over HHUS, such as operator-independence and reproducibility, ABUS showed great potential for use in breast cancer screening and early detection, especially in resource-limited areas.

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PATIENT-PROVIDER AND PATIENT-FAMILY COMMUNICATION IN HEREDITARY BREAST AND OVARIAN CANCER

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Background: Less than 40% of people with strong family history for breast cancer use genetic services. In hereditary cancers, family communication on genetics is essential for family members' decision making about genetic risk assessment and counselling. The role of healthcare-providers in supporting communication on genetics within family is recognized, but still limited and unclear. This study aims to understand how healthcare-providers address family-communication in clinical practice and how this may affect genetic test results disclosure from mutation carriers to relatives.

Methods: Convergent-parallel mixed-method design. Quantitative data are collected with self-administered surveys from hereditary breast and ovarian cancer (HBOC) mutation carriers and at-risk relatives from three linguistic areas of Switzerland. Concomitantly, qualitative data are collected with focus groups and interviews with HBOC mutation carriers, relatives and healthcare-providers. After quantitative and qualitative data analyses, data integration and interpretation will be done.

Result: Currently, 493 individuals have been recruited, 254 surveys completed and 11 focus groups and 25 interviews conducted (n = 51). Only 37% of participants remember receiving recommendation for genetic testing for at-risk relatives and 66.1% shared genetic information to blood relatives. Qualitative data show that family communication on genetics is complex, influenced by many individual and family-related aspects and changing along the trajectory of life and illness. Providers address communication to at-risk relatives discontinuously and in a quick and non-detailed way.

Conclusions: Supporting family communication on genetics is challenging. Research about genetic communication is timely and essential to implement interventions to enhance clinical practice, cascade testing and multilevel public-health initiatives for cancer prevention and control.

IS THERE A ROLE FOR SOMATIC BRCA MUTATION TESTING FOR GERMLINE MUTATION-NEGATIVE BREAST CANCER?

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Background: PARP inhibitor is approved for metastatic breast cancer patients with germline BRCA mutations. Based on ovarian cancer data, this drug may also be applicable to breast tumors with somatic mutations. However, there is limited literature regarding the mutation rates of somatic BRCA mutations in germline negative breast cancer patients. This study aimed to investigate the rate of somatic mutation in these patients so that appropriate testing protocols can be implemented.

Methods: Breast and ovarian cancer patients recruited under Hong Kong Hereditary Breast Cancer Family Registry (The Registry) who fulfilled criteria for germline genetic testing based on a previously reported local clinical high-risk guideline but tested germline mutation-negative with 6-gene panel (BRCA 1, BRCA 2, TP53, PTEN, PALB2, and CDH1) were included. DNA from tumor tissue was extracted, and 93-gene Human Breast Cancer Panel was used for somatic mutation detection.

Result: BRCA mutation detection rate in germline genetic testing in the Registry was 8.3% (217 positives out of 2,618 patients) for breast cancer and 9.9% (45 positives out of 453 tested) for ovarian cancer. In this study, 108 breast tumor tissue with germline BRCA mutations negative were tested; none of these had pathogenic BRCA mutations. In contrast, 32.6% (15 out of 46) ovarian tumor tissues were found to carry somatic BRCA pathogenic mutations despite negative germline testing.

Conclusions: Unlike ovarian cancer, the proportion of germline BRCA mutation-negative breast cancers that carry a somatic BRCA mutation is extremely low; thus somatic BRCA mutation test has limited value for these patients.

GERMLINE FOLLOW-UP TESTING SIGNIFICANTLY INCREASES THE CLINICAL UTILITY OF TUMOR-ONLY DNA SEQUENCING IN BREAST AND OVARIAN CANCERS

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Invitae, Genetics, U.S.A.

Background: Germline genetic testing is recommended for patients with specific presentations or family histories. Separately, tumor sequencing is increasingly used to inform therapy, usually in advanced disease. Although tumor sequencing, in principle, detects both somatic and germline mutations, common tumor tests have limitations with germline alterations. We investigated the utility of germline sequencing in a cohort of patients referred by clinicians for both test modalities.

Methods: We analyzed consecutive patients who (a) had a current diagnosis or personal history of breast or ovarian cancer; (b) were referred for germline testing; and (c) previously received tumor DNA sequencing. Variants of uncertain significance were excluded. Clinicians stated diverse reasons for ordering germline testing, including: somatic findings of potential germline significance, treatment/surgical planning, personal/family history, or patient concern.

Result: Of 257 patients meeting criteria, 64% had breast cancer, 32% ovarian, and 4% both. 24% had additional cancer histories as well. 39% of these patients were found to harbor a pathogenic germline variant (PGV) in a cancer predisposition gene. Mutations in certain genes (e.g. BRCA1) were much more likely to be germline compared to others (TP53). Most PGVs were clinically actionable. Of note, 9% of actionable PGVs were not reported by tumor-only sequencing as either germline or somatic findings. Also, 29% of patients with PGVs had these variants uncovered only after a second, possibly preventable, cancer had occurred.

Conclusions: Recent ESMO and NCCN guidelines recommend germline testing as a follow-up to somatic testing. Our data show that such testing can improve patient care, although it appears underutilized.

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PREDICTING RESPONSE OF NEOADJUVANT CHEMOTHERAPY IN HORMONE RECEPTOR POSITIVE AND HER2-NEGATIVE WITH AXILLARY LYMPH NODE METASTASIS BREAST CANCER BY A MULTIGENE ASSAY (GENESWELL^{TM} BCT)

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Background: The GenesWell^{TM} BCT is a recently developed multigene assay that predicts the risk of distant recurrence in patients with hormone receptor positive (HR+) and HER2 negative (HER2-), early breast cancer (BC). Ability of the assay to predict response to neoadjuvant chemotherapy (NACT) has not been established.

Methods: Biopsy specimen were analyzed BCT which underwent NACT with HR+/HER2- and LN metastasis BC at a single institution from 2008 to 2018. BCT score was developed and classified as high and low according to response. The ratio of pCR and PR (pCR/PR), of SD and PD (SD/PD), pre-NACT score of Ki-67 was evaluated for tumor response.

Result: A total of 88 patients were available BCT score among 108 eligible patients. Median follow up duration was 45 months. Of those, 61 (69.3%) had a cN1 and 53 (60.2%) had a cT1/2. BCT score were low in 25 (28.4%) patients and high in 63 (71.6%) patients. Among 50 patients with pCR/PR, 41 (56.8%) patients were in high and 9 (36.0%) were in low, and 38 patients with SD/PD, 22 (34.9%) patients were in high and 16 (64.0%) were in low ($p=0.025$). Ki-67 before NACT showed a significant factor for predicting tumor response ($p=0.006$; 3.81 (1.50-10.16)). BCT score showed a significant response to NACT ($p=0.016$; 4.18 (1.34-14.28)). There was a significant difference for distant metastasis free survival between BCT high and low group ($p=0.004$).

Conclusions: We demonstrated the BCT predicts NACT responsiveness of HR+/HER2- with LN metastasis BC and may predict prognosis. Further study is warranted for validation.

POST-HOC ANALYSIS OF EFLAPEGRASTIM, A NOVEL, LONG-ACTING GRANULOCYTE-COLONY STIMULATING FACTOR, TO EXPLORE ANY ETHNIC DIFFERENCE OF KOREAN COMPARED WITH POOLED POPULATION OF PHASE 3 TRIALS

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Background: Eflapegrastim is the novel, long-acting granulocyte-colony stimulating factor (G-CSF) that consists of a recombinant human G-CSF analog conjugated to a human IgG4 Fc fragment via a polyethylene glycol linker. The two pivotal trials, RECOVER and ADVANCE, meet the primary endpoint which is a non-inferiority with Pegfilgrastim in the Duration of Severe Neutropenia (DSN; Grade 4) in cycle 1. The authors conduct the post-hoc analysis to explore any difference of Korean with pooled population of phase 3 trials regarding safety and efficacy.

Methods: A total 643 patients with early-stage breast cancer (Stage I to IIIA) including 28 Korean were 1:1 randomized to Eflapegrastim or Pegfilgrastim arm in two phase 3 trials. The investigator product (IP) was administered on day 2 following TC (Docetaxel/Cyclophosphamide) chemotherapy on day 1. Daily blood sampling was conducted to assess DSN in cycle 1.

Result: The Eflapegrastim is non-inferior to Pegfilgrastim with Korean sub-population in mean difference of DSN (-0.288 days, 95% CI: -0.764, 0.193). This is similar with pooled population result (-0.120 days, 95% CI: -0.227, -0.012). Other major secondary endpoints (Depth of ANC nadir, febrile neutropenia incidence) consistently support the similarities. Musculoskeletal and connective tissue disorders are the most common IP-related TEAE in both Korean and pooled population and the overall safety profiles were similar between two groups.

Conclusions: Given the results of post-hoc analysis, there is no observed ethnic difference of Korean population regarding safety and efficacy perspective of Eflapegrastim.

NIGHT SHIFT WORK AND BREAST CANCER RISK: A META-ANALYSIS OF OBSERVATIONAL EPIDEMIOLOGYCAL STUDIES

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Background: Previous observational epidemiological studies have reported inconsistent findings in the association between night shift work (NSW) and breast cancer risk. This study aimed to investigate those associations by using a meta-analysis of observational epidemiological studies.

Methods: We searched PubMed and EMBASE using keywords related to this topic from inception till November 2020. The pooled effect sizes such as odds ratio (OR), hazard ratio (HR), or relative risk (RR) with 95% confidence intervals (CI) were calculated using a random-effects model.

Result: In the meta-analysis of a total of 32 observational studies including 13 case-control studies, 4 nested case-control studies, and 15 cohort studies, we found that NSW significantly increased the risk of breast cancer (OR/RR/HR, 1.11; 95% CI, 1.04 to 1.20; I-squared = 72.4%). In the subgroup meta-analysis by type of study, NSW also was associated with the increased risk of breast cancer in case-control studies (OR, 1.34; 95% CI, 1.17 to 1.53; I-squared = 63.8%). However, no significant association was found in both nested case-control studies (OR, 1.14; 95% CI, 0.89 to 1.46; I-squared = 65.8%) and cohort studies (RR/HR, 0.98; 95% CI, 0.93 to 1.03; I-squared = 25.3%). Besides, there was no significant association between NSW for over 20 years and breast cancer risk (OR/RR/HR, 1.03; 95% CI, 0.95 to 1.11; I-squared = 36.6%, n = 14).

Conclusions: Given that cohort studies provide higher evidence than case-control studies, there is no association between NSW and the risk of breast cancer. Further large prospective cohort studies are warranted to confirm these associations.

RISK FACTORS FOR BREAST CANCER IN HONG KONG WOMEN: THE FIRST LARGE-SCALE CASE-CONTROL STUDY IN THE TERRITORY

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Background: Breast cancer has become the most common cancer among women in Hong Kong for the past two decades. Various risk assessment tools or models have been developed worldwide, and yet predominantly validated in western countries. To date, comprehensive epidemiological study which focuses on the risk factors of breast cancer among local Chinese women is still lacking.

Methods: A total of 5,102 breast cancer cases and 5,520 age-matched controls were recruited from 2014 to 2017. Data were collected from standardized questionnaires through face-to-face interviews. Chi-square test was used to compare the distribution of sociodemographic characteristics. Variables were studied by unconditional multiple logistic regression controlled for age. Associations were first tested by univariate models, and then further by multivariate models for variables with p-value < 0.1. Stratified analyses by age, menopausal status, and hormonal receptor status of tumor were also conducted.

Result: Among the eleven personal and reproductive factors studied, menopausal status was not found to have relationship with breast cancer risk. Apart from some widely recognized risk factors like positive family history, we found that women who perceived having high level of stress were associated with a significantly higher risk, followed by lack of exercise and obesity. Furthermore, nulliparity and late menopause contributed to an increased risk of breast cancer in postmenopausal women.

Conclusions: Our study supports that some, but not all, common modifiable and non-modifiable risk factors of breast cancer also applied to local Chinese women. These results may form the basis of building a risk prediction model more appropriate for our population.

TUMOR-SPECIFICITY OF TUMOR-INFILTRATING CD8+ T CELLS DETERMINES THE POTENTIAL OF IMMUNE CHECKPOINT INHIBITORS IN BREAST CANCER

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Background: Recent researches revealed that CD103+CD8+ tumor-infiltrating lymphocytes (TILs) with tissue-resident memory features are associated with improved prognosis in breast cancer. However, prognostic value of TRMs and heterogeneity of CD103+ TRMs of breast cancer in terms of tumor-specificity needs further understanding to establish immuno-therapeutic implications.

Methods: We isolated peripheral blood mononuclear cells (PBMCs) and TILs from 150 patients who underwent surgical resection between July 2016 and May 2020 at Severance Hospital, Seoul, Republic of Korea. Multi-color flow cytometry analyses were performed.

Result: CD103+TRMs consist of both tumor-antigen specific CD8+ T cells and bystander CD8+ T cells such as viral antigen-specific CD8+ T cells. Dissection of CD103+TRMs with CD39 expression reveals a clonally-distinct subpopulation exhibiting tumor-antigen specificity and reactivity with transcriptionally and phenotypically exhaustive features, proven by single cell RNA sequencing and functional restoration assay. CD39+CD103+ TRMs were enriched in HER2 enriched and triple-negative breast cancer (TNBC) subtypes, but not in Hormone receptor (HR) positive/HER2 not enriched subtypes, implying that the role of tumor-infiltrating CD8+ T cells in eliciting anti-tumor immune response differ among molecular subtypes. In line with early-exhaustive features of CD39+CD103+TRMs, inhibition of either PD-1 alone or both PD-1 and CTLA-4 reinvigorate the proliferation and the cytokine production of CD8+ TILs in HER2 and TNBC subtypes.

Conclusions: Our findings indicate CD39+CD103+TRMs may play an important role in immuno-oncology in breast cancer especially in HER2 enriched and TNBC subtype. Different immuno-therapeutic strategies should be considered to different subtypes of breast cancer.

KYNURENINE 3-MONOOXYGENASE UPREGULATES PLURIPOTENT GENES THROUGH β-CATENIN AND PROMOTES TRIPLE-NEGATIVE BREAST CANCER PROGRESSION

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Background: Triple-negative breast cancer (TNBC) is aggressive and poor prognostic. Kynurenine 3-monooxygenase (KMO), a crucial kynurenine metabolic enzyme, is involved in inflammation, immune response and tumorigenesis. We aimed to study the roles of KMO in TNBC progression.

Methods: KMO alterations and expressions were analyzed from several publicly available database including The Cancer Genome Atlas database. KMO expressions in 59 paired TNBC samples were analyzed using immunohistochemistry (IHC). Knockdown of KMO in TNBC cells was achieved by RNAi and CRISPR/Cas9. Functions of KMO were examined by MTT, colony-forming, transwell migration/invasion, and mammosphere assays. The molecular events were analyzed by cDNA microarrays, western blot, quantitative real-time PCR and luciferase reporter assays. Tumor growth and metastasis were conducted by orthotopic xenograft and tail vein metastasis mouse models, respectively.

Result: KMO was amplified and associated with survival in breast cancer patients. KMO expressions were higher in TNBC tumors compared to adjacent normal mammary tissues. In vitro ectopic KMO expression increased cell growth, colony and mammosphere formation, migration, invasion as well as EMT markers expressions in TNBC cells. In addition, KMO increased pluripotent genes expressions and promoter activities in vitro. Mechanistically, KMO was associated with β-catenin and prevented β-catenin degradation, thereby enhanced transcription of pluripotent genes. KMO knockdown suppressed tumor growth and expressions of β-catenin, CD44 and Nanog. Importantly, mice bearing CRISPR KMO-knockdown TNBC cells showed decreased lung metastasis and prolonged overall survival.

Conclusions: KMO serves as a novel regulator of pluripotent genes via β-catenin and plays an oncogenic role in promoting TNBC progression.

DIFFERENTIAL EXPRESSION OF EPITHELIAL MESENCHYMAL TRANSITION FACTORS IN POSITIVE AND NEGATIVE MARGIN OF BREAST CARCINOMA AFTER PARTIAL MASTECTOMY

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Background: The tumor microenvironment involves tumor progression, invasion and metastasis. Aim of this study was to determine whether epithelial mesenchymal transition (EMT) factors associated with positive or close margins after partial mastectomy by comparing patients with a negative margin.

Methods: We reviewed data of women diagnosed with invasive breast carcinoma and ductal carcinoma *in situ* at our institution between January 2006 and December 2016. Primary breast tissue samples were evaluated using immunohistochemistry staining of the EMT markers; vimentin, cluster of differentiation 31 (CD31), Factor VIII, matrix metalloproteinase (MMP)-9, fibroblast activation protein (FAP). Expression of EMF factors were analyzed in 3 area; central, interface and distal normal zones.

Result: A total of 272 patients underwent BCS during the study period and 132 patients had intraoperative and/or postoperative positive or close margins. The remaining 140 patients had a negative margin intraoperatively and postoperatively. The positive expression rate of MMP-9 and FAP were 10.0% and 24.0% in the tumor center, 21.1% and 25% in interface zone and 5% and 4% in distal normal zones in patients with positive or close margin. There was a significant association between EMT status and margin positivity. Expression level of CD31 and MMP-9 correlated with the margin positivity ($p = 0.003$ and $p = 0.047$, respectively). Multivariate analyses showed that level of MMP-9 was significantly associated with margin positivity ($p = 0.02$).

Conclusions: EMT factors from the tumor interface zone in margin positive group exhibited more expression than did margin negative group. Our result suggests that the interface zone of the tumor interplayed during process of tumor progression.

IMMUNOTHERAPY BASED ON DENDRITIC CELLS STIMULATED BY TUMOR CELL-DERIVED EXOSOMES IN AN ORTHOTOPIC BREAST CANCER MOUSE MODEL

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Background: This study was performed to evaluate the therapeutic effect of the dendritic cells (DCs) stimulated by tumor exosomes (TEXs) in orthotopic breast tumor model.

Methods: DC cell line (DC2.4) and breast cancer cell line (E0771) originally isolated from C57BL/6 mouse were used. E0771 cells expressing the exosomal CD63-RFP fusion protein were produced. MTT assay, trans-well migration assay, western blot, and flow cytometry were performed. E0771 cells were injected into mammary fat pad of C57BL/6 mouse (n = 4). Tumor exosomes-stimulated dendritic cells (TEX-DCs) were administered by intradermal injection into the axillary region of tumor mice four times every seven days. Tumor growth was monitored by bioluminescence imaging. Immunohistochemical staining of different T lymphocyte antigens (CD3, CD4, CD8, and Foxp3) on the tissue section was performed. PBS was injected into four mice for control group.

Result: TEXs contained molecules involved in antitumor activity and immunogenicity such as HSP70, HSP90, MHC I, MHC II, TGF-β, and PD-L1. TEXs significantly increased DC growth and migration abilities and the expression of CD40 on DCs. In orthotopic E0771 breast tumor mouse model, the administration of TEX-DCs reduced tumor growth, as compared to the control group. Higher CD8+ cells infiltration and lower CD4+ and FOXP3+ cells infiltration were observed in tumors of TEX-DC group as compared with control group.

Conclusions: Our findings have shown a therapeutic potential of TEX-DC-based cancer immunotherapy. Further studies on the bioengineering of TEXs, such as loading immunostimulatory molecules or excluding immunosuppressive molecules, is required to produce a potent antitumor immune effect of TEX-DCs in vivo.

NSDHL KNOCKDOWN DECREASES A TIGHTLY COHESIVE TUMORSPHERE FORMATION AND BREAST CANCER STEM CELL POPULATIONS

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Background: NAD(P)-dependent steroid dehydrogenase-like (NSDHL) is involved in cholesterol biosynthesis. NSDHL has been implicated in maintaining cancer stem cell, but its role in regulating breast cancer stem cells (BCSC) remains unclear. This study aimed to uncover the molecular mechanisms by which NSDHL, regulates BCSCs capacity.

Methods: The knockdown of NSDHL was induced by a transfection of short interfering RNA (siRNA) into MCF-7 cells. A non-adherent 3D culture method that promotes stem cell growth was performed to form tumor spheres under serum-free condition. 3' quant mRNA-sequencing, qRT-PCR, western blot, immunofluorescent staining, ELISA, flow cytometry and ALDEFLUOR assay were carried out. NOD.Cg-Prkdcscid Il2rgtm1wjl /SzJ mice were used for orthotopic xenograft tumor models by injecting tumorspheres.

Result: NSDHL knockdown in MCF-7 cells suppress a tightly cohesive sphere formation. Expression levels of cholesterol metabolism-related genes were altered by NSDHL knockdown. There was significant upregulation of 253 DEGs and downregulation of 364 DEGs with >2-fold change associated with TGF-β signaling pathway and cell cycle, respectively. Cell populations with CD44+/CD24- and CD49f+/EpCAM+ phenotype were significantly decreased in NSDHL knockdown cells, along with decreased expressions of TGF-β 1 and 3 and phosphorylation of Smad 3. In xenograft tumor models, NSDHL knockdown strongly suppressed tumor growth.

Conclusions: Our findings reveal that NSDHL has an important role in maintaining BCSC population and tumor-initiating capacity, suggesting NSDHL as an attractive therapeutic target to eliminate BCSCs, and thus preventing breast cancer initiation and progression.

Oral Presentation

USE OF MRI-BASED AUGMENTED REALITY TARGETING TECHNIQUE FOR PRECISE BREAST-CONSERVING SURGERY IN NEOADJUVANT SYSTEMIC THERAPY PATIENTS

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Background: If breast cancer is large, breast-conserving surgery (BCS) is often attempted after neoadjuvant systemic therapy (NST). Conventional methods for targeting tumors for BCS after NST are limited in quantitatively marking the original tumor area in MRI. To solve this problem, we developed an MRI-based quantitative tumor marking method using AR.

Methods: AR tumor localization was planned for 53-year-old female patients with BCS after NST. Breast and tumor were 3D modeled based on MRI before and after NST. Tumor excision boundary was segmented via professional personals from the pre-NST MR images, then registered into post NST MR space with the use of registration algorithms in open-source, image process SW application framework; ITK (InsightToolkit) 4.13.1. The segmented, registered 3D boundary of the tumor was augmented into real-time camera vision of patient chest, via attaching 3 QR codes on the patient's anatomical landmarks; nipples on both sides and suprasternal notch. Once QR codes are recognized as reference landmarks, the 3D tumor model was augmented by using the pre-determined relative geometry between the landmarks and the tumor boundary.

Result: A long axis 3.3cm tumor was observed in MRI before NST but there was no enhancement after treatment. BCS was performed following the marking of the boundary of the original tumor and had a negative resection margin. Total operation time was 67 minutes, including axillary dissection surgery.

Conclusions: The tumor localization technique using AR can quantitatively mark the extent of tumors in the MRI on the breast, which helps precise tumor resection in BCS.

BREAST CANCER MANAGEMENT IN ASIA DURING GLOBAL COVID-19 PANDEMIC (ABC-COVID STUDY)

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Background: Novel coronavirus disease (COVID-19) has spread quickly across different continents. This international multi-center study aims to evaluate the clinical and pathological characteristics of breast cancer at the time global COVID-19 pandemic.

Methods: This is a case-control study comparing breast cancer patients treated between January 2020 to April 2020 (Case) and January 2019 to April 2019 (Control) in nine different Asian Countries. Baseline demographic data, clinical presentation, breast cancer management, breast cancer pathology between the two groups were retrieved according to a predefined study protocol. Additional phone interview was carried out on the 2020 cohort to evaluate the impact of COVID-19 on patients' psychological well-being.

Result: There were 1,499 and 1,692 patients in the 2020 (Case) and 2019 (Control) cohorts respectively, 34.1% of the patients expressed concerns over hospital-acquired COVID-19 infection, 17.1% patients had intentionally postponed their medical appointment for breast symptoms. Mean symptom duration was 22.5 weeks (0-540) in the 2020 cohort, while that in the 2019 cohort was 17 weeks (0-350) ($p<0.0001$). There were significantly more T2 or above breast cancer in the 2020 cohort (N = 720, 48.0%), when compared to that in the 2019 cohort (N = 741, 43.8%) ($p=0.0182$). Nodal and distant metastatic rates remain similar. Surgery waiting time was shorter in the 2020 cohort (4.2 vs. 5.8 weeks, $p<0.0001$).

Conclusions: Due to concerns and fears of COVID-19 infection, there was a delayed presentation to medical care among patients with breast symptoms, resulting in more advanced disease at presentation.

ENDOSCOPIC MASTECTOMY FOLLOWED BY IMMEDIATE RECONSTRUCTION WITH FAT GRAFTING

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Background: We report a new combination of endoscopic nipple-sparing mastectomy (endo-NSM) or endoscopic skin-sparing mastectomy (endo-SSM) followed by immediate reconstruction with fat grafting (FG) to minimize postoperative scars.

Methods: We have performed the procedure respecting the approval of institutional review board and the procedure has been performed off label in Japan. Patients with multifocal, multicentric, or extensive intraductal carcinoma necessary for mastectomy, who were diagnosed as clinical stage I were the candidates. Endo-NSM or endo-SSM was performed from the incision of sentinel node biopsy at the axilla and periareola. Immediate FG from abdomen was performed for breast reconstruction with Coleman method. FG was repeated 6 to 12 months after primary procedure.

Result: From January 2015 to July 2019, 17 cases underwent endo-NSM or endo-SSM followed by immediate reconstruction with FG. The median age was 45 years (41-55 years) and BMI was 19.5 (17.8-26.6). The median operation time was 288 minutes (242-320 minutes), and the hospital stay was 8 days (7-11 days). The median weight of the resected specimen was 162 g (101 g-334 g), and the amount of fat grafted at the primary procedure was 206 g (136 g-320 g). Complications included seroma and partial necrosis of the nipple or the breast skin. All healed conservatively. One case had got local recurrence and resected.

Conclusions: FG requiring no incisions may have best compatibility with endo-NSM or endo-SSM for minimal scar breast surgery. Need for additional FG and the lack of insurance adaptation seemed to be issues.

THE COMPARISON BETWEEN GASLESS AND GAS-INFLATED ROBOT-ASSISTED NIPPLE-SPARING MASTECTOMY

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Background: There are various methods for nipple-sparing mastectomy (NSM) including conventional or endoscopic mastectomy. Robot-assisted nipple-sparing mastectomy (RANSM) is one of the techniques introduced recently. Since the introduction of RANSM in 2015, two distinct techniques have been attempted: gasless and gas-inflated techniques. The aim of this study is to compare the two techniques and to analyze the clinicopathological characteristics and the post-operative outcomes of the two groups.

Methods: We conducted a retrospective study of the gasless and gas-inflated RANSM with immediate breast reconstruction for women with early breast cancer, interstitial mastopathy, or carriers of BRCA1/2 mutations from November 2016 to May 2019. The clinicopathological characteristics and surgical outcomes were analyzed.

Result: The gasless and gas-inflated RANSM were performed in 43 and 15 cases, respectively. The proportion of node negative disease was higher in the gas-inflated group (gasless: 69.2% vs. gas: 97.1%, $p = 0.017$). About a third of the gasless group received adjuvant radiotherapy. The other factors were not significantly different between the two groups. In terms of surgical outcomes, initial incision size of the gasless group was 1cm longer than that of the gas-inflated group (gasless: 5.17 ± 0.88 cm vs. gas: 4.2 ± 1.05 cm, $p = 0.002$). The gasless group showed longer final incision size than the gas-inflated group (gasless: 5.17 ± 0.88 cm vs. gas: 4.57 ± 1.07 cm, $p = 0.018$). Operation time, complication rates, and the grades of complications were not different between the two groups.

Conclusions: The gasless and gas-inflated techniques showed no significantly different surgical outcomes except incision size. Both techniques are feasible and can be applied for RANSM with immediate reconstruction.

DEVELOPMENT OF SURGICAL SKILL LABORATORY TRAINING PROGRAMS FOR ROBOTIC MASTECTOMY USING CADAVERIC AND PORCINE MODELS: AN ANIMAL AND CADAVERIC STUDY

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Background: Lack of well-structured training system is one of the hurdles to adopt robot-assisted nipple-sparing mastectomy (RNSM) for beginners. Therefore, it is necessary to establish cadaveric or animal skill labs as educational programs for RNSM. This study aims to evaluate the effectiveness of the cadaveric or animal skill labs for RNSM.

Methods: We have performed 24 RNSMs using 11 cadavers and one porcine model between Dec 2013 and Nov 2020. Majority of skill labs using Da Vinci Si and Xi were performed in Severance MIS center, Seoul, Korea since 2013. Skill labs using Da Vinci SP were performed in Nov 2019 in Medizin im Grnen, Berlin, Germany. All procedures utilized a single incision between anterior and mid-axillary lines. General characteristics of the skill labs were reviewed.

Result: Eighteen RNSMs using Xi system and six RNSMs using SP system were conducted. Six gasless and 12 gas-inflated RNSMs were simulated. Ten RNSMs were followed by reconstruction with six LD flaps with implants and four direct-to-implants. Robotic axillary lymph node dissection was performed in four cadaver. There was one event of injury of the medial part of pectoralis muscle and costal cartilage in the first skill lab. Since then no intra-operative event and open conversion occurred. All trainees completed to response the questionnaire on their satisfaction with a high score after training.

Conclusions: Standardized training protocol of RNSM should be established. Cadaveric or porcine skill labs for RNSM can be one of the essential programs offering safe and efficient training.

ROBOT-ASSISTED NIPPLE-SPARING MASTECTOMY WITH IMMEDIATE BREAST RECONSTRUCTION: AN INITIAL EXPERIENCE OF KOREA ROBOT-ENDOSCOPY & MINIMAL ACCESS BREAST SURGERY STUDY GROUP (KOREA-BSG)

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Background: Robot-assisted nipple-sparing mastectomy (RANSM) improved cosmetic outcomes over conventional nipple-sparing mastectomy (CNSM). However, data regarding the feasibility and safety of the RANSM are limited. In this study, we report the early experience of RANSM with IBR in the KoREa-BSG.

Methods: Patients underwent RANSM with immediate breast reconstruction (IBR) by KoREa-BSG (Korea Robot-Endoscopy Minimal Access Breast Surgery Study Group) members from Nov. 2016 to Jan. 2020 were enrolled. Clinico-pathologic characteristics, perioperative complications, and operation time were collected.

Result: Overall, 73 women underwent 82 RANSM procedures conducted by 11 breast surgeons at 8 institutions. The median patient age was 45.5 years old. Invasive breast cancer was noted in 55 cases and DCIS was recorded in 20 cases. Of those, 3 patients with BRCA1/2 mutation carriers underwent contralateral risk-reducing RANSM. The median length of hospitalization was 12.0 days. The incision location was the mid-axillary line and the median incision length was 50.0 mm. Median total operation time and median total mastectomy time was 307.0 minutes and 189.5 minutes. Only 2 cases (2.5%) required re-operation. Nipple ischemia was found in 9 cases (10.9%) but only 1 case (1.2%) required nipple excision given that 8 cases (9.7%) resolved spontaneously. Skin ischemia was observed in 5 cases (6.1%) and only 2 (2.4%) cases needed skin excision whereas 3 cases (3.6%) resolved spontaneously. There was no conversion to open surgery.

Conclusions: This is the first report of RANSM procedure with KoREa-BSG. RANSM is technically feasible and acceptable. Further prospective study to evaluate the surgical and oncologic outcomes is needed.

NEOADJUVANT CHEMOTHERAPY VERSUS ADJUVANT CHEMOTHERAPY IN BREAST CANCER PATIENTS: ANALYSIS OF BREAST CONSERVING RATE AND DE-ESCALATION OF AXILLARY SURGERY IN 5,141 KOREAN WOMEN

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Background: Neoadjuvant chemotherapy (NACT) in breast cancer has several advantages such as more breast conservation surgery (BCS) rate and de-escalation of extent of axillary surgery. Actual practice change in this area compared with adjuvant chemotherapy (ACT) is not well established.

Methods: We retrospectively analyzed 5,141 women diagnosed with breast cancer from 2009 to 2013, treated with chemotherapy before or after definite surgery.

Result: BCR rate was lower in T2 (57.1% vs. 64.1%), T3 (12.6% vs. 20.9%) group between ACT vs. NACT ($p=0.03, 0.001$), SNB try (SNB only or SNB followed by ALND) rate was still higher in ACT group with cN0 (98.4% vs. 95.4%), cN1 (89.3% vs. 73.5%), cN2 (77.9% vs. 62.1%) tumors ($p=0.001$, <0.001, 0.003). Axillary surgery rate analyzed with pathologic N stage showed more ALNDs attempted even after achieving ypN0 or minimal residual N disease (ypN0: 4.4% vs. 27.2%, ypN0(i) & ypN1mi; 26.2% vs. 57.6%, $p<0.001$, $p=0.001$ respectively). In contrast however, average of total axillary nodes retrieved by cN stage were statistically lower in NACT group in clinically positive tumors (N1; 15.3 vs. 12.7, N2; 19.1 vs. 14.6, N3; 25.1 vs. 15.6, all $p<0.001$).

Conclusions: NCT had shown advantage to perform more BCS than ACT in T2, T3 tumors. SNB attempts in NACT were comparable to ACT. Still, patients with NCT received more aggressive axillary surgery than ACT shown by axillary surgery category irrespective of negative SNB results. Lesser retrieve in total nodes may suggest that extent of actual nodal dissection in NACT patients with clinical nodal response is decreasing.

COMPARISON OF TRENDS ON AXILLARY SURGERY FOR BREAST CANCER BETWEEN ASIA AND EUROPE: IMPACT OF ACOSOG-Z0011 TRIAL ON SURGICAL PRACTICE

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Background: Since the publication of the Z0011 trial, the practice-changing international guidelines have been spread for the surgical approach in breast cancer. Patients with T1-2 lesions, treated with breast conserving surgery (BCS), who have not received neoadjuvant chemotherapy and have 1-2 positive sentinel nodes could avoid axillary lymph node dissection (ALND). We aimed to investigate the trends on axillary surgery for breast cancer in Asia and compare those with Europe to reveal the impact of Z0011 trial over a period of time.

Methods: We collected prospectively constructed data of the nationwide Korean Breast Cancer Registry (KBCR). We identified patients who underwent BCS followed by sentinel lymph node biopsy from 2011 to 2018 and analyzed time-dependent trends in rates of ALND. Joinpoint regression analyses were used to compare the decreasing trends for ALND with previously published data from Dutch population-based cohort.

Result: Among KBCR data, 7,478 patients with stage T1-2 N1-3 M0 were included. Rates of ALND showed a significant decrease from 2011 (76.6%) to 2018 (47.5%). After multivariate analysis, early year of diagnosis, increasing tumor size, and lymphatic invasion were associated with a higher probability of ALND ($p < 0.001$). Compared to Dutch cohort, the decreasing trends of ALND in Korea was significantly slower (annual percent change; -30.1% vs. -5.8%, $p < 0.001$).

Conclusions: This study demonstrated decreasing trends of ALND in Asian breast cancer patients. However, there was a significant difference in the decreasing rate of ALND between Asia and Europe, indicating the need to spread clinical guidelines in Asia to apply evidence-based practice.

COMPARISON OF IPSILATERAL BREAST TUMOR RECURRENCE RATE BETWEEN RE-EXCISION AND RADIOTHERAPY ONLY GROUP WHEN SURGICAL MARGIN INVOLVEMENT OF DCIS AFTER BREAST-CONSERVING SURGERY

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Background: In general, re-excision is not recommended in case of close margin involvement of ductal carcinoma in situ (DCIS) less than 2 mm in final pathology. There was no report about comparison of the ipsilateral breast tumor recurrence (IBTR) rate between re-excision plus radiation therapy and radiotherapy only if DCIS is confirmed in the resection margin after BCS. We investigated the IBTR rate depending on re-excision of margin treated with BCS followed by radiation therapy.

Methods: We analyzed 8,474 among 15,341 patients treated with BCS followed by radiation therapy from January 2013 to December 2019. These patients were divided into two groups according to surgical resection margin status at permanent pathology and superficial and deep margin were excluded. We searched for patients who have re-excision with DCIS confirmed in the resection margin and checked the IBTR rate.

Result: There were 495 patients (5.8%) with positive surgical resection margin among 8,474 patients treated with BCS. Of the 8,474 patients with positive resection margin, 367 patients (74.1%) had residual DCIS at surgical resection margin in the final pathology. Among confirmed DCIS at resection margin, 24 patients (6.5%) were re-excised and 343 patients (93.5%) were observed and followed by radiation therapy. The IBTR rate was 4.1% in the re-excision group versus 1.4% in the observational group.

Conclusions: There was no difference in the IBTR rate between re-excision plus radiation therapy group and radiotherapy only group if DCIS was confirmed at the resection margin. In conclusion, DCIS involvement on resection margin is not an important marker for the IBTR.

POTENTIAL CANDIDATES FOR OMISSION OF SENTINEL LYMPH NODE BIOPSY AFTER NEOADJUVANT CHEMOTHERAPY: A NATIONWIDE STUDY FROM THE KOREAN BREAST CANCER SOCIETY

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Background: As advances of neoadjuvant chemotherapy (NACT), pathologic complete response (pCR) rates increased, indication of NACT have been expanded. Naturally, some clinicians have been trying omission of breast surgery in excellent response to NACT. However, appropriate candidate for omission of axillary surgery in excellent response to NACT is unknown. We evaluated the relationship of breast pCR (BpCR) and axillary CR (ApCR) after NACT to identify the optimal candidates for omission of axillary surgery.

Methods: Data collected by the Korean Breast Cancer Society Registry in patients underwent NACT followed by surgery between 1992-2020. We analyzed the pathologic axillary nodal positivity after NACT according to BpCR stratified by tumor subtype.

Result: : A total of 7,748 patients were identified. Of those, 9.1%, 67.5%, and 23.4% were cT1, cT2, and cT3, and 28.0%, 52.4%, and 19.6% were cN0, cN1, and cN2, respectively. BpCR, ApCR, and overall pCR was 21.0%, 59.6%, and 18.8%, respectively. Distribution of biologic subtypes, 38.8%, 19.2%, 7.0%, and 35.0% were HR (+)/HER2(-), HR (+)/HER2(+), HR (-)/HER2(+), and HR (-)/HER2(-), respectively. Among patients with BpCR, 88.7% had ApCR. Of those, in cN0 disease, 98.9% showed ApCR and in cN1-2 disease, 85.3% showed axillary pCR. Among BpCR and axillary non-pCR, in cN0, only 4 (1.1%) patients showed ypN1 disease.

Conclusions: BpCR is highly correlated with ApCR after NCT. In cN0 and BpCR after NACT patients, the risk of missing axillary nodal metastasis is extremely low. These data provide the fundamental basis and rationale for omission of axillary surgery after NACT if the patients showed BpCR.

LATERAL INTERCOSTAL ARTERY PERFORATOR FLAP AN ALTERNATIVE TO LATISSIMUS DORSI FLAP FOR PARTIAL BREAST RECONSTRUCTION: A SINGLE INSTITUTION EXPERIENCE

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Background: Partial breast reconstruction (PBR) surgery after large volume excisions for women with breast cancer (BC) is known to be a feasible option using a latissimus dorsi flap (LD). However in addition to donor site morbidity, LD may also be complicated by damage to the muscles important for shoulder movement. PBR techniques based on perforator flaps are possibly a more functional alternative. We present our experience with the use of lateral intercostal artery perforator flaps (LICAP) for PBR.

Methods: We included women with BC who underwent PBR using LICAP at our hospital. Clinicopathological data was collected from medical records.

Result: Of the 73 women at our institution that had pedicled flap for PBR, LICAP reconstructions were performed in 24. The median age of those undergoing LICAP was 44 years (range 34-58), median BMI was 26.50, median cT size was 3 cm. The median volume of breast tissue excised was 182 cc. Tumors were located in upper outer and outer central region of the breast in 14, in lower outer quadrant in 7 and upper central region in 5 women. None required a contralateral breast cosmetic correction. Post-operative morbidity was seen in 4/24 (16.7%) and none required any active intervention or flap revision. The LICAP reduces the operative time compared to LD since there is no position change.

Conclusions: Based on our experience, oncoplastic breast surgery using LICAP flap is an effective remodeling technique for moderate breast defects in suitable women.

EVALUATION OF DEEP LEARNING-BASED AUTO-SEGMENTATION OF TARGET VOLUME AND NORMAL ORGANS IN BREAST CANCER PATIENTS

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Background: Intensity-modulated radiotherapy (IMRT) allows lower radiation doses to the nearby normal organs, thus reducing toxicity in breast cancer patients. However, target volume and normal organ segmentation for IMRT increases the physicians' workload considerably. Thus, deep learning-based auto-segmentation can be an expedient tool for target and normal organ segmentation. Here, we evaluated the deep learning-based auto-segmented contours compared to manually delineated contours in breast cancer patients.

Methods: Clinical target volumes (CTV) for bilateral breasts and lymph node and normal organs including heart, lung, esophagus, spinal cord, thyroid and cardiac substructures (atrium and ventricle, left ascending artery (LAD), right coronary artery (RCA)) were manually delineated on a planning computed tomography scans of 61 breast cancer patients. Afterwards, a two-stage convolutional neural network algorithm was conducted. Quantitative metrics, including dice similarity coefficient (DSC) and Hausdorff distance (HD), and qualitative scoring by expert and non-expert panel were used for analysis.

Result: The correlation between the auto-segmented and manual contours was excellent for CTV and normal organs except for LAD and RCA. Auto-segmented contours for LAD and RCA showed reduced performance with mean DSC lower than 0.5 and mean HD higher than 20 mm, whereas other CTV and normal organs showed mean DSC of mostly higher than 0.80. Qualitative subjective scoring showed good results for all CTV and normal organs.

Conclusions: The feasibility of deep learning-based auto-segmentation was shown in this study. Although deep learning-based auto-segmentation cannot be a substitution for radiation oncologists, it can be an expedient tool in clinic, by assisting radiation oncologists.

EXCEPTIONAL RESPONSES TO RADIOTHERAPY OF TUMORS HARBORING SOMATIC MUTATIONS IN ATM AND BRCA

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Background: Germline BRCA mutations are well known risk factor for breast cancer. At the same time, somatic mutations of genes involved in DNA repair may confer sensitivity to radiation therapy. In this study, we investigated the role of somatic ATM and BRCA mutations in tumor response to radiotherapy (RT).

Methods: Among 1,070 patients who underwent Next Generation Sequencing (NGS) panel screening, 97 patients received radiotherapy. Missense or frameshift mutations in ATM and/or BRCA were identified in 33 patients (mutation group). Six patients had both ATM and BRCA mutations (ATMmtBRCAmt), 5 patients had ATM mutation only (ATMmtBRCAwt), and 22 patients had BRCA mutation only (ATMwtBRCAmt). Propensity score matching was performed to select the control group without ATM or BRCA mutations (ATMwtBRCAwt, $n = 33$).

Result: A total of 90 target lesions were evaluated in 66 patients. Objective response rate was highest in ATMmtBRCAmt lesions (60.0%, 37.5%, 11.1%, and 6.7%, in ATMmtBRCAmt, ATMmtBRCAwt, ATMwtBRCAmt, ATMwtBRCAwt, respectively, $p = 0.004$). Moreover, the 2-year local recurrence rate was lowest in ATMmtBRCAmt lesions (0%, 16.7%, 38.0%, and 66.3%, respectively, $p = 0.003$). RT-associated toxicities were observed in 10 cases with no significant difference among the subgroups (20.0%, 12.5%, 11.1%, and 8.9%, respectively, $p = 0.68$). Most toxicities were limited to grade 1-2 with a single case of grade 3 nausea during treatment of an ATMwtBRCAwt lesion.

Conclusions: Tumors with ATM and BRCA mutations exhibited exceptional responses to RT. Integration of individually tailored RT can be a novel approach in patients harboring ATM and/or BRCA mutations in tumor.

A 40 GY IN 15 FRACTIONS AND VOLUMETRIC-MODULATED ARC THERAPY (VMAT) CAN REDUCE RADIATION-RELATED TOXICITY IN PATIENTS WITH BREAST CANCER

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Background: Based on START-B trial, 3-week schedules of hypofractionated-RT (HF, 40 Gy/15fractions) has been adopted as the UK standard of care. Despite an increasing interest of HF in Korea, detailed schedules varied across the hospitals. Additionally, there is a paucity of clinical data supporting HF-VMAT. We aimed to compare the radiation-related toxicity profiles among RT schedules.

Methods: We reviewed 4,209 patients in conventional fractionation-3D (CF-3D, mostly 50 Gy/28 fractions) and 1,540 patients in HF (768 in HF-3D, 772 in HF-VMAT, mostly 40 Gy/15 fractions) between 2005 and 2017. A total of 2,229 patients (38.8%) received regional node irradiation (RNI): 1,642 (39.0%), 167 (21.7%), and 420 (54.4%) received RNI via CF-3D, HF-3D, and HF-VMAT, respectively. Physician-reported events during or within 3 months after RT were defined as acute/subacute toxicity. Late toxicities included radiation pneumonitis, lymphedema, hypothyroidism, and cardiotoxicity. Propensity scores were calculated via logistic regression.

Result: Grade 2+ acute/subacute toxicities was the highest in CF-3D group (15.0%, 2.6%, and 1.6% in CF-3D, HF-3D, and HF-VMAT, respectively; $p < 0.001$). HF-VMAT reduced grade 2+ acute/subacute toxicities significantly compared to CF-3D (odds ratio [OR] 0.11, $p < 0.001$) and HF-3D (OR 0.45, $p = 0.010$). The 3-year cumulative rate of late toxicities was 18.0% (20.1%, 10.9%, and 13.4% in CF-3D, HF-3D, and HF-VMAT, respectively; $p < 0.001$). On sensitivity analysis, the benefit of HF-VMAT was high in RNI group.

Conclusions: Women treated with HF-VMAT appear to have a lower toxicity than those treated with either HF-3D or CF-3D. Although prospective evaluation with long-term follow-up is needed, current data support a wider adoption of HF-VMAT.

Oral Presentation

DUMMY RUN OF QUALITY ASSURANCE PROGRAM IN A PROSPECTIVE COHORT STUDY INVESTIGATING THE EFFECT OF REGIONAL NODAL IRRADIATION ON THE REGIONAL RECURRENCE RATE IN YPN0 BREAST CANCER PATIENT: KROG 19-09

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Background: Korean Radiation Oncology Group (KROG) 19-09 prospective cohort study aims to see the effect of regional nodal irradiation on the regional recurrence rate in ypN0 breast cancer patients. The variation of the dose distribution of the radiotherapy (RT) plan among the participating institutions may affect the clinical outcome of the study. The purpose of this study was to assess inter-institutional dosimetric variations by dummy run.

Methods: All participating institutions performed RT plans for 4 clinical scenarios with 2 dummy patients computed tomography; (1) whole breast irradiation (WBI) in a large breast patient (L-B), (2) whole breast + regional nodal irradiation (WBI+RNI) in an L-B, (3) WBI in a medium breast patient (M-B) and (4) WBI+RNI in a M-B. We evaluated the dose-volume histograms (DVH) for the clinical target volumes (CTVs) and organs at risk (OARs).

Result: Among 10 institutions, for WBI, 2 utilized intensity-modulated radiotherapy (IMRT), and 8 used 3-dimensional radiotherapy (3D-CRT), and for WBI+RNI, 5 utilized IMRT and 5 used 3D-CRT. There were 1-2 outliers (10-20%) for each CTVs and OARs in all four plans. Notably, for CTV of interpectoral node in WBI+RNI in an L-B, there were 3 outliers (30%). The minimum and maximum of the percentage of the prescribed dose to 95% volume (D95%) of CTV of interpectoral node were 10.3% and 106.3%, respectively.

Conclusions: There are discrepancies in DVH for CTVs and OARs among institutions. Actual patients RT plan data should be collected to analyze the effect of these divergences of DVH on regional recurrence rate and toxicity.

SYSTEMIC THERAPY AND THE PROGNOSIS OF OLDER PATIENTS WITH STAGE II/III BREAST CANCER: RESULTS FROM A JAPANESE LARGE COHORT

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Background: The standard of care for older breast cancer (BC) patients remains controversial. We investigated the real-world prognostic impact of systemic treatment in older patients with stage II/III BC.

Methods: We reviewed the data from the Japanese Breast Cancer Registry between 2004 and 2011. We compared clinicopathological characteristics, treatments, and prognosis among three groups: older (≥ 75 years), young-old (65-74 years), and post-menopause group (55-64 years).

Result: In total, 56,093 patients (older: 12,727; young-old: 17,860; post-menopause: 25,506) were enrolled. Among luminal (hormone receptor (HR)-positive/human epidermal growth factor receptor 2 (HER2)-negative) patients, 10%: 42.5%: 62.9% of the older, young-old, and post-menopause groups received chemotherapy, respectively. Among triple-negative (TN, HR-negative/HER2-negative) and HER2-enriched (any-HR/HER2-positive) patients, 33.5%: 76.7%: 87.7% and 31.6%: 74.3%: 86.3% were administered chemotherapy, respectively. The 5-year breast cancer specific survival (BCSS) was 94.5% vs. 96.0% vs. 94.9% ($p < 0.001$) in luminal. Meanwhile, among those with TN and HER2-enriched, the older group had poorer BCSS (78.6% vs. 86.3% vs. 85.3%, $p < 0.001$ and 87.1% vs. 93.2% vs. 93.2%, $p < 0.001$, respectively). The 5-year overall survival (OS) was also poorer in the older group across all subtypes (luminal; 84.1% vs. 92.5% vs. 93.2%, $p < 0.001$; TN: 64.9% vs. 81.8% vs. 82.6%, $p < 0.001$; HER2-enriched: 75.7% vs. 90.6% vs. 91.6%, $p < 0.001$, respectively). Chemotherapy was most strongly associated with improved survival in HER2-enriched patients (hazard ratio: 0.39 (95% confidence interval: 0.22-0.70)).

Conclusions: Older patients with advanced BC received less chemotherapy. Those with TN and HER2-enriched had lower BCSS than their younger counterparts. Chemotherapy may be more beneficial for improving OS among HER2-enriched patients.

COMPANION DIAGNOSTICS FOR TRASTUZUMAB-BASED NEOADJUVANT THERAPY - TWO IS BETTER THAN ONE

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Background: While trastuzumab-based chemotherapy has shown remarkable clinical benefits for HER2-positive breast cancer (HER2+ BC) patients, a subset of patients (30-40%) shows little/no effect. This highlights an important clinical need for biomarkers in addition to HER2 for better stratification of patients for precision medicine of HER2+ BC.

Methods: HER2+ BC is associated with an amplification of the HER2 locus in chromosome 17q. We hypothesized that HER2 & its co-amplified genes in C17q not only form a molecular network but also cooperatively & functionally contribute to the phenotype of HER2+ BC. In other words, the HER2-associated genes may regulate the response of HER2+ BC to drugs and are therefore potential companion diagnostics for HER2-based therapeutics. To this end, my lab has created an in-silico network of genes in C17q that are co-amplified with HER2 in breast cancer. Following in vitro studies, we tested a candidate biomarker in a multi-center, cross border retrospective study involving close to 200 patients.

Result: The study, which was published in Clinical Cancer Research recently, establishes that women who are <50 years and with HER2+ BC that overexpressed a HER2-associated gene had better pathologic complete response to trastuzumab-based neoadjuvant therapy of about 80% compared to 40% in non-stratified HER2 BC.

Conclusions: The findings allow clinicians to better plan therapeutic interventions for patients. Being able to predict which patients would attain successful tumor downstaging from neoadjuvant therapy would also guide surgical decisions e.g. breast conserving surgery versus mastectomy. This leads to better patient outcomes.

A PHASE 2 STUDY OF POZIOTINIB IN PATIENTS WITH HER2-POSITIVE METASTATIC BREAST CANCER PREVIOUSLY TREATED WITH HER2-TARGETED THERAPIES

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Background: Poziotinib is a novel pan-HER inhibitor that irreversibly blocks the EGFR family of tyrosine-kinase receptors and inhibits the proliferation of tumor cells. This study evaluates the safety and efficacy of poziotinib in patients with HER2-positive metastatic breast cancer (MBC) who received at least 2 therapies (trastuzumab and T-DM1).

Methods: Patients were treated with oral poziotinib in 2 dose cohorts: 24 mg daily 2 weeks and 16 mg daily in a 21-day cycle. Dose reduction was allowed if toxicity observed. Patients continued treatment until disease progression, death, intolerable adverse event (AE), or for 24 months. Tumor response was evaluated using RECIST v1.1. Safety assessments were performed throughout the study.

Result: Sixty-seven patients were enrolled (57 evaluable) in 2 cohorts (30 in 24 mg; 27 in 16 mg). The median (range) age was 59 (29-94) years. Patients were heavily pretreated with the median (range) number of previous HER2-directed regimens was 3 (2-5) and >70% received pertuzumab in addition to trastuzumab and TDM-1. Relative dose intensities were 62% and 55% in 2 cohorts respectively. The overall response rate were 23% and 22%; DCR 47% and 63%; DoR 5.6 and 13.8 months; progression free survival 3.0 and 4.9 months respectively in 2 cohorts. The most common AEs were diarrhea and rash as expected in EGFR inhibitors.

Conclusions: Antitumor activity of poziotinib was observed in both dose levels in this heavily pretreated MBC patients (23% and 22% overall response rate in 2 doses).

EFFICACY AND SAFETY OF PYROTINIB CONTAINED REGIMEN IN PATIENTS WITH HER2-POSITIVE METASTATIC BREAST CANCER: A MULTICENTER REAL-WORLD STUDY

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Background: Pyrotinib, a novel irreversible epidermal growth factor receptor (EGFR)/HER2 dual tyrosine kinase inhibitor, has shown promising antitumor efficacy and tolerable toxicity in several clinical trials. The purpose of this study was to evaluate the efficacy and safety of pyrotinib in HER2-positive metastatic breast cancer (MBC) in real world.

Methods: 172 HER2-positive MBC patients treated with pyrotinib-based therapy from multiple centers in non-clinical trial settings from September 2017 to June 2020 were included.

Result: The median PFS (mPFS) in 172 patients was 8.83 months. The patients received 1st-line pyrotinib treatment had the longer mPFS (20.93 months) compared with 2nd-line (8.67 months, $p = 0.0339$) and 3rd-or-higher-line (7.13 months, $p = 0.0075$), respectively. Patients who had not previously received lapatinib (n = 44, 25.6%) achieved longer mPFS (10.97 months vs. 5.97 months, $p = 0.0036$) than who had (n = 128, 74.4%). The difference is not significant in mPFS between patients with and without brain metastasis (7.97 months vs. 10.23 months, p = 0.0622). 146 patients were evaluable for efficacy: 2.1% had complete response (CR), 58.9% partial response (PR), 32.9% stable disease (SD). Efficacy evaluation of intracranial lesions in 48 patients with brain metastases: 2.1% obtained CR, 56.3% achieved PR, 22.9% showed SD. Adverse effects (AEs) occurred in 92.4% of patients, grade 3 and higher AEs was noted in 33.3% of patients. Diarrhea (57.0%) was the most frequent AE, followed by anemia (44.8%) and leukopenia (40.7%).

Conclusions: The pyrotinib-based regimen can effectively treat HER2-positive MBC, including patients who progressed after lapatinib treatment and with brain metastasis, and drug-related toxicity are acceptable.

CLINICAL APPLICATION OF NEXT GENERATION SEQUENCING IN BREAST CANCER PATIENTS: A REAL-WORLD DATA

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Background: This study aimed to evaluate the use of next generation sequencing (NGS) in real-world clinical practice and to assess whether it leads to molecular profiling (MP)-guided treatment in breast cancer.

Methods: A total of 137 female patients with breast cancer underwent NGS panel testing between December 2017 and July 2020 in Seoul National Univ. Bundang Hospital (SNUBH). Samples were profiled on the in-house SNUBH pan-cancer panel. Sixty-four patients were profiled on SNUBH V1, which targeted 88 genes; 73 patients were profiled on SNUBH V2, which targeted 180 genes.

Result: Breast cancer subtypes were HR+/HER2-(n = 87), triple-negative (n = 44), and HER2+ (n = 6). Most of the patients had locally advanced/metastatic cancer (92%). Prior to NGS, 61% and 46% of the patients received chemotherapy (median line of treatment = 2; range 1-7) or endocrine therapy (median 1; range 1-4), respectively. Eighty-eight percent (120/137) of patients had more than one genomic alteration (tier I and II), and 60% (82/137) had targetable genomic alteration. The most common targetable genomic alterations were PIK3CA (39%) and ESR1 (9%), followed by ERBB2 (7%), PTEN (7%), BRCA2 (6%), and BRCA1 (4%). Of the 82 patients, 15 (18%) received MP-guided treatment; ERBB2-directed therapy (n = 9), PARP inhibitor (n = 4), ATR inhibitor (n = 1), and PI3K inhibitor (n = 1). Among these 15 patients, 7 (47%) received treatment covered by National Health Insurance, 5 (33%) participated in clinical trials, 2 (13%) received treatment at their own expense, and 1 (7%) received drug through expanded access program.

Conclusions: NGS panel testing allowed MP-guided treatments for 15% of advanced breast cancer patients in a real world setting. To make personalized treatment a reality, availability of matched drug is critical.

PALBOCICLIB PLUS FULVESTRANT IN PATIENTS WITH HORMONE RECEPTOR-POSITIVE, HUMAN EPIDERMAL GROWTH FACTOR RECEPTOR 2-NEGATIVE, ADVANCED BREAST CANCER: A SUBGROUP ANALYSIS OF KOREAN PATIENTS FROM PALOMA-3

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Background: PALOMA-3 demonstrated the clinical benefit of the CDK4/6 inhibitor palbociclib (PAL) plus fulvestrant (FUL) for the treatment of patients with HR+/HER2 ABC whose disease had progressed on prior endocrine therapy (ET). This subgroup analysis examined the efficacy and safety of PAL+FUL among Korean patients from PALOMA-3.

Methods: Patients were randomized 2:1 to PAL (125 mg/d, 3/1 schedule)+FUL (500 mg) or placebo (PBO)+FUL. Pre/perimenopausal women received concurrent goserelin. Median progression-free survival (PFS), tumor response, safety, and subsequent treatments were analyzed among Korean patients and Asian-Pacific patients.

Result: Among the 114 patients from the Asia-Pacific region enrolled in PALOMA-3, 43 were from Korea (PAL, n = 24; PBO, n = 19). Median age of Korean patients was 51.5 and 49.0 years in the PAL and PBO groups, respectively. In both treatment groups, > 40% of patients were pre/perimenopausal at enrollment. Median PFS was significantly prolonged with PAL+FUL versus PBO+FUL (12.3 [95% CI, 9.1not estimable] vs. 5.4 months [95% CI, 1.99.2]; hazard ratio, 0.40 [95% CI, 0.190.83]; 1-sided $p = 0.005493$). The confirmed objective response among Korean patients in the PAL and PBO groups was 21.1% and 11.8%, respectively (odds ratio = 2.0 [95% CI, 0.2424.8]). Neutropenia was the most common adverse event with PAL+FUL. In the PAL and PBO groups, 13 (54.2%) and 15 (78.9%) patients, respectively, received 2 subsequent anticancer therapies; 8 (33.3%) and 13 (68.4%) patients, respectively, received ≥ 3 subsequent anticancer therapies.

Conclusions: PAL+FUL was an effective treatment option in Korean patients with HR+/HER2 ABC whose disease progressed following prior ET, regardless of menopausal status. Pfizer (NCT01942135).

POOR TREATMENT OUTCOMES OF FULVESTRANT (F) FOLLOWING PALBOCICLIB (P)-BASED ENDOCRINE TREATMENTS IN HORMONE RECEPTOR (HR)-POSITIVE ADVANCED BREAST CANCER (ABC) PATIENTS

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Background: Optimal subsequent therapies following first-line CDK 4/6 inhibitor-based regimens for HR-positive HER2-negative ABC patients remain largely unknown. We aimed to investigate the clinical outcomes of F in patients who had received prior P+letrozole (L) versus those who had received aromatase inhibitor (AI) alone.

Methods: A retrospective cohort study involving 112 patients treated with F as second-line or later therapy following first-line P+L (n = 37) or AI alone (n = 74) was performed. The efficacy of fulvestrant was analyzed between the groups.

Result: Most baseline characteristics were comparable, but F was used as more later lines in the AI only group. P+L group exhibited worse progression-free survival (PFS) than AI only group (median 2.63 vs. 5.56 months, $p = 0.001$). As second-line therapy, F yielded significantly worse PFS in P+L group (median 2.63 vs. 9.3 months, $p = 0.002$). There was no significant difference in objective response rates ($p = 0.420$). In multivariate analysis, P+L group was independently associated with worse PFS (hazard ratio [HR] 2.22, 95% confidence interval [CI] 1.393.56), together with an age ≤ 50 years (HR 2.05, 95% CI 1.19-3.52) and the presence of liver metastasis (HR 2.53, 95% CI 1.60-4.02). The same effect was noted in an inverse probability treatment weighting analysis (HR 2.05, 95% CI 1.18-3.67).

Conclusions: Prior P+L treatment compared to AI alone is associated with poor treatment outcomes with F. After failure with CDK 4/6 inhibitors-based regimens, treatment options other than F may be preferentially considered, especially for those with age ≤ 50 years or liver metastasis.

BIODEGRADEBLE AND REDOX-RESPONSIVE NANOPARTICLE PLATFORM FOR RNA INTERFERENCE TARGETING LNCRNA AFAP1-AS1 TO REDUCE RADIO-RESISTANCE IN TRIPLE NEGATIVE BREAST CANCER

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Background: Radio-resistance, the major cause of treatment failure, relapse and metastasis of triple negative breast cancer (TNBC), is partially induced by aberrant expression of long non-coding RNA (lncRNA).Targeting lncRNA is the promising therapeutic strategy and radiation can trigger redox reaction, therefore, we constructed a biodegradable and redox-responsive nanoparticle (NP) platform for RNA interference targeting lncRNA AFAP1-AS1 which could enhance radio-resistance of TNBC.

Methods: We constructed a biodergradable and redox-responsive NP platform that consists of a solid poly (disulfide amide) (PDSA)/cationic lipid core and a lipid-poly (ethylene glycol) (lipid-PEG) shell for systemic small interfering RNA (siRNA) targeting lncRNA AFAPA1-AS1 in TNBC cells. The NP platform is highly responsive to the concentrated glutathione (GSH) in the cytoplasm induced by radiation and further trigger intracellular siRNA release.

Result: We identified lncRNA AFAP1-AS1 was up-regulated in radio-resistant TNBC. The NP platform efficiently suppressed AFAP1-AS1 expression and increased radio-sensitivity in TNBC notably in vitro and in vivo. Meanwhile, a durable blood circulation, high tumor accumulation, an impressive synergistic anticancer effect with radiation and negligible toxicities were observed in vivo.

Conclusions: Our findings revealed a promising therapeutic strategy to radio-resistant TNBC that targeting AFAP1-AS1 by a novel biodegradable and redox-responsive NP platform. It shows an encouraging synergistic anticancer effect with radiation and provides an original approach to overcome the radio-resistance in TNBC.

POOLED EFFICACY ANALYSIS FROM TWO PHASE 3 STUDIES IN PATIENTS RECEIVING EFLAPEGRASTIM, A NOVEL, LONG-ACTING GRANULOCYTE-COLONY STIMULATING FACTOR, FOLLOWING TC FOR EARLY-STAGE BREAST CANCER

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Background: Eflapegrastim (Rolontis, Efla) is the novel, long-acting granulocyte-colony stimulating factor (G-CSF). Efla consists of a recombinant human G-CSF analog conjugated to a human IgG4 Fc fragment via a polyethylene glycol linker. Both Phase 3 studies met the primary endpoint of non-inferiority in duration of severe neutropenia (SN; ANC $< 0.5 \times 10^9$/L) ($p < 0.001$) for Efla vs. Pegfilgrastim (Peg) in Cycle 1. We provide a pooled analysis across the two pivotal studies comparing Efla vs. Peg for SN.

Methods: Patients with early-stage breast cancer (ESBC; Stage I to IIIA) were 1:1 randomized to fixed-dose Efla or Peg administered on Day 2 following TC (docetaxel/cyclophosphamide). ANCs were collected daily in Cycle1 and 5-times in Cycles 2-4.

Result: A total of 643 patients who received either Efla ($n = 314$) or Peg ($n = 329$) were included in the analysis. The safety profiles for Efla and Peg were comparable. The majority (67%) of patients experience a 1-day SN. And mean duration of SN for Efla was statistically lower than for Peg (0.24 vs. 0.36 days; $p = 0.029$). Univariate analysis of the SN incidence showed a significant risk reduction in favor of Efla (8.6% vs. 14.1%; $p = 0.034$) for patients weighing > 75 kg. The incidence of febrile neutropenia and neutropenic complications was similar with $< 5\%$ in each treatment group.

Conclusions: A pooled analysis showed Efla and Peg had similar safety profiles with Efla demonstrating a significant risk reduction in SN overall and in patients weighing > 75 kg. Eflapegrastim may provide an attractive option in supporting patients at risk for SN-related complications.

THE PROSPECTIVE STUDY OF MRI AND PATHOLOGY THREE-DIMENSIONAL RECONSTRUCTION ON SHRINKAGE MODES AFTER NEOADJUVANT THERAPY IN BREAST CANCER

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Background: The aim was to assess the accuracy of MRI three-dimensional (3D) reconstruction for estimating shrinkage modes of primary tumor after neoadjuvant therapy (NAT).

Methods: From April 2010 to 2018, 104 breast cancer patients underwent operation after NAT were included in this prospective study. All the patients underwent MRI examinations before and after NAT. Breast specimen after surgery was prepared with sub-serial section. The MRI and pathological 3D modes of residual tumors was reconstructed with 3D-DOCTOR software. The correlation and association between MRI and pathological modes were analyzed. Combined with the MD Anderson Cancer Center BCS indications after NAT and traditional shrinkage modes, we derived clinical-pathological shrinkage modes which oriented by BCS purpose: clinical pathological-concentric shrinkage modes (CP-CSM) and clinical pathological-non concentric shrinkage modes (CP-NCSM).

Result: The accuracy, sensitivity and specificity of MRI for predicting the traditional shrinkage modes were 84.6%, 61.9%, and 90.4%, respectively (Kappa = 0.497). The CSM was observed in 67 (64.4%) and 70 (67.3%) patients by MRI and pathology. The accuracy, sensitivity and specificity of MRI in predicting clinical-pathological shrinkage modes were 93.3%, 97.0%, and 86.5%, respectively (Kappa = 0.850).

Conclusions: The MRI 3D reconstruction modes could fully reveal the shrinkage modes of primary tumor after NAT. The MRI and pathological 3D reconstruction have a good correlation and consistency in the evaluation of residual tumor extent after NAT, and it could help to guide the individualized selection of patients receiving breast conserving surgery and extent of resection after NAT.

WOMEN WITH AGE UNDER 50 PRESENT BETTER OUTCOME THAN OLDER PATIENTS WHO ACHIEVED PATHOLOGIC COMPLETE RESPONSE AFTER NEOADJUVANT CHEMOTHERAPY

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Background: Pathologic complete response (pCR) is widely used as a good prognostic surrogate endpoint in many different clinical trials but results reported in retrospective study in real-world data varies by studies.

Methods: We analyzed 1,657 Korean women diagnosed with breast cancer who underwent neoadjuvant chemotherapy (NACT) in our single institution between 2008 and 2014. Primary endpoint was rate of pCR and secondary endpoint was disease free survival (DFS) and overall survival (OS). We analyzed data with different age groups and subtypes.

Result: Median follow up period was 65.5 months (2-137 months) with median age at diagnosis was 45 years (20-80 years). 286 patients (17.3%) achieved pCR after NAC in all patient group. 346 recurrences (20.9%) and 246 deaths (17.3%) occurred during follow up period. In all patient population, patients with pCR had significantly better DFS and OS ($p < 0.001$). Combining age groups with presence of pCR, woman with age under 50 without achieving pCR had worst disease free survival and same aged women with pCR had best outcomes compared with other groups. In subgroup analysis by different subtypes and age groups, women younger than age 50 showed better DFS in all subtypes (HR+, HER2+, TNBC) after adjusting preexisting co-factors.

Conclusions: Achieving pCR showed better survival in all age groups and subtypes. Especially in patients under 50 with pCR had best prognosis compared to other counterparts. Tools are needed to accurately predict effects of preoperative chemotherapy such as genomic tests to actively consider NACT in HR+ subtype also.

CLINICAL APPLICATION OF MULTI-GENE EXPRESSION ASSAYS IN THE ERA OF SENTINEL LYMPH NODE BIOPSY - A MULTI-CENTER NOMOGRAM STUDY

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Background: There is also no relevant research on how to apply multi-gene expression assays to 1-2 sentinel lymph node (SLN) positive patients but omission of axillary lymph node dissection (ALND). The purpose was to construct a nomogram based on the multi-center data to predict which hormone receptor positive/HER-2 negative (HR+/HER2-) patients with 1-2 positive SLN had ≤ 3 metastasis lymph nodes.

Methods: A retrospective analysis of clinical-pathological data of breast cancer patients admitted to Shandong Cancer Hospital, Fudan Univ. Cancer Hospital and Sichuan Univ. West China Hospital from May 2010 to 2020. Univariate and multivariable analysis to identify the independent predictive factors of having ≤ 3 positive nodes among patients with 1-2 positive SLN.

Result: Among 1,817 HR+/HER2- patients with 1-2 positive SLN and receiving ALND subsequently, the proportion of no more than three total ALN metastases was 84.2% (1,530/1,817). The univariate and multivariate analysis result showed that cN0/iN+, the number of positive SLN, the number of negative SLN, pathological T stage and lymph-vascular invasion were indicated as independent predictors for the proportion of total ALN metastasis ≤ 3. These five predictors were used to create the predictive nomogram. The AUC value was 0.702 (95% CI: 0.681-0.812, $p < 0.001$).

Conclusions: The nomogram shows good accuracy, and could help the oncologist to decide on whether to deliver multi-gene expression assays for breast cancer patients with 1-2 positive SLN but omit ALND. The combined application of multi-gene expression assays and SLNB could provide patients with better strategy of dual-de-escalation treatment, not only the de-escalation of surgery, but also the de-escalation of systemic treatment.

LONG-TERM RESULTS AND BONE-PROTECTIVE EFFECT OF EVEROLIMUS ADDED TO LETROZOLE AND OVARIAN SUPPRESSION FOR PREMENOPAUSAL HORMONE RECEPTOR POSITIVE BREAST CANCER: AN UPDATED ANALYSIS OF THE LEO STUDY

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Background: In phase 2 LEO study, everolimus (EVE) plus letrozole (LET) with ovarian suppression resulted in longer progression-free survival (PFS) in tamoxifen-exposed premenopausal women with hormone receptor-positive, HER2-negative metastatic breast cancer with visceral metastases. Here, we report an updated survival for the LEO study, along with the results of exploratory analyses on bone turnover marker changes and bone-specific progressive disease.

Methods: Patients who were exposed to or progressed on tamoxifen as adjuvant or palliative treatment were randomly assigned (2:1) to the EVE (leuprorelin+LET+EVE) or LET arm (leuprorelin+LET).

Result: With a median follow-up of 51 months, Median PFS was 17.5 months in EVE arm and 13.8 months in LET arm ($p=0.245$). PFS favored EVE arm in patients with baseline visceral metastases (median PFS, 16.4 vs. 9.5 months, $p=0.040$), and patients with bone metastases (median PFS, 17.1 vs. 10.9, $p=0.003$). No differences in the OS were observed (median OS, 48.3 vs. 50.8 months, $p=0.948$). One-year cumulative incidence of bone-specific disease progression was 6.0% in EVE arm, and 23.4% in LET arm (Hazard ratio 0.26, $p<0.001$). At 6 and 12 weeks after treatment, bone markers decreased in EVE arm, whereas they increased or were stationary in LET arm. Skeletal-related events occurred 6.5% and 11.1% of the patients in the EVE and LET arm, respectively.

Conclusions: EVE plus LET with ovarian suppression prolonged PFS in patients with baseline visceral or bone metastases and offered bone-protective effect in the overall study population. However, these clinical benefits were not translated into an OS benefit.

SERIAL ANALYSIS OF MUTATIONS IN CIRCULATING TUMOR DNA DETECTS SUBSEQUENT RECURRENCE, DISEASE PROGRESSION BEFORE CLINICAL DIAGNOSIS

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Background: Cell-free DNA (cfDNA) enables to overcome temporal/spatial tumor heterogeneity. We aimed to assess whether cfDNA can 1) provide response to specific systemic therapy or, 2) detect subsequent metastasis during surveillance after standard treatment by tracking mutations, using mass spectrometry method from minimal plasma volume.

Methods: Twenty recurrent cases (9 locoregional, 11 distant metastasis) and ten primary early breast cancer cases were analyzed. Anchor mutations were selected from each patients tumor using in-house Oncopanel (382 genes, 0.82 Mb) sequencing. We applied in-house developed mass stectrometry UHS-platform (Ultra-high sensitive, VAF 0.01%) from 2 mL whole blood drawn at each serial time-points.

Result: Among 20 patients, 1 failed sequencing and 15 displayed ctDNA positive at time of recurrence (sensitivity, 78.9%). Among the 4 false negative cases, 3 had locoregional recurrences and one had bone metastasis. However, sensitivity was 100%, when number of anchor mutations >5. Among 10 early breast cancer cases, 6 were successfully analyzed. While no patient was MRD positive postoperatively, 1 triple negative case displayed cfDNA positive at 7 months after surgery (DDR2 F804S, TP53 R248Q). She was diagnosed to have lung metastases 4 months later cfDNA positive conversion.

Conclusions: Anchor mutations selected from primary tumor was analyzed in serial cfDNA using mass spectrometry based UHS platform. With sufficient number of anchor mutations for tracking (>5), 100% sensitivity was observed. Unlike other methods using 10-20 mL of blood, UHS-platform works in less than 2-3 mL whole blood. Clinical utility of serial cfDNA analysis using UHS platform needs further evidence with longer follow-up in larger prospective cohort.

PROSPECTIVE VALIDATION TRIAL DETERMINING THE EFFICACY OF THE THREE-PROTEIN SIGNATURE AS A POTENTIAL SERUM MARKER FOR BREAST CANCER SCREENING

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Background: We have previously reported the diagnostic accuracy of three-protein signature (Mastocheck) in breast cancer screening using retrospective samples. In the present study, we show the results of prospective validation of the three-protein signature in breast cancer patients and healthy controls.

Methods: The three-protein signature values were obtained using serum samples from 98 newly diagnosed breast cancer patients and 103 healthy women were prospectively collected. Among the 98 breast cancer patients, follow-up blood samples after the surgery were available in 61 patients who agreed for additional sampling.

Result: The three-protein signature accurately classified 67 out of 98 breast cancer patients and 80 out of 103 healthy controls. The sensitivity, specificity, and overall accuracy of the assay was 68.3%, 78.1%, and 73.1% (AUC 0.794), respectively. Among the three protein markers, only APOC1 showed significant changes in post-surgery follow-up samples ($p = 0.001$) while the remaining CA1 and NCHL1 showed no significant differences.

Conclusions: This prospective trial shows similar accuracy of the three-protein signatures in detecting breast cancer patients when compared to the previous retrospective studies.

VISCERAL FAT METABOLIC ACTIVITY EVALUATED BY PREOPERATIVE 18F-FDG PET/CT IS INDEPENDENTLY ASSOCIATED WITH AXILLARY LYMPH NODE METASTASIS IN POSTMENOPAUSAL LUMINAL BREAST CANCER

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Background: Obesity is known to increase breast cancer risk and aggressiveness in postmenopausal luminal breast cancer and obesity-driven dysfunctional metabolic activity in visceral adipose tissue (VAT) is considered as one of the principal underlying mechanism. We aimed to investigate the relationship between VAT metabolic activity evaluated by preoperative 18F-FDG PET/CT and axillary lymph node (ALN) metastasis in postmenopausal luminal breast cancer patients.

Methods: A total of 173 patients (131 with luminal type and 42 with non-luminal type) with newly diagnosed postmenopausal breast cancer were enrolled in this study. They all underwent preoperative 18F-FDG PET/CT and surgery. VAT metabolic activity was defined as the maximum standardized uptake value (SUVmax) of VAT divided by the SUVmax of SAT (V/S ratio).

Result: In luminal breast cancer, the patients with ALN metastasis showed significantly higher V/S ratio than the patients without ALN metastasis, whereas non-luminal breast cancer patients showed no difference of V/S ratio between positive and negative ALN metastasis groups. Furthermore, V/S ratio was significantly associated with ALN metastasis in luminal breast cancer patients by uni-and multivariate analyses. We also found that the erythrocyte sedimentation rate, which could reflect the systemic inflammatory condition, was significantly higher in ALN metastasis group than the negative ALN metastasis group in luminal breast cancer patients and showed significant positive correlation with V/S ratio.

Conclusions: V/S ratio significantly affects the ALN metastasis status in postmenopausal luminal breast cancer patients and it may be useful as a potential biomarker of obesity-driven systemic inflammation associated with tumor aggressiveness.

INITIAL RESULTS OF A NOVEL TECHNIQUE OF CLIPPED NODE LOCALIZATION IN BREAST CANCER PATIENTS POST NEOADJUVANT CHEMOTHERAPY: SKIN MARK CLIPPED AXILLARY NODES REMOVAL TECHNIQUE (SMART)

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Background: Removal of clipped nodes can improve sentinel node biopsy accuracy in breast cancer patients post neoadjuvant chemotherapy (NACT). However, the current methods of clipped node localization have limitations. We evaluated the feasibility of a novel clipped node localization and removal technique by preoperative skin marking of clipped nodes and removal via Skin Mark clipped Axillary nodes Removal Technique (SMART), with the secondary aim of assessing the ultrasound visibility of the various clips in the axillary nodes after NACT.

Methods: Invasive breast cancer patients with histologically metastatic axillary nodes, going for NACT, and ≤ 3 sonographically abnormal axillary nodes were recruited. All abnormal nodes had clips inserted. Patients with M1 disease were excluded. Post NACT, patients underwent SMART and axillary lymph node dissection. Specimen radiography and pathological analyses were performed to confirm the clipped node presence. Success, complication rates of SMART and ultrasound visibility of the various clips were assessed.

Result: Twenty-five clipped nodes in 14 patients underwent SMART without complications. The UltraCor Twirl, hydroMARK, UltraClip Dual Trigger and UltraClip were removed in 13/13 (100%), 7/9 (77.8%),1/2 (50.0%) and 0/1 (0%), respectively ($p = 0.0103$) with UltraCor Twirl having the best ultrasound visibility and removal rate. Removal of 3 clipped nodes in the same patient ($p = 0.0010$) and deeply seated clipped nodes ($p = 0.0167$) were associated with SMART failure.

Conclusions: SMART is feasible for removing clipped nodes post NACT, with 100% observed success rate, using the UltraCor Twirl marker in patients with < 3 not deeply seated clipped nodes. Larger studies are needed for validation.

UTILITY OF NOVEL RAPID- IMMUNOHISTOCHEMISTRY USING AN ALTERNATING CURRENT ELECTRIC FIELD FOR INTRAOPERATIVE DIAGNOSIS OF SENTINEL LYMPH NODES IN BREAST CANCER
-FOCUSING ON ACCURACY AND FUTURE PERSPECTIVE-

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Background: Axillary lymph node status and pathological diagnosis of sentinel lymph nodes (SLNs) is an important factor that influences management of postoperative therapy. Recent reports indicate that one-step nucleic acid amplification and hematoxylin and eosin (HE)-stained frozen sections are effective for intraoperative diagnosis of SLNs. This is the report on SLN diagnosis using a rapid-immunohistochemical staining method (R-IHC) in breast cancer.

Methods: We prospectively examined 632 dissected SLNs from 260 breast cancer patients who underwent surgery at our institute. The dissected SLNs were sectioned and conventionally stained with HE or R-IHC procedures with anti-cytokeratin antibody. With this R-IHC system, we apply a high-voltage, low-frequency AC electric field to lymph node sections while they are incubating with the antibodies. The antibodies are mixed within microdroplets and the contact between the antibody and antigen is increased. This greatly reduces the time required for the antigen-antibody reaction and enables intraoperative detection of SLN metastases within 16 min using an anti-cytokeratin antibody.

Result: The total time required for intraoperative staining and diagnosis was only 20 min. In this study, R-IHC detected nine metastatic SLNs (macro and micro metastases) that were undetected using intraoperative HE (9/50, 18%). R-IHC offered 98.0% sensitivity (95% CI 0.895-0.999) with AUC of 0.990 (95% CI 0.97-1.00), they were significantly higher than those of intraoperative HE.

Conclusions: R-IHC is precise, quick, and readily detectable diagnostic method of SLNs. Furthermore, it will be cost effective (activation of antigen-antibody reaction reduces the amount of expensive anti-cytokeratin antibodies) and potentially be helpful for remote diagnosis. This abstract has been published in the CANCER Research but is updated with statistical analysis.

CONTRAST ENHANCED DIGITAL MAMMOGRAPHY VERSUS MAGNETIC RESONANCE IMAGING FOR ACCURATE MEASUREMENT

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Background: This study aimed to compare the diagnostic performance of contrast-enhanced digital mammography (CEDM) and contrast-enhanced magnetic resonance imaging (CEMRI) for measuring tumor size of breast cancer according to immunohistochemical subtypes. We also investigated differences in positive rates of margins in patients who underwent partial mastectomy between CEDM and CEMRI.

Methods: This single-center, prospective study was approved by the Institutional Review Board, and informed consent was obtained from all patients. From November 2016 to October 2017, 84 patients who were diagnosed with invasive carcinoma (69/84) and ductal carcinoma *in situ* (15/84), and underwent both CEDM and CEMRI, were enrolled. Lin concordance and Pearson correlation coefficient, Bland-Altman plots analysis were used to evaluate the maximum size between imaging and pathology including both invasive or with carcinoma *in situ* component.

Result: Eighty-four women were included in the analysis. Mean tumor size of invasive component was 15.5 mm. All parameters of CEDM and CEMRI showed good agreement ($k > 0.75$) with pathologic tumor extent. The agreement between CEDM or CEMRI and tumor extent was both highest in the triple negative subtype (CEDM: 0.823, CEMRI: 0.789). The agreement between CEDM or CEMRI and tumor extent was low in hormone receptor (HR)+/human epidermal growth factor receptor 2 (HER2)- subtype (CEDM: 0.823, CEMRI: 0.789). Positive rates of margin during intraoperative or postoperative assessment were highest in HR+/HER2- subtype (25.2%).

Conclusions: CEDM demonstrated a diagnostic performance comparable with CEMRI in assessment of the pathologic extent of tumor size. This result was more pronounced in TNBC and HER2-positive tumors.

THE INTENSITY OF METASTASIS SCREENING AND SURVIVAL OUTCOMES IN BREAST CANCER PATIENTS

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Background: Previous randomized trials, performed decades ago, showed no survival benefit of intensive screening for distant metastasis in breast cancer. However, recent improvements in targeted therapies and diagnostic accuracy of imaging have again raised the question of the clinical benefit of screening for distant metastasis. Therefore, we investigated the association between the use of modern imaging and survival of patients with breast cancer who eventually developed distant metastasis.

Methods: We retrospectively reviewed data of 398 patients who developed distant metastasis after their initial curative treatment between January 2000 and December 2015.

Result: Patients in the less-intensive surveillance group (LSG) had significantly longer relapse-free survival than did patients in the intensive surveillance group (ISG) (8.7 vs. 22.8 months; $p = 0.002$). While the ISG showed worse overall survival than the LSG did (50.2 vs. 59.9 months; $p = 0.015$), the difference was insignificant after adjusting for other prognostic factors. Among the 225 asymptomatic patients whose metastases were detected on imaging, the intensity of screening did not affect overall survival. A small subgroup of patients showed poor survival outcomes when they underwent intensive screening. Patients with HR-/HER2+ tumors and patients who developed lung metastasis in the LSG had better overall survival than those in the ISG did.

Conclusions: Highly intensive screening for distant metastasis in disease-free patients with breast cancer was not associated with significant survival benefits, despite the recent improvements in therapeutic options and diagnostic techniques.

※ This abstract has been published in the Scientific Report

A TRIPLE-NEGATIVE BREAST CANCER SURROGATE SUBTYPE CLASSIFICATION CORRELATING TO GENE EXPRESSION SUBTYPES

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Background: In this study, we have developed a triple-negative breast cancer (TNBC) surrogate subtype classification that represents TNBC subtypes based on the Vanderbilt subtype classification.

Methods: Patients who underwent primary curative breast cancer surgery for TNBC were included. A representative FFPE block was used for gene expression analysis and tissue microarray construction for IHC staining. The Vanderbilt subtypes were re-classified into 4 groups: basal-like (BL), mesenchymal-like (M), immunomodulatory (IM) and luminal androgen receptor (LAR) subtype.

Result: A total of 145 patients were included. The study cohort was allocated to the Vanderbilt 4 subtypes as follows: BL, 25 (17.2%); IM, 32 (22.1%); M, 38 (26.2%); LAR, 22 (15.2%) and unclassified, 28 (19.3%). A classification and regression tress model was applied to develop a TNBC surrogate subtype classification that correlates with the Vanderbilt 4 subtypes. LAR subtype was defined as AR Allred score 8. IM subtype was defined as not LAR and TIL score > 70% and M subtype as not LAR and TIL score < 20%. BL subtype was defined as not LAR, TIL 20-70% and p16 positive (diffuse and strong staining). The study cohort was classified by the surrogate subtypes as LAR (n = 26, 17.9%), IM (n = 21, 14.5%), M (n = 44, 30.3%), BL1 (n = 27, 18.6%) and unclassified (n = 18, 12.4%). The performance of the surrogate subtypes to predict Vanderbilt 4 subtypes was good with an accuracy of 0.708.

Conclusions: We have developed a TNBC surrogate classification that correlates with the Vanderbilt subtype adopting AR, TIL and p16. It is a practical diagnostic test, easily applied in clinical practice.

SHORT-TERM SERIAL ASSESSMENT OF ELECTRONIC PATIENT REPORTED OUTCOME (EPRO) FOR DEPRESSION AND ANXIETY IN BREAST CANCER

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Background: The incidence of depression and anxiety is higher in patients with breast cancer compared to general population. The authors evaluated the degree of depression and anxiety in patients with breast cancer during treatment period and short-term follow-up period.

Methods: One hundred-thirty seven patients with breast cancer were evaluated with Patient Health Questionnaire 9-item depression scale (PHQ-9) and Generalized Anxiety Disorder scale (GAD-7) scales. The scales were developed as web-based electronic Patient Reported Outcome (ePRO) for easier access and the serial results were assessed at preoperative, postoperative, post-treatment and 6-months follow-up period. And the archived data were analyzed by professional data managers.

Result: Although the mean scores of depression and anxiety had increased during the treatment, they decreased at 6-months follow-up period. However, the daily fatigue (PHQ-9 Q4) and insomnia (PHQ-9 Q3) were the most serious problem during the treatment and at 6-months follow-up period, respectively. In GAD-7, the worrying too much (Q3) showed consistently highest scores during treatments and follow-up periods. And seven patients (5.11%) and eleven patients (8.03%) had been worsened the status of depression and anxiety at post-treatment status compared to pre-treatment status.

Conclusions: Although the degree of depression and anxiety were improved after treatment, several factors still disturb patients with breast cancer even at 6-months follow-up period. Therefore, the serial assessment of the depression and anxiety would be necessary for patients with breast cancer.

WORK STATUS AND FACTORS RELATED TO RETURN TO WORK IN BREAST CANCER SURVIVORS

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Background: As more breast cancer patients are diagnosed at younger ages and the duration of cancer survival increases, breast cancer diagnosis and treatment often coincide with the period of working life. This study aimed to investigate working status of breast cancer survivors and their return to work, and to identify relevant factors, especially fatigue.

Methods: In this observational cross-sectional survey, 188 Korean women, who had an initial diagnosis of breast cancer and were between the ages of 20 and 70, were recruited to complete a questionnaire.

Result: Fatigue level (mean 94.26 ± 40.196) of the respondents was higher than the results of previous studies on breast, colorectal cancer, and brain tumor patients. Most (71.8%) of participants worked before cancer diagnosis, but only 57.0% of those who were working before diagnosis reported they were still working after their diagnosis. The most common reasons for change in work status were fatigue (17.68%), anxiety (12.65%), and change in body appearance (10.37%). For those who were working before diagnosis (n = 135), subjective fatigue ($p = 0.034$), physical fatigability ($p = 0.021$) and anxious preoccupation ($p = 0.001$) were statistically significantly worse in those who had not yet returned to work. Also there were significant differences in return to work by marital status ($p = 0.005$) and survivorship ($p = 0.038$).

Conclusions: Breast cancer survivors were experiencing higher level of fatigue. Various physical, mental factors and those concerned with social relationship work in combination to make a difference in return to work. Among them, fatigue was a powerful variable that indicates a difference in work status change.

DISCOVERY OF POTENTIAL BIOMARKERS BY QUANTITATIVE PROTEOME ANALYSES FROM TREATMENT NAIVE TUMOR AND BLOOD SAMPLES

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Background: Clinical unmet needs for biomarkers to predict outcome of breast cancer prior treatment exists, yet majority of previous candidates failed to show reliable performance. Here, proteome of plasma and FFPE tumor tissue at time of diagnosis prior to treatment from breast cancer patients undergone preoperative systemic therapy were analyzed using quantitative and reproducible LC-MS platform to discover biomarkers to predict outcome and response to therapy.

Methods: Fifty seven breast cancer patients were grouped into pCR group (n = 21) and non-pCR group (n = 36) based on response to neoadjuvant chemotherapy. Paraffin blocks of core needle biopsy samples were collected and tumor was microdissected by expert pathologists. After deparaffinization of FFPE tissue, protein was extracted and analyzed using a high-resolution LC-MS system. Plasma samples from corresponding patients drawn before treatment, were depleted to remove high abundant proteins and quantities of low abundant proteins were measured using the same LC-MS platform.

Result: From tumor tissue, 4,983 proteins were successfully identified. Among differentially expressed proteins (DEPs), 217 and 146 proteins were found exclusively in tumors of non-pCR and pCR cases, respectively. From plasma, 725 proteins were identified overall and there were 32 DEPs which were abundantly found in non-pCR cases. Four plasma proteins were found exclusively in patients with early distant metastasis (n = 17).

Conclusions: We found proteins associated with achievement of pCR, and subsequent metastasis by performing quantitative analyses of proteome extracted from FFPE tumor tissue, plasma from breast cancer patients at diagnosis.

INTERMEDIATE HER2 EXPRESSION IS ASSOCIATED WITH POOR PROGNOSES IN ESTROGEN RECEPTOR-POSITIVE BREAST CANCER PATIENTS AGED 55 YEARS AND OLDER

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Background: An antibody-drug conjugate targeting HER2, DS8201, has shown clinical activity against breast cancer with low-level HER2 expression. We aimed to evaluate the prognostic impact of intermediate HER2 expression in estrogen receptor (ER)+ early breast cancer (EBC) and metastatic breast cancer (MBC) cohorts.

Methods: We analyzed prospectively collected data from EBC and MBC cohorts at Yonsei Cancer Center. Patients with HER2 immunohistochemistry (IHC) 0~1+ were assigned to the HER2-negative group, and patients with IHC 2+ and *in situ* hybridization (ISH)-negativity were assigned to the HER2-intermediate group. After the exclusion of HER2 IHC 3+ or ISH+ patients, a total of 2,657 EBC and 535 MBC patients were analyzed.

Result: In total, 654 (24.6%) EBC and 166 (31.0%) MBC patients were classified in the HER2-intermediate group. The HER2-intermediate patients showed significantly poorer recurrence-free survival (RFS) compared to the HER2-negative patients in the EBC cohort ($p = 0.044$). Notably, intermediate HER2 expression predicted poorer RFS in EBC patients aged ≥ 55 years (hazard ratio, 1.95; $p = 0.042$) in multivariate Cox analysis but did not affect RFS in those aged < 55 years. In line with the EBC cohort results, intermediate HER2 expression predicted poorer overall survival (OS) in MBC patients aged ≥ 55 (hazard ratio, 1.45; $p = 0.044$) without affecting OS of those aged < 55 years.

Conclusions: Intermediate HER2 expression is an independent predictor of poor prognoses in both ER+ EBC and MBC patients aged ≥ 55 years.

THE VALUE OF PHOSPHORYLATED-AKT1(SER473) AS A PROGNOSTIC MARKER AND THERAPEUTIC TARGET IN PATIENTS WITH HORMONE RECEPTOR POSITIVE AND HER2 POSITIVE BREAST CANCER

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Background: Phosphorylated-AKT1 (pAKT1) (ser473) is one of the isoforms of AKT, the key component of the PI3K/mTOR/AKT pathway, and triggers the downstream oncogenic mechanism. In this study, the prognostic significance of pAKT1 (ser473) was evaluated based on the subtypes in patients with breast cancer. Also, the pre-clinical study was conducted to investigate the potential value of pAKT1 (ser473) as a therapeutic target.

Methods: To investigate the prognostic value of pAKT1 (ser473), retrospective chart review was done. Data of expression of pAKT1 (ser473), hormone receptor (HR) status, HER2 expression status, and other clinicopathologic factors were obtained. Furthermore, we explored the therapeutic effect of blocking pAKT1 (ser473) in breast cancer cells.

Result: A total of 3,044 patients were evaluated in this study. Median follow-up period was 43 (range: 0-125) months. In patients with HR positive and HER2 over-expressed (HR+/HER2+) disease, pAKT1 (ser473) positive group showed worse disease-free survival (DFS) compared with pAKT1 (ser473) negative group (hazard ratio 1.948; 95% confidence interval 1.098-3.472, $p = 0.021$). In multivariate analysis, pAKT1 (ser473) remained as a significant worse prognostic factor in patients with the HR+/HER2+ breast cancer ($p = 0.030$). Otherwise, there was no difference in DFS according to the expression of pAKT1 (ser473) in patients with other subgroup of breast cancer. In vitro analysis, perifosine, the AKT inhibitor decreased the pAKT1 (ser473) expression, and enhanced trastuzumab-induced cell death in BT474 cells, eg. HR+/HER2+ breast cancer cells. Knockdown of AKT1 by siRNA also showed same results as perifosine.

Conclusions: pAKT1 (ser473) was a worse prognostic marker in patients with HR+/HER2+ breast cancer, and may have a potential value as a therapeutic target.

CHEMOTHERAPY-INDUCED COGNITIVE IMPAIRMENT IN NEOADJUVANT CHEMOTHERAPY FOR PATIENTS WITH BREAST CANCER

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Background: Chemotherapy-induced cognitive impairment (CICI) is clinically significant problems for cancer survivors, but the objective assessments have not been established. Because multiple factors including surgery and anesthesia can affect cognitive function in cancer patients, patients in neoadjuvant chemotherapy are suitable subjects for investigating CICI. The purpose of this study was to prospectively monitor the cognitive function according to neoadjuvant chemotherapy in patients with breast cancer.

Methods: Twelve Japanese breast cancer patients who received neoadjuvant chemotherapy at our institution were enrolled prospectively. They underwent cognitive function tests at three time-points; [1] before chemotherapy (baseline) [2] one month after completing chemotherapy (post phase) and [3] more than six months after completing chemotherapy (late phase). The cognitive function tests included three kinds of tests recommended for the assessments of chemotherapy-induced cognitive impairment; [1] Controlled Oral Word Association (verbal fluency test) [2] Trail Making Test (executive function, attention, processing speed test) and [3] Hopkins Verbal Learning Test-Revised (memory test).

Result: Patients' median age was 49 years (range 32-58). Stage II was 9 cases (75%) and stage III was 3 cases (25%). Regarding chemotherapy regimen, anthracycline and taxane were dosed sequentially in all cases. Trastuzumab was dosed in 6 cases (50%). Cognitive impairment was observed in 2 cases (17%) at baseline, 3 cases (25%) at post phase and 0% at late phase. Verbal fluency and memory function were especially impaired following chemotherapy.

Conclusions: Cognitive impairment was detected at baseline and post phase, and then improved at late phase in neoadjuvant chemotherapy for patients with breast cancer.

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Poster Presentation

GBCC10

10th Global Breast Cancer Conference

PERSONALIZED, PREVENTION DECISION AID DEVELOPED FOR BREAST CANCER RISK-REDUCING DISCUSSIONS AND INTERVENTIONS IN THE WISDOM STUDY

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Background: Breast cancer risk reduction has been validated by Level I evidence generated in large-scale clinical trials, however uptake of chemoprevention among women at high risk remains very low.

Methods: A patient-facing shared decision-making aid was designed to inform women enrolled in the PCORI-funded WISDOM (Women Informed to Screen Depending on Measures of Risk) Study of their individualized breast cancer risk and ways to reduce their risk. The tool displays the key factors that are used to calculate a participants risk (Breast Cancer Surveillance Consortium [BCSC] and Polygenic Risk Score). The aid also estimates the anticipated change in a participants risk due to particular risk-reduction interventions (medication, lifestyle). Expert opinion was sought from decision scientists, low literacy experts, breast health specialists, epidemiologists, and breast cancer specialists, in order to generate a tool with suitable language and adequate communication of content. We piloted the decision-making aid with 15 elevated risk WISDOM Study participants without a common mutation associated with breast cancer.

Result: The pilot has enrolled 10 elevated-risk participants with an average age of 63. Six have completed the quantitative survey. 3 (50%) indicated that they would consider chemoprevention. 6 (100%) indicated that they would consider lifestyle changes, such as exercise or reducing their body mass index (BMI). 3 (50%) indicated the aid has been extremely helpful and 6 (100%) indicated that they had a better understanding of their breast cancer risk.

Conclusions: The WISDOM Study shared decision-making aid represents a novel, participant-centered approach to integrate breast cancer prevention and personal breast cancer risk.

FACTORS ASSOCIATED WITH PHYSICAL ACTIVITY IN BREAST CANCER SURVIVORS

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Background: Breast cancer is one of the top three most common cancers in Korea, and the breast cancer survival rate has been increasing. Recommendations for cancer survivors include physical activity which includes at least 150 minutes of moderate or 75 minutes of vigorous aerobic exercise per week. The purpose of this study is to evaluate factors associated with physical activities among breast cancer survivors.

Methods: A descriptive correlation study was conducted. A total of 130 breast cancer survivors participated in this study. Breast cancer survivors' total amount of physical activities, symptoms (MDASI), and emotions (HADS) were collected. Logistic regression analysis was conducted to identify contributing factors of recommended physical activities.

Result: Average amount of physical activities translated as moderate aerobic exercise was 157.42 min per week, and 42.3% were adhering physical activity recommendations. Current work status, monthly income and pain severity were related to meeting physical activity recommendations. In logistic regression analysis, not currently working and having less pain explained 17.9% of meeting physical activity recommendations.

Conclusions: Our findings demonstrated that breast cancer survivors who were not working or having less pain had higher odds of practicing recommended amount of physical exercise. Challenges exist for those who are working and continue to experience pain even after cancer treatment. It is recommended to consider work status and pain in developing interventions promoting physical activities for breast cancer survivors.

INCIDENCE OF BREAST CANCER IN WOMEN USING RALOXIFENE: A NATIONWIDE STUDY

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Background: Breast cancer risk reduction using selective estrogen receptor modulators (SERMs) has not been widely accepted. Also, there was no evidence among Asian population using SERMs for risk reduction. Raloxifene is one of SERMs and its reimbursement in Korean national health insurance is for osteoporosis treatment. Authors retrospectively investigated the protective effect of raloxifene to breast cancer development in those population.

Methods: Using the Health Insurance Review and Assessment Service (HIRA) database, female osteoporosis patients aged older than 50 years were included. Women who had been treated at least 2 years of raloxifene were assigned to user group, and the others were assigned to non-user group. Development of breast cancer were assessed using Cox proportional hazards model with time-dependent covariate to minimize immortal bias.

Result: A total of 322,870 women were included during 2010 to 2011. User group were 0.70% (n = 2,307) of the total population. Mean age was 65.7 ± 8.0 in user group and 67.2 ± 8.6 was in non-user group ($p < .0001$). There was no difference in previous use of estrogen replacement ($p = 0.0866$). Incidence of breast cancer per 1,000 person-year was 0.49 (n = 8) in user group and 0.68 (n = 1,714) in non-user group (HR 0.63, 95% CI 0.32-1.27). Decreasing hazard ratio showed following the duration of treatment without statistical significance (HR 1.00 (95% CI 0.32-3.11) in 2-3 years, HR 0.63 (95% CI 0.20-1.94) in 3-4 years, and HR 0.41 (95% CI 0.10-1.65) in 4-5 years).

Conclusions: Although there was no statistical significance because of small number of user group, there showed low incidence of breast cancer in raloxifene users. Further investigation of those population is required.

MACHINE LEARNING-BASED LIFETIME BREAST CANCER RISK RECLASSIFICATION COMPARED TO THE BOADICEA MODEL: IMPACT ON SCREENING RECOMMENDATIONS

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Background: The clinical utility of Machine-Learning (ML) algorithms for breast cancer risk prediction and screening practices is unknown. We compared classification of lifetime breast cancer risk based on ML and the BOADICEA model. We explored differences in risk classification and their clinical impact on screening practices.

Methods: We used three different ML algorithms and the BOADICEA model to estimate lifetime breast cancer risk in a sample of 112,587 individuals from 2,481 families from the Oncogenetic Unit, Geneva Univ. Hospitals. Performance of algorithms was evaluated using the Area under the Receiver Operating Characteristic (AU-ROC) curve. Risk reclassification was compared for 36,146 breast cancer-free women ages 20-80 years old. Impact on recommendations for mammography surveillance was based on the Swiss Surveillance Protocol.

Result: The predictive accuracy of ML-based algorithms (AU-ROC = 0.843-0.889) was superior to BOADICEA (AU-ROC = 0.639) and reclassified 35.3% of women in different risk categories. The largest reclassification (20.8%) was observed in women characterized as near population risk by BOADICEA. Reclassification had the largest impact on screening practices of women younger than 50 years old.

Conclusions: ML-based reclassification of lifetime breast cancer risk impacts more than one in three women and is important for younger women because it impacts clinical decision making for initiation of screening.

Poster Presentation

INCREASED SECOND PRIMARY LIVER CANCER RISK IN YOUNG BREAST CANCER PATIENTS UNDERGOING RADIOTHERAPY AND CHEMOTHERAPY: A NATIONWIDE POPULATION-BASED STUDY

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Background: Although radiotherapy (RT) are important breast cancer (BC) treatment modalities, they can cause other cancers. However, second cancers of liver and stomach tend to be ignored during BC treatment. In this study, the incidence patterns of second primary cancer of liver and stomach were analyzed.

Methods: The insurance claim data of patients that underwent definitive surgery from 2009 to 2010 were analyzed. Standardized incidence ratios (SIRs) were used to estimate the relative risks of second primary liver cancer (SPLC) and second primary stomach cancer (SPSC). In addition, hazard ratios (HRs) of risk factors were analyzed.

Result: Data were obtained on 21,024 BC patients that underwent definitive mastectomy. The median follow-up period was 105.5 months. Overall SIRs for SPLC and SPSC were 7.26 ($p < 0.01$) and 2.92 ($p < 0.01$). In the young age group, the crude HR for CT was 2.27 ($p < 0.05$) and the age/RT adjusted HR was 2.37 ($p < 0.05$). RT also showed a tendency to induce SPLC. The effect of CT peaked within 5 years after treatment, whereas the effect of RT gradually increased after 5 years.

Conclusions: This study shows CT and RT both increase the risk of SPLC in BC patients and that these increases are greater in young BC patients. Times to SPLC occurrence after RT and CT were found to differ.

CLINICAL FEATURES OF BREAST CANCER IN PATIENTS WITH GERMLINE TP53 GENE MUTATION IN SOUTH KOREA

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Background: Breast cancer in Li-Fraumeni Syndrome had been reported as various subtypes with limited data about the appropriate treatment for this group of patients. We aim from this study to conduct a review of the clinical features and treatment of breast cancer in patients with germline TP53 mutation in South Korea.

Methods: The data were collected retrospectively about the clinicopathological features and the treatment of all breast cancer patients who had confirmed germline TP53 mutation from the available database of major hospitals in South Korea.

Result: Twenty-one cases of breast cancers were collected in 12 unrelated women with confirmed germline TP53 mutations. The median age at diagnosis was 33.5 years. The histopathological diagnosis includes 16 invasive ductal carcinomas, 3 DCIS, and two malignant phyllodes tumor. Estrogen and progesterone receptors were positive in 42% and 31% of the cases, respectively. HER2 was positive in 52.6% of the cases. Mastectomy and BCS were the treatment in 52% and 38% of cases, respectively. Five patients had radiotherapy. The median follow-up was 96 months. During the follow-up, there were seven breast recurrences, and eight patients developed new primary cancers. In the post- RT subgroup, there were two ipsilateral, two contralateral breast recurrences, and three patients had a new primary cancer.

Conclusions: The breast cancer with LFS in South Korea showed similar clinical features as previously reported, early-onset, and predominantly positive in HER2. A multidisciplinary approach with adherence to the treatment guidelines in terms of considering mastectomy and avoiding radiotherapy is encouraged to prevent RT-associated sequelae.

DOUBLE HETEROZYGOSITY FOR BRCA1 AND BRCA2 MUTATIONS IN BREAST CANCER PATIENTS

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Background: Development and generalization of diagnostic test for hereditary breast cancer, more breast cancer patients are being tested and more hereditary breast cancers are being diagnosed. The purpose of this study is to review the frequency of hereditary breast cancer patients and the rare cases of BRCA 1/2 double heterozygosity identified in a single center.

Methods: The medical records of breast cancer patients who underwent the BRCA mutation test between January 2008 and June 2020 reviewed retrospectively. BRCA mutation tests have been performed on breast cancer patients diagnosed younger than 40 years or with a familial history of breast or ovarian cancer.

Result: There were 4,108 breast cancer patients who underwent the BRCA test, of which 230 with the BRCA 1 mutation, 229 with the BRCA 2 mutation, and 7 with the BRCA 1/2 double mutations. The mean age at diagnosis with BRACA 1,2 double mutation was 33.71 years, younger than those of BRCA 1 and BRCA 2 respectively. Five patients were triple-negative breast cancer. Six patients had familial history of breast or ovarian cancer, and one of the other had familial history of many other tumors. During follow-up, contralateral breast cancer developed in 2 patients, distant metastasis occurred in 1 patient, and there was no case of ovarian cancer.

Conclusions: As genetic mutation tests are widely implemented, more patients with hereditary breast cancer are being identified than before. Based on the information on these patients, more intensive surveillance and active genetic counseling for families could be provided.

COMPARISON OF CLINICO-PATHOLOGIC FEATURES OF BRCA1/2 PATHOLOGIC VARIANTS, VARIANTS OF UNKNOWN SIGNIFICANCE, OR WILD TYPE IN BREAST CANCER

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Background: There are 5-10% of BRCA-positive breast cancers and its prognosis has been reported worse than sporadic breast cancers due to higher grade and proliferation indices. The authors analyzed the clinic-pathologic features of breast cancer based on the BRCA gene status.

Methods: Between 2006 and 2019, 276 women with breast cancers underwent genetic assessments at Kyungpook National Univ. Chilgok Hospital. The genetic analysis was performed with PCR direct sequencing method and the BRCA gene status was classified as Pathologic Variants, Variants of Unknown Significance (VUS) and Wild Type. The clinicopathologic variables included patients' age, body mass index, clinical and pathologic T/N stage, treatment modalities and oncologic outcomes.

Result: Thirty-six patients (13.1%) had BRCA 1/2 pathologic variants and seventy-eight patients (28.3%) had VUS. There was no significant difference in the mean age, mean BMI and types of breast and axillary surgery, most of treatment modalities except receiving the neoadjuvant chemotherapy which was more frequently administrated for patients with BRCA-positive breast cancer ($p = 0.013$). And the clinical and pathologic T/N stage, estrogen receptor, progesterone receptor, HER2 gene status, also, did not show any statistical difference between three groups. However, the Ki-67 index was significantly highly expressed in BRCA-positive breast cancer ($p = 0.024$). The oncologic outcomes including locoregional recurrence, distant metastasis and death did not show statistical difference between three groups ($p = 0.571$, $p = 0.691$, and $p = 0.413$).

Conclusions: The Ki-67 index was significantly highly expressed in BRCA-positive breast cancer. This result implies that the Ki-67 index can be efficient prognostic factor in predicting the prognosis of BRCA-positive breast cancer.

Poster Presentation

MUTATION SPECTRUM COMPARISON IN CHINESE HEREDITARY BREAST AND OVARIAN CANCER PATIENTS

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Background: Differences in mutation spectrum of hereditary breast and ovarian cancers across ethnicity and cancer types are not fully understood in the Chinese population.

Methods: 2,618 high-risk breast cancer (BR), 453 ovarian cancer (OV) and 93 breast and ovarian cancers (BROV) patients were recruited in Hong Kong Chinese, between 2007 and 2018. Next generation sequencing (NGS) on germline DNA from peripheral white blood cells were screened in a 4-genes panel (BRCA1, BRCA2, TP53 and PTEN) consisting of known high penetrance genes; partial negative cases (1,188 Br, 107 OV and 43 BROV) were then investigated with a 30-cancer-related genes panel.

Result: In the BR, OV and BROV cohort, 8.2%, 9.9%, and 35.5% harbored pathogenic BRCA variants, respectively. Regression tree modeling showed high grade and stage epithelial OV cancer patients, regardless of family history and age, were more likely to carry BRCA mutations and 31.1% of them carried an Asian specific mutation (only 11.1% and 15.2% in BR cohort and BROV cohort, respectively). About 3-folds higher rates of (13.1% and 9.2%) mutations in cancer-related genes, other than in the 4 high penetrance genes, were identified in OV cohort and BROV cohort, respectively, comparing to a lower rate of 3.87% in the BR cohort.

Conclusions: In Hong Kong Chinese, high grade and high stage epithelial OV patients or patients with both BR and OV cancers were likely to have BRCA or other cancer genes mutations. These patients should be prioritized for germline genetic testing, which would have significant impact on the practices of genetic counseling.

HEALTH INEQUALITIES AND THE HOMO GENETICUS AN ANALYSIS USING CITIZENS' FORUMS ABOUT GENETIC SEQUENCING AND CANCER IN SWITZERLAND

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Background: Major advances in molecular research due to the possibilities offered by high-throughput DNA sequencing, allow for the advancement of tailor-made cancer treatments, along with increased predictive knowledge (such as genetic predisposition). This medicine of the future, driven by bioinformatics and genetic engineering, raises hopes and fears. Our inter-disciplinary research examines how both healthy citizens and cancer patients perceive the ethical challenges underlying genetic sequencing related to cancer prevention.

Methods: A citizen forum study was conducted to gather the opinions and concerns of members of the public ($n = 73$) as well as cancer patients ($n = 19$) regarding these issues. Qualitative data was collected through an activity of prospective imagination: a marvellous world carried by the benefits of genetics, and a frightful world conditioned by potential risks. Thematic coding using MAXQDA built on grounded theory-based analysis was used.

Result: Data analysis revealed, on the one hand, a fictional figure, the homo geneticus, who is characterized by an ideal geneticization. This figure is counterbalanced, on the other hand, by the dilemmas implied by potential unequal access to the utilization of genetic knowledge. Ambivalence emerged between both worlds revealing how participative and deliberative dialogues can lead to enriching experiences. Indeed, the various viewpoints expressed about some controversial topics increased self-reflexivity.

Conclusions: Citizen forums, using engaging activities about dilemmas in small groups, enabled deliberative exchanges and raised biopolitical awareness regarding inequalities (genetic, social or environmental).

PATTERN OF GERMLINE VARIANTS IN THE BRCA1 AND BRCA2 GENES IN A SRI LANKAN COHORT WITH HEREDITARY BREAST CANCER: A RETROSPECTIVE AUDIT

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Background: Germline variants in the BRCA1 and BRCA2 genes account for almost 15-40% of hereditary breast cancers in Caucasian populations. This study aims to describe the frequency and spectrum of germline variants in the BRCA1 and BRCA2 genes identified in a Sri Lankan cohort with hereditary breast cancer.

Methods: 172 consecutive index cases (80 cancer affected and 92 pre-symptomatic individuals) from families with hereditary breast cancer who underwent exome sequencing between January 2015 and January 2020 were maintained prospectively in a database and analyzed retrospectively. The exome data was subjected to bioinformatics analysis and variants were classified according to international guidelines.

Result: Altogether, BRCA1 and BRCA2 germline variants were identified in 28.8% (23/80) breast cancer affected and 2/92 (2.2%) pre-symptomatic individuals. 10 (40%) were BRCA1 variants and 15 (60%) were BRCA2 variants. They consisted: non-synonymous variants-9 (36%); small indels-15 (60%); and synonymous variants-1 (4%). 16 (64%) were pathogenic variants and 9 (36%) were variants of unknown clinical significance (VUS). All were reported variants. Highest frequency of variants was identified in exons 10 and 21 in BRCA1 gene accounting for 90% (9/10) and in exons 10 and 11 in BRCA2 gene accounting for 60% (9/15).

Conclusions: A predominance of BRCA2 variants were identified. Small indels involving the BRCA1 and BRCA2 genes were the commonest variations. Exons 10 and 21 in BRCA1 gene and exons 10 and 11 in BRCA2 gene appear to be mutational hotspots in the Sri Lankan population and warrant further investigation with larger studies.

EFFICACY OF NGS MULTIGENE PANEL TESTING WITH GENETIC COUNSELLING FOR KOREAN BREAST CANCER PATIENTS WITH HIGH RISK FOR HEREDITARY BREAST CANCER: UPDATED ANALYSIS

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Background: The high frequency of variants of unknown significance (VUS) and low- or moderate-penetrance genetic mutations still prevent us to recommend the multigene panel germline testing to all the candidates.

Methods: In this study, we provided the multigene panel tests beyond BRCA with counselling programs for the patients without BRCA1/2 mutation tests sequentially, and investigated cancer worry, genetic knowledge, and attitude towards gene panels among the patients.

Result: As of 31 December 2019, we prospectively enrolled 342 Korean BRCA1/2 mutation-negative female breast cancer patients with high risk for hereditary breast cancer. Median age of the patients was 43.4 (range, 21.9–83.2) years. Among the patients, we identified 38 cases (11.1%) with pathogenic/likely pathogenic variants. After genetic counselling about multigene panel, patients showed decreased concern about the possibility of cancer in the future (pre-, 4.21 to post-, 3.92; $p<0.001$), decreased influence on mood (pre-, 3.26 to post-, 3.12; $p<0.001$), daily activity (pre-, 3.04 to post-, 2.93; $p=0.002$), and slight increase in genetic knowledge. In the survey on multigene panel, 329 (96.2.0%) patients reported that genetic testing and counseling about multigene panel were very much (54.1%) or much (42.1%) helpful for the patients and family. 161 (47.1%) patients wanted concurrent application of BRCA1/2 mutation testing and multigene testing beyond BRCA, and 152 (44.4%) patients wanted sequential application of the tests.

Conclusions: Multigene panel testing with genetic counselling may help BRCA1/2 mutation-negative patients with high risk for hereditary breast cancer. We need to improve NGS multigene panel testing methods with counselling programs in our clinics.

USING DIGITAL HEALTH TO IMPROVE CARE FOR FAMILIES WITH PREDISPOSITION TO HEREDITARY CANCER: THE DIALOGUE STUDY

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Background: Despite the importance of communicating test results with family when hereditary breast cancer and ovarian cancer (HBOC) genes are identified, prior studies report that the usefulness and importance of cascade genetic testing is not well communicated. This study is an international joint collaboration, aiming to develop a modern, scalable, mobile-friendly digital health solution for Swiss and Korean HBOC families to improve communication of genetic information among relatives.

Methods: A RCT will utilize a digital health solution that will be created, based on the *Family Gene Toolkit* (FGT), a web-based intervention designed to enhance communication of genetic test results within HBOC families. The FGT has been successfully tested for acceptability, usability, and participant satisfaction. Probands and family members who opt to participate will be randomly assigned to the intervention or comparison website (52 participants each). The main outcomes (proportion of informed relatives, intention to inform/genetic testing) will be measured at baseline and at 2 months and 6 months.

Result: The K-CASCADE started recruitment on November, 2020, and is based on the Swiss CASCADE consortium. The digital health intervention will consist of 5 modules. Individual and/or group interviews are currently underway with mutation carriers and relatives and tailoring variables are being investigated.

Conclusions: As more than 50% loss of HBOC family members occurs, the development of an evidence-based digital intervention that is effective for comprehension and communication of genetic test results will be conducive to clinical practice and may aid preventive measures and medical management.

BREAST CANCER GENE ANALYSIS WITH CORRELATION FOR CLINICAL CHARACTERISTICS THROUGH NEXT GENERATION SEQUENCING

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Background: The next generation sequencing technology has the advantages of high speed, high throughput and high accuracy. One of the characteristics of breast cancer is heterogeneity. We hope that analysis of breast cancer genes through next-generation sequencing will help us understand breast cancer heterogeneity.

Methods: From January 2018 to December 2018, we studied patients who underwent surgery at Kosin Univ. Gospel Hospital. The study patients were from stage I to stage III of breast cancer. Patients who were not able to undergo surgery or who had more than stage IV patients were excluded. This study included patients who underwent Neo-systemic therapy (NST). The patients who underwent NST, NGS proceeded to pre-chemotherapy specimens. And another patient's NGS was performed post-operatively.

Result: The expression of somatic mutation was different for each type of breast cancer. Most of them have been observed to have more than two mutations. It shows the expression ratios of each gene in figure 2. Overall, TP53, PIK3CA, and ERBB2 showed high expression frequencies. Figure shows the frequency of mutation incidence frequent in each type of patient.

Conclusions: Various types of somatic mutations are also expressed in breast cancer, and they are different according to each type. These various manifestations may be associated with the prognosis of breast cancer. Further studies are needed to determine for them.

PREOPERATIVE DIAGNOSIS OF BRCA1/2 MUTATION IMPACTS DECISION-MAKING FOR RISK-REDUCING MASTECTOMY IN BREAST CANCER PATIENTS

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Background: The aim of this study was to examine whether preoperative diagnosis of BRCA1/2 mutation status influences surgical decision-making in newly diagnosed breast cancer patients.

Methods: We retrospectively reviewed ipsilateral breast cancer patients with BRCA1/2 mutation who underwent primary surgery between January 2008 and November 2019 at a single institution in Korea. Chi-Square test was used to compare types of surgery between the two groups and logistic regression was conducted to identify factors associated with preoperative knowledge of BRCA1/2 mutation status. Cumulative incidence function plot was used to analyze the 5-year cumulative incidence of contralateral breast cancer.

Result: Of 344 eligible patients, 140 (40.7%) patients had their BRCA1/2 mutation status identified prior to surgery, while 204 (59.3%) were aware of their mutation status after surgery. Contralateral RRM rates were significantly different between the two groups who had their BRCA1/2 mutation identified prior to surgery and after surgery [45.0% (63/140) vs. 2.0% (4/204)] ($p < 0.001$). Reduced turnaround time of BRCA1/2 testing ($p < 0.001$) and the use of neoadjuvant chemotherapy ($p < 0.001$) were associated with BRCA1/2 mutation status identified prior to surgery. Patients who underwent contralateral RRM did not develop any contralateral breast cancer. The 5-year cumulative incidence of contralateral breast cancer patients who underwent ipsilateral surgery only was 12.1% (95% CI: 7.7%-17.7%). However, difference between the two groups was insignificant ($p = 0.1618$).

Conclusions: Preoperative identification of BRCA1/2 mutation could impact surgical decision-making for breast cancer patients in favor of contralateral RRM.

DIFFERENCES OF HUB GENES EXPRESSION IN BREAST CANCER SUBTYPE CLASSIFIED THROUGH GENE FUNCTIONAL GROUPING

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Background: The aim of this study was to investigate the correlation between the subtypes of breast cancer and the genes with metabolic function.

Methods: 359 patients' data of breast cancer (basal vs. luminal subtypes) and 162 patients' data of breast cancer (HER2 vs. luminal subtypes) were recruited from The Cancer Genome Atlas Program. Differential expressed gene assay was performed by DESeq2 and visualized by ggplot2 in R. To identify the difference in the basal and HER2-positive condition of breast cancer comparing with luminal condition, the genetic difference between two groups was used. For the more elaborate assay, the gene modules were classified by GSEA with gene expression patterns and gene functions related to the breast cancer metastasis. Hub gene assay was performed with genes from the selected modules by string.

Result: For the comparison of two conditioned groups (basal/luminal and HER2/luminal), gene modulation assay was performed with hypoxia and glycolysis known as relation to metastasis. In the glycolysis function, TPI1 was identified as a hub gene in basal only, GALE and PGK1 for HER2-positive and PKM and MDH2 were identified in both conditions. In the hypoxia function, TPI1 and IL6 were identified as hub genes in basal only, GALE and PGK1 for HER2-positive and PKM and MDH2 were identified in both conditions.

Conclusions: Our study revealed the specific metabolic functions, hypoxia and glycolysis, were related to the subtypes of breast cancer. Differences of gene expression were identified between the subtypes of breast cancer, and over-expressions of these multiple genes were concerned with hypoxia and glycolysis.

COMPARATIVE TRANSCRIPTOME ANALYSIS OF BREAST PRIMARY TUMORS IN SERPINB2 DEFICIENT MICE

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Background: SerpinB2 is also known as plasminogen activator inhibitor type (PAI-2), is highly expressed in diverse tumor cells. The role of SerpinB2 in breast cancer is complex and controversial. To understand how SerpinB2 could influence breast tumor progression, in the present study, we used RNA-seq technology to perform a comparative transcriptome analysis of the mouse breast tumor tissue which Serpinb2 deficient or not.

Methods: We compared RNA-seq profiles from primary tumors of SerpinB2 deficient MMTV-PyMT (SB2-/-) and MMTV-PyMT mice. The gene ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway enrichments of differentially expressed genes (DEGs) genes in SerpinB2 deficient tumor versus wild type tumor were performed by DAVID, Cytoscape and QuickGO online analyses, respectively.

Result: Compared with wild type group, a total of 305 genes were identified as being differentially expressed by over 1.5-fold and $p < 0.05$, of which 75 genes were upregulated and 230 genes were downregulated. 61 significantly enriched GO terms and 3 significantly enriched KEGG pathways were identified. Top 10 subclasses of GO enrichment terms and functionally grouped annotation network of DEGs in SB2-/- tumors mainly enriched in the peptidase activity, cell adhesion, immune and inflammatory response, chemotaxis and cell proliferation. The ten genes associated with immune and inflammation that annotated with at least two GO categories were extracted from DEGs in SB2-/-tumors.

Conclusions: In conclusion, the transcriptomic data provided comprehensive information to understand SerpinB2 how influence tumorigenesis.

THE TEST WAS NOT TOPICAL : LIFE-COURSE PERSPECTIVE TO ANALYZE THE COMMITMENT IN GENETIC TESTING TO PREVENT HEREDITARY CANCER

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Background: Close and regular surveillance is essential to enhance risk prevention in Hereditary Breast and Ovarian Cancer (HBOC). At-risk individuals have the sole responsibility of undergoing genetic testing. The moment in life-course-such as being single or in couple, young in academic training, older with a maternity project or parental charge, retired-has an influence on the significance and underlying stakes of the genetic test.

Methods: Interviews and focus groups in Switzerland and Korea (N = 58) are conducted with HBOC carriers to explore lay theories and personal reasons (not) to engage in genetic testing as well as potential cultural interpretations. The material is video- and/or audio-recorded, transcribed and analyzed using a diachronic approach to visualize the risk management of the HBOC index cases and their at-risk relatives. These life-course graphic tools help the multilingual, interdisciplinary qualitative research team to collect, standardize and share data.

Result: Data analysis reveals various arguments related one's life-course stage leading to commitment regarding genetic testing. Addressing the various "good" reasons and moments, as well as cultural meanings about genetic testing, reveals lay representations that do not fit with the model of the ideal agency of a patient-actor or "patient in-becoming". In addition to this, genetic risk management raises issues based on gender, social determinants, and unequal genetic literacy.

Conclusions: This study around key moments in life-course supporting or avoiding to do genetic tests is intended to better understand different ways of thinking and acting to prevent hereditary cancer.

TO SAY OR NOT TO SAY: A QUALITATIVE STUDY ON BARRIERS AND FACILITATORS IN FAMILY COMMUNICATION ABOUT GENETIC CANCER RISK

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Background: In Hereditary Breast and Ovarian Cancer (HBOC), open communication of genetic risk among families is essential to allow people to take decisions about genetic counselling and testing. According to Swiss and Korean laws, individuals identified with a pathogenic variant have the sole responsibility to share information about test results with at-risk relatives. Empirical evidence shows that up to 50% of blood relatives of known HBOC cases are unaware of the potential benefits of genetic testing, raising the question of barriers and facilitators in family communication about genetic cancer risk.

Methods: Interviews and focus groups in Switzerland and Korea (N = 58) are conducted with HBOC carriers to explore potential cultural interpretations, risk perceptions, lay theories and personal reasons (not) to communicate results with blood relatives. Interviews are video and/or audio recorded, transcribed and inductively analyzed by a team of multilingual, interdisciplinary qualitative researchers.

Result: While the importance of family communication is generally recognized by the participants, its modalities and timing are subject to interpretation. Elements such as gender, genetic literacy, health status, and life trajectory of the HBOC carrier and/or the blood relative, are analyzed and participate in both building and legitimizing the decision to communicate/not communicate.

Conclusions: This comprehensive, inductive, and sensitive study helps to better understand ways of thinking and acting to communicate genetic cancer risk. These broad, in-depth analyses will sustain the development of a tailored, interactive digital health platform designed to support HBOC carriers in managing communication among their at-risk relatives.

FACTORS ASSOCIATED WITH BREAST CANCER SCREENING AWARENESS AND PARTICIPATION AMONG WEST JAVA INDONESIAN WOMEN

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Background: Breast cancer screening awareness and participation may be lower in low and middle income countries that lack established national screening programmes compared with those that do. We evaluated potential factors that influence awareness and participation of mammography and breast self examination (BSE) in women using survey data from West Java Indonesia.

Methods: From the 2015 until 2018, a total of 1,012 women aged 40 and older without any history of cancer who responded to questionnaires concerning mammography and BSE were included. Multilevel modelling was used to assess potential factors influence awareness of mammography, and participation in BSE practice. Multivariable analysis was performed to identify independent predictors of cancer screening.

Result: Of the 1,012 respondents, 251 (24.8%) participants were aware of mammography. A total of 605 (59.8%) of women reported they performed BSE. Higher education and household of expenditure were consistently associated with higher odds of awareness about mammography (e.g., odds ratio [OR] of being aware mammography: 7.82 (95% CI: 6.30–9.70) and 7.70 (95% CI ; 6.19–9.58), respectively, for higher education level compared to women with less educational attainment in the multivariable models), and participation in BSE. We also identified factors which contribute cancer screening awareness and participation, including health insurance, availability to reach health services, and community participation.

Conclusions: There are socioeconomic discrepancy in cancer screening awareness and participation among West Java Indonesian women. Our findings may help inform targeted health promotion and screening for cancer in the presence of limited resources.

NEWLY DIAGNOSED BREAST CANCER PATIENTS-TO IMPROVE KNOWLEDGE AND TO REDUCE ANXIETY LEVELS WHEN PREPARING FOR SURGERY

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Background: When diagnosed with breast cancer, most ladies are filled with a combination of emotions: depression, anxiety and fear; and are overwhelmed when a variety of oncological breast surgeries is offered. A lack of knowledge and understanding can compound upon a patients' anxiety level, affecting and influencing her decision making on the choice of surgery. This project aims to facilitate the process of patient education through an education booklet, and to reduce their anxiety levels of the unknown.

Methods: Information booklets were introduced in the SingHealth breast clinics and used by surgeons and breast care nurses. The anxiety and knowledge levels were assessed pre-and post-introduction of the booklets through a questionnaire.

Result: 60 patients (mean 56.5 years-old) were recruited; with 30 patients in each of the pre- and post-intervention arms. About half had an above-secondary school level education (46.7% and 56.7% in the pre- and post-intervention arms respectively). The introduction of our booklets significantly increased the knowledge scores from 61% to 75% ($p=0.02$). There was a notable decreasing trend in anxiety scores from 53% to 49%, but it was not significant ($p=0.37$).

Conclusions: The introduction of a patient information booklet, in the patients preferred language, is a useful tool to increase their knowledge, and helps our breast cancer patients to make an informed decision for their choice of surgery. Larger numbers may be required to demonstrate a significant decrease in anxiety in our patients. We expect this to improve our patients overall satisfaction and these educational booklets will continue to be our valuable resource in our clinics.

WHY DO SOME BREAST CANCER PATIENTS PRESENT SO LATE WITH LOCALLY ADVANCED DISEASE? A SINGAPOREAN PERSPECTIVE

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Background: Singapore is a developed country with a nationwide breast screening programme and readily accessible healthcare services. Yet, the incidence of T4 locally advanced breast cancer (LABC; i.e. skin and/or chest wall invasion) in the last decade remains constant (2.9%). This study aims to investigate and identify the reasons for the late disease presentation in these patients.

Methods: 20 breast cancer patients who presented with T4 disease were recruited from the SingHealth Institute from 2018-2019. They were administered a comprehensive multi-domain questionnaire, adapted from the UK Breast Cancer Awareness Measure (CAM) Toolkit.

Result: The median age was 62.00 years. Majority of the patients were of Chinese (57.9%) ethnicity. The association between various factors and the outcome (i.e. delay in presentation >3 months) was assessed using multiple logistic regression analysis. After adjustment, personal perceptions, specifically wanting to 'rather avoid confirmation (of) cancer' (OR = 11.374, CI 0.829–156.065 $p = 0.069$) was the only significant factor contributing to the delay in presentation. Other factors like demographics, breast cancer screening awareness, perceptions of treatment and cost were not significant in contributing to the delay in presentation.

Conclusions: Patients who present with an advanced stage of breast cancer are likely to be governed by personal fears and denial, rather than healthcare and societal factors. These perceptions and fears are factors that need to be further explored and addressed. This is a vital step in reducing the incidence of LABC, thereby improving the prognosis and overall survival of breast cancer patients.

THE DEVELOPMENT OF SMARTPHONE BASED BREAST SELF-EXAMINATION APPLICATION

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Background: The five-year survival rate of breast cancer has been steadily increasing to 92.7% as the early detection rate of breast cancer and development of medical technologies. Therefore, early detection of breast cancer and active treatment are very important. Breast self-examination is easy and simple examination and less costly than other methods. It is essential for early diagnosis of breast cancer.

Methods: This study aims to develop the smartphone application that motivates breast self-examination and can periodically perform breast self-examination (Pink Road Application).

Result: The development of Pink Road application has progressed to 3 stages: production of breast self-examination education video and contents, design of application, and implementation. In the video production phase, about 15 minutes of the educational video including the breast cancer related information, breast self-examination method and demonstration, and a simple quiz were produced. The design was completed in a hybrid type compatible with both IOS and Android. The application consist of the main screen, survey, educational video, Q&A, and interactive Chabot. In the evaluation phase, usability evaluation of the application were verified by expertise using application evaluation scale. The results showed content truth 19.33 ± 1.15, accessibility and convenience 23.67 ± 1.53, speed and connection 15.0, overall impression 15.0.

Conclusions: The findings present that the Pink Road application is useful and will be effective to improve the breast self-examination rate. Therefore, Pink Road application might be applied.

PREDICTING FACTORS OF BREAST SELF-EXAMINATION AMONG KOREAN WOMEN: A LOGISTIC REGRESSION ANALYSIS

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Background: Breast cancer is the most commonly diagnosed malignancy in worldwide women. In the case of breast cancer within stage 2, the five-year survival rate of breast cancer is more than 90%. Breast self-examination, clinical breast examination, and mammography are recommended for the secondary prevention of breast cancer, which can increase early detection of breast cancer. However, although breast self-examination is a useful method, the practice rate and utilization are low. The purpose of this study was to identify predicting factors on the practice of breast self-examination on Korean women.

Methods: Data were collected using an online self-administered survey on November to December, 2020. This present study analyzed which factors can predict the practice of breast self-examination using a logistic regression model with the SPSS 25.0 program.

Result: Participants average age was 35.29 ± 11.20 years ranged from 19 years to 71 years. Only 6% of participants had monthly regular breast self-examination, 45.8% of participants had never practice of breast self-examination. There was no difference in the practice of breast self-examination based on marital status, childbirth, breastfeeding experience, and breast self-examination knowledge. Statistically significant predicting factors on breast self-examination practice were 'family history of breast cancer,' 'experience of breast self-examination education,' and 'confidence in breast self-examination as a health belief'.

Conclusions: The results of this study suggest that there is a need to improve awareness of breast self-examination, develop standardized breast self-examination education programs, and disseminate them to local communities.

PATTERNS OF SURVEILLANCE AND RISK-REDUCING INTERVENTION OF UNAFFECTED BRCA1/2 MUTATION CARRIERS

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Background: The lifetime risk of breast and ovarian cancer increases substantially for mutations in BRCA1/2. Evidences have shown that BRCA1/2 mutation carriers benefit from cancer early detection and prevention strategies. However, data regarding the pattern of risk-reducing intervention are lacking. We investigated the pattern of surveillance and risk-reducing intervention among unaffected BRCA1/2 mutation carriers.

Methods: A cohort of unaffected BRCA1/2 mutation carriers were identified from the Korean Hereditary BReast cAncer (KOHBRA) Study database, and a telephone survey was done. The survey questionnaire included incidence of new cancer, pattern of cancer (breast, ovary, prostate, other) surveillance, pattern of chemoprevention and risk-reducing surgery.

Result: From August 2017 to November 2019, 192 BRCA1/2 mutation carriers were contacted and 83 responded. After excluding 37 responders who refused to participate, 46 participants (15 male, 31 female) were included in the analysis. The median follow-up time was 60 months and the mean age was 30.37 ± 8.13 years old. Ten BRCA1/2 mutation carriers developed breast cancer, 1 ovarian cancer, and 3 other cancers. Fourteen BRCA1/2 mutation carriers (45.2%) had surveillance for breast cancer, 10 (32.3%) for ovarian cancer, 1 (6.7%) for prostate cancer, and 24 for other cancer (52.2%). Two carriers (6.4%) had chemoprevention for breast cancer. Risk-reducing salpingo-oophorectomy was done for 1 BRCA1/2 mutation carrier.

Conclusions: The rate of breast/ovarian cancer surveillance was lower than 50% in unaffected BRCA1/2 mutation carriers. Considering that the risk of developing breast cancer was relatively high in this cohort, alternative strategies to induce active participation for risk reduction will be required.

PRIMARY OUTCOME ANALYSIS OF INVASIVE DISEASE-FREE SURVIVAL FOR MONARCHE: ABEMACICLIB PLUS ADJUVANT ENDOCRINE THERAPY FOR HIGH-RISK EARLY BREAST CANCER

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Background: MonarchE (phase 3, open-label) evaluated abemaciclib+endocrine therapy (ET) vs. ET-alone in node-positive, HR+, HER2-, high-risk early breast cancer that resulted in a statistically significant improvement in invasive disease-free survival (IDFS) at a pre-planned interim analysis.

Methods: Following the positive interim analysis, patients continued to be followed for IDFS, distant recurrence and overall survival. 5,637 patients were randomized (1:1) to standard-of-care adjuvant ET with/without abemaciclib (150 mg BD for 2 years). Patients with ≥4 positive nodes, or 1-3 nodes and either grade3 disease, tumor size ≥5 cm, or central Ki-67≥20% were eligible. We present results of the primary outcome IDFS analysis which was planned after ~390 IDFS events.

Result: At the primary outcome analysis, median follow-up=~19 months in both arms. With 395 IDFS events observed, abemaciclib+ET continued to demonstrate superior IDFS vs. ET-alone ($p=0.0009$; HR=0.713; 95% CI=0.583, 0.871). Two-year IDFS rates were 92.3% (95% CI=90.9, 93.5 abemaciclib+ET) and 89.3% (95% CI=87.7, 90.7 ET-alone). With 324 distant relapse-free survival (DRFS) events observed, abemaciclib+ET improved DRFS vs. ET-alone ($p=0.0009$; HR=0.687; 95% CI=0.551 ,0.858). Two-year DRFS rates were 93.8% (95% CI=92.6,94.9; abemaciclib+ET) and 90.8% (95%CI=89.3,92.1; ET-alone). A key secondary endpoint was efficacy in patients with centrally assessed high Ki-67 (≥20%) (Ki-67H, n=2498). Abemaciclib+ET demonstrated superior IDFS vs. ET-alone ($p=0.0111$; HR=0.691; 95% CI=0.519, 0.920) and 2-year IDFS rates of 91.6% (95% CI=89.4, 93.4) and 87.1% (95% CI=84.3, 89.5), respectively. Safety was consistent with the results at the interim IDFS analysis and with the known safety profile of abemaciclib.

Conclusions: Abemaciclib+ET demonstrated a clinically meaningful improvement in IDFS in the study population with a statistically significant improvement in IDFS in patients with central Ki-67≥20%. Reused with permission SABCS 2020.

ASSOCIATION BETWEEN SKELETAL MUSCLE MASS AND MAMMOGRAPHIC BREAST DENSITY

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Background: Mammographic density (MD) of the breast and body mass index (BMI) are positively associated with the risk of breast cancer in postmenopausal women, but they are inversely associated with each other. We supposed that the reason for this paradox may be due to the heterogeneity of BMI. Therefore, we calculated the skeletal muscle mass index (SMI), and evaluated whether SMI was an independent predictor for MD.

Methods: A cross-sectional study was performed in 143,456 women who underwent comprehensive examinations from 2012 to 2016. Mammographic density was assessed using Breast Imaging Reporting and Data System, and the breasts were classified as dense or non-dense. The association between SMI, anthropometric factors, and MD were estimated using logistic regression models after adjustment for potential confounders.

Result: In all, 115,013 premenopausal women (80.2%) and 28,443 postmenopausal women (19.8%) were included in the analysis. In both pre and postmenopausal women, weight, BMI, SMI and waist circumference were associated with MD. After adjustment for confounding factors including BMI, the odds ratios (ORs) for MD with 95% confidence interval for the dense breasts was between the highest and lowest quartiles of SMI at 2.65 (2.52-2.79) for premenopausal women and at 2.39 (2.02-2.82) for postmenopausal women.

Conclusions: SMI was related to MD independent of BMI, which could be due to the similar growth mechanism of the skeletal muscle and breast parenchymal tissue. The positive correlation between the muscularity and breast density might explain the reason for the paradoxical relationship between BMI, MD and breast cancer risk in previous studies.

THE PHARMACOKINETICS AND PHARMACODYNAMICS OF EFLAPEGRASTIM, A NOVEL, LONG-ACTING GRANULOCYTE-COLONY STIMULATING FACTOR, ARE NOT ETHNICALLY SENSITIVE

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Background: Eflapegrastim (Rolontis; HM10460A) is a novel, long-acting granulocyte-colony stimulating factor (G-CSF). Eflapegrastim consists of a recombinant human G-CSF analog conjugated to a human IgG4 Fc fragment via a polyethylene glycol linker. Eflapegrastim showed a non-inferiority to pegfilgrastim in the duration of severe neutropenia (DSN) through two pivotal trials. In the present study, we evaluated the ethnic difference in the pharmacokinetic (PK) and pharmacodynamics (PD) profiles of eflapegrastim between Korean and Non-Korean populations using two Phase 1 trials.

Methods: We pooled the PK and PD data from two single-ascending phase I studies with eflapegrastim: 09-HM10460A-102 (healthy adult Koreans) and 08-HM10460A-101 (healthy adult Japanese and Caucasians). The PK profiles of eflapegrastim at 1.1, 3.3, 10, 45, 135, 270, and 350 μg/kg were compared between different ethnic and dose groups. Furthermore, we compared PD variables such as absolute neutrophil count (ANC) and CD34+ cell number between ethnic groups. Additionally, the PK-PD relationships of eflapegrastim and the PD variables were evaluated.

Result: The number of Koreans, Japanese and Caucasians was 39, 28, and 32, respectively. The PK profile of eflapegrastim was linear or dose-independent, which was similarly shown in all of the three ethnicities. Furthermore, ANC and CD34+ cell counts did not show any ethnic difference. The PK-PD relationship was also similar between the three ethnic groups.

Conclusions: We concluded that there is no ethnic difference in the PK, PD, and PK-PD relationship of eflapegrastim between Koreans and Non-Koreans.

DETERMINANTS OF PRESENTATION DELAY OF BREAST CANCER PATIENTS: A HOSPITAL-BASED STUDY IN YOGYAKARTA, INDONESIA

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Background: Breast cancer (BC) is the commonest malignancy in Indonesia and late presentation of BC patients is frequently observed. This study aims to identify sociodemographic determinants that contribute to patient-related presentation delay.

Methods: We included 123 female BC patients visiting Dr Sardjito Hospital between July 2018 and April 2020. Sociodemographic data were obtained from the clinical registry. A questionnaire was developed to capture determinants of diagnosis delay. We defined delay as duration between BC symptom onset to patient's first presentation to a health facility. We stratified delays as no delay (<3 months), short delay (3-6 months), moderate delay (6 months-1 year) and prolonged delay (≥ 1 year). Association between determinants and delay was explored using multivariate logistic regression analysis.

Result: Seventy patients (56.91%) present with no delay, 9 (7.32%) with short delay, 18 (14.63%) with moderate delay, and 26 (21.14%) with prolonged delay. When stratified for delays <6 months and ≥ 6 months, age and income were found as significant predictors. Individuals aged ≥ 60 years were more likely to present with delay than those aged <40 years (OR = 13.2, 95% CI 1.10-158.85, $p = 0.042$). Cases having low income were more likely to present later than those with high income (OR = 5.13, 95% CI 1.03-25.45, $p = 0.046$).

Conclusions: Older age and lower income are determinants of presentation delay. Assessment of health facility-related delay and the correlation of delays with clinicopathological features are currently underway. These findings will provide a basis for policy makers to improve community education and access to cancer services.

PROGNOSTIC FACTORS IN MALE BREAST CANCER: A RETROSPECTIVE NATIONWIDE STUDY IN SOUTH KOREA BY THE SMARTSHIP GROUP

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Background: We investigated the characteristics of Male breast cancer (MBC) in this nationwide retrospective cohort study and evaluated the prognostic factors related to outcomes.

Methods: Between 2005 to 2018, MBC patients were identified from the National health insurance service database of Korea. We used the new claim code of C50 among the International Classification of Diseases-10 (ICD-10) diagnosis code, and data was refined by excluding subjects if the claim was non-existent within 6 months of the first claim or when the cancer-specific code of V193 was lacking. Medical, surgical, and radiotherapy treatment records within one year of the first claim were also reviewed. Deaths attributed to all causes were enumerated for the evaluation of overall survival.

Result: From 2005 to 2016, a total of 838 newly diagnosed MBC patients were identified and included in the study with a median follow-up of 1,769 days. The annual incidence was assessed for each year and a gradually increasing trend. The age group of 70-74 years had the highest incidence. The 5-year survival probability was 0.737 (Hazard ratio: 2.454, 95% Confidence interval: 1.909-3.154). Age over 65 years, low income, lack of surgical intervention, no tamoxifen use, and more than two coexisting comorbidities were related to a worse outcome.

Conclusions: The incidence of MBC has increased over time, and the peak incidence of MBC is noted at an age >70 years. Age over 65 years, the presence of more than two comorbidities, undertreatment for the tumor including no surgery and no tamoxifen use were related to poor prognosis.

CLINICOPATHOLOGIC COMPARISON, ASSOCIATION FACTORS AND SURVIVAL OUTCOMES OF TRIPLE NEGATIVE AND NON TRIPLE NEGATIVE BREAST CANCERS OF PATIENTS IN CHONG HUA HOSPITAL IN JANUARY 1 TO DECEMBER 31, 2017

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Background: Triple negative breast cancer (TNBC) is a subtype of breast cancer with characteristic biological and pathological features. Among the subgroups of breast cancer, TNBC is particularly feared because it is associated with poor outcome. However, clinical data on TNBC in Asian population are limited. The present study was aimed to find the prevalence of TNBCs and to compare various clinicopathological features of TNBC with non-TNBC patients in Chong Hua Hospital, Cebu City, Philippines.

Methods: Clinical and pathological data of 169 breast cancer patients who underwent curative surgery at Chong Hua Hospital, Cebu, Philippines from January 1, 2017 to December 31, 2017 were analyzed statistically using the Mann Whitney U test, Two Sample t-Test and Binary Logistic Regression and Minitab for the two groups.

Result: Of 169 cases, 40 (23.67%) had TNBC and 129 (76.33%) had non-TNBC. Data analysis revealed significant difference in age, age at first term pregnancy, parity and tumor size. Breastfeeding, oral contraceptive use and body mass index were recorded more in the TNBC group, however these were statistically insignificant.

Conclusions: For the year 2017, the TNBC and Non-TNBC groups differ significantly when it comes to age, age at first term pregnancy, parity and tumor size. However, in terms of age at menarche, the two groups do not differ significantly. For the studied population, age, breastfeeding, use of oral contraceptives and family history of cancer are significant predictors. TNBC becomes less likely as the age increases and breastfeeding but likely with oral contraceptive use and family history of cancer.

CORRELATION OF BODY MASS INDEX WITH TUMOR CHARACTERISTICS AND MOLECULAR SUBTYPE OF BREAST CANCER CASES IN YOGYAKARTA, INDONESIA

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Background: Body mass index (BMI) has been observed to associate with the risk of development and severity of breast cancer (BC) in Western population. It is uncertain whether the association applies to Indonesian population that has different molecular subtype distribution and obesity prevalence.

Methods: This cross-sectional study involved 122 BC patients who were treated in our center in 2019. Information about BMI, tumor size, metastatic status and immunohistochemistry markers (ER, PR, HER2) were collected at baseline. BMI ≥ 25 was categorized as obese. BC subtype was categorized as luminal A, luminal B, HER2-enriched and triple negative.

Result: Most of subjects were with non-metastatic disease (68%), diagnosed with T4 (41%) and were of luminal A tumors (57%). The mean BMI was 24.1 kg/m^2 and were similar among all BC subtypes ($p=0.258$), with obesity presents in 43.4% subjects. Median of age was 51 years (range, 32-78) with even obesity distribution in younger and older subjects ($p=0.115$). HER2-enriched tumor was more common in non-obese than in obese cases (72.7%; $p=0.033$). BMI was negatively correlated with tumor size ($r=-0.099$; $p=0.277$), metastatic status ($r=-0.088$; $p=0.392$) and subtype ($r=-0.061$; $p=0.502$).

Conclusions: Our study observed a similar distribution of BMI status among BC subtypes. HER2-enriched was more prevalent in non-obese individuals, suggesting that lower BMI might not protect against HER2-enriched BC. Although significance was not reached, we observed negative correlations between BMI with tumor size, metastatic status and subtype. This finding indicates the possibility of other factors that play a role in the local BC development.

SURVIVAL IMPROVEMENT OVER TIME IN KOREAN BREAST CANCER PATIENTS; A LARGE SCALE, SINGLE-CENTER STUDY

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Background: The aim of this study was to evaluate chronological changes in survival of Korean breast cancer patients over recent 13 years. We also sought to investigate the factors that may have influenced the changes in survival rate.

Methods: We retrospectively analyzed 17,776 breast cancer patients who were treated at Asan Medical Center between January 2000 and December 2013. Patient information was collected from the Asan database, including age at diagnosis, clinical manifestation, pathology report, types of treatment and modality, types of recurrence, and follow-up period. We classified the patients into two cohorts according to the year of their surgery (P1, 2000-2007 and P2, 2008-2013) and compared survival and recurrence between the two cohorts.

Result: We observed that patients treated more recently had better survival outcomes. The 5-year breast cancer-specific survival increase from 94.0% in P1 to 96.6% in P2 ($p < 0.001$) and 5-year disease free survival increase from 87.9% in P1 to 91.2% in P2 ($p < 0.001$). When we analyzed by type of recurrence only distant metastasis free survival increased to a significant degree. In subgroup analysis by intrinsic subtypes of breast cancer, the survival rates were improved in all subtypes except for triple negative breast cancer and the improvement was more prominent in subtypes with overexpressed human epidermal growth factor receptor 2.

Conclusions: The study showed improvement in the breast cancer survival over the succeeding years, which is in consistent with the advancement in systemic therapy.

STEREOTACTIC ABLATIVE RADIATION THERAPY (SART) COULD INDUCE ABSCOPAL EFFECT IN MOUSE BREAST CANCER MODEL THROUGH IMMUNOLOGICAL MECHANISM

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Background: The abscopal effect is the ability of local radiation to cause systemic antitumor effects. This study investigates the immunological mechanism of local radiation therapy inducing the abscopal effect in multi-tumor metastatic breast cancer mouse model.

Methods: A multi-tumor mouse breast cancer model was produced by subcutaneous implantation of TUBO and/or TUBO-P2J cells on the flanks of BALB/c mice. Tumors were locally irradiated with a single dose of 15 Gy (stereotactic ablative radiation therapy; SART) or 10 fractions of 4 Gy/fraction (conventional fractionated radiation therapy; CFRT). The immune cell populations in tumor tissues and lymph nodes were evaluated with flow cytometry, and tumor-specific T cells were measured with ELISpot.

Result: SART successfully induced regression of the irradiated tumor mass and the non-irradiated distant TUBO tumor. On the other hand, SART could not regulate the growth of non-irradiated distant TUBO-P2J tumor. CFRT also induced regression of the primary irradiated tumor mass at a similar level to SART, while its inhibition ratio of the non-irradiated TUBO tumor being inferior to that of SART. In the primary and secondary TUBO tumors, SART significantly increased the number of tumor specific CD8+ T cells while CFRT could not. Furthermore, SART also increased the amount of interferon-γ in splenocytes and primary tumor.

Conclusions: In this study, we identified that SART induced the abscopal effect on radiosensitive tumors, and the therapeutic benefits of SART were highly dependent on CD8+ T cells. Further studies might be required to clarify our results.

PI3Kγδ INHIBITOR COMBINED WITH RADIATION ENHANCES THE ANTITUMOR IMMUNE EFFECT OF PD-1 BLOCKADE IN SYNGENIC MURINE BREAST CANCER MODEL AND HUMANIZED PATIENT-DERIVED XENOGRAFT MODEL

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Background: Breast cancer is viewed as immunologically 'cold', responding poorly to immune checkpoint blockade (ICB) alone. We hypothesized that combined use of RT and a PI3Kγδ inhibitor might enhance the efficacy of ICB.

Methods: Murine breast cancer cells (4T1) were grown in BALB/c mice, and tumors were irradiated (24Gy/3Fx). A PD-1 blockade and a PI3Kγδ inhibitor were administered every other day for 2 weeks. Tumors from humanized patient-derived xenograft (PDX) mouse model was sequenced to identify immune-related pathways and to profile infiltrated immune cells. In TCGA pan-cancer cohort, a deconvolution algorithm was used to profile immune cellular distributions according to PIK3C and PIK3CD expression.

Result: In the immune-competent syngenic 4T1 murine tumor model, PD-1 blockade alone led to tumor hyperprogression, whereas a three-pronged strategy of PI3Kγδ inhibitor, RT, and PD-1 blockade significantly delayed primary tumor growth, boosted abscopal effect, and improved animal survival by comparison. Triple combination therapy significantly lowered proportions of Treg, MDSCs, and M2 TAMs, achieving dramatic gains in splenic, nodal, and tumor CD8+ T-cell populations. Humanized PDX showed that triple combination was associated with low activity of immune-suppressive pathways, increased CD8+ T-cell, and decreased M2 macrophage. In the TCGA cohort, high Treg/CD8+T-cell and M2/M1 TAM ratios were shown in high PIK3CG or PIK3CD gene expression groups which demonstrated worse overall survival.

Conclusions: The PI3Kγ and PI3Kδ are clinically relevant targets in an immunosuppressive TME. Combining PI3Kγδ inhibitor, RT, and PD-1 blockade may thus be a viable approach to overcome the therapeutic resistance of immunologically cold tumors such as breast cancer.

PREVIOUS ANTI-ESTROGEN TREATMENT MAY AFFECT CAPECITABINE RESPONSE IN HORMONE RECEPTOR POSITIVE METASTATIC BREAST CANCER AFTER ANTHRACYCLINE AND TAXANE FAILURE

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Background: Capecitabine is one of a treatment option in anthracycline and taxane pre-treated metastatic breast cancer (MBC) patients. We analyzed the clinicopathologic differences between durable (partial response or stable disease for more than 10 cycles of chemotherapy) and poor responder during capecitabine treatment. Furthermore, miRNA microarray of durable responders was analyzed and compared with cell line miRNA expression profile MCF-7, tamoxifen-resistant MCF-7 [MCF-TAM] cell line treated with 5-FU.

Methods: Between January 2006 to December 2016, 66 patients treated with capecitabine after anthracycline and taxane failure were enrolled. Twenty-three archival tumor tissues (11 durables and 12 poor responders, each) were collected and went through nCounter miRNA expression assay. MCF-7, MCF-TAM cell line was treated with tamoxifen or 5-FU for proliferation assay.

Result: HR positive patients who received anti-estrogen before capecitabine showed longer PFS (median 7.7 vs. 4.03 months, $p=0.006$). MCF-7 treated with tamoxifen, 5-FU showed decreased proliferation compared to 5-FU treated MCF-7. There was significant difference of miR-579-3p expression between durable and poor responders (log2FC -3.02, $p=0.004$). Tamoxifen-treated MCF-7 cell line showed upregulation of miR-579-3p compared to MCF-7. Based on miRNA database, authors hypothesized that MDM2 may be target protein of miR-579-3p and planning to perform further analysis.

Conclusions: Anti-estrogen treatment before capecitabine administration was associated to better survival in HR positive MBC. Anti-estrogen potentiated the effect of 5-FU in MCF-7. MiR-579-3p was upregulated in durable responders and tamoxifen treated MCF-7 cell line. Further study is planned to analyze the role of miR-579-3p and its potential target, MDM2 in breast cancer.

EPIGENETICALLY REGULATED MIR-205 MEDIATES NON-CANONICAL TGFβ GENES NETWORK IN TRIPLE NEGATIVE BREAST CANCERS (TNBCS)

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Background: Intratumoral heterogeneity in triple negative breast cancer (TNBC) remains a setback in the therapeutic regime. This characteristic attributes to epithelial-to-mesenchymal transition (EMT) and chemoresistance. Thus, the discovery of EMT driver mechanism is essential. Epigenetic modifiers have been associated with EMT and chemoresistance in cancers. This study intended to unravel epigenetic modifier mechanism and capture regulated signatures in TNBC cell lines.

Methods: SiRNA screening of 58 epigenetic enzymes were assayed in Hs578T. Differentially expressed EMT genes were carried out on Nanostring PanCancer Progression panel in MDA-MB-468 (FEC-sensitive) and Hs578T (FEC-resistant) cell lines. RqPCR were performed to validate significant genes upon SETD1A knockdown (KD). Clonogenic and wound scratch assays were conducted to complement regulation of genes.

Result: The epigenetic screening displayed highest cell death by SETD1A. 247 genes were differentially expressed. Our previous work showed miR-205 dysregulation in TNBC tumors, thus, narrowed down the significant genelists to miR-205 downstream targets. Significant hit genes were shown to be involved in TGFβ signaling pathway. Declined cell proliferation and migration were observed by SETD1A-KD. RqPCR data showed significant increase of miR205 ($p = 0.003$), LRG1 ($p = 0.02$) and reduction of Ki-67 ($p = 0.02$). All TGFβ isoforms showed potent re-expression, however, SMAD1 showed significant reduction ($p = 0.03$).

Conclusions: This preliminary data showed markers attributed to EMT suggesting this proposed mechanism; SETD1A modulates EMT via perturbation of miR-205 then activates non-canonical SMAD-dependent TGFβ signaling in our TNBC cell line model. Further evaluation is warranted to further understand this mechanism in TNBCs.

MOLECULAR PROFILING OF BREAST CANCER LUNG METASTASIS THROUGH PRECLINICAL METASTATIC MODEL

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Background: Metastasis is a major cause of death in breast cancer patients. In particular, lung metastasis is diagnosed in up to 40% breast cancer patients with triple negative disease. Approximately 60-70% of breast cancer patients died with lung metastasis. This study aimed to investigate the change of gene expression pattern of breast cancer cells during lung metastasis.

Methods: Lung metastasis of NOD/SCID mice was induced by injection of luciferase-labeled MDA-MB-231 (MB231-Luc) triple negative breast cancer cells intravenously. Development of metastases was monitored by in vivo bioluminescence imaging. Mice with lung metastases were sacrificed at week 5-6. Metastasized lung tissues were dissociated into single cell suspension. Dissociated cells were cultured and injected intravenously as described above. This process was repeated three times to establish a highly metastatic subline, designated as LM619, for subsequent experiments. Gene expression patterns of MB231-Luc and LM619 cells were investigated by RNA-sequencing.

Result: Tumorsphere formation ability of LM619 cells was significantly higher than MB231-Luc cells. In addition, tumor volume of LM619 was significantly larger than MB231-Luc with more metastatic events in vivo. Differential gene expression analysis of LM619 and MB231-Luc revealed dysregulated tumor suppressor genes, including SCARA3 and CDH19, which may be involved in breast cancer metastasis to lung.

Conclusions: Our study has successfully established a highly metastatic breast cancer subline from preclinical lung metastatic model. Investigation of differential gene expression pattern of parental cells and metastatic cells may be useful in identifying potential novel mechanism on breast cancer metastasis, as well as development of targeted therapies.

THE CLINICAL SIGNIFICANCE AND FUNCTION OF SUSD2 IN HER2 POSITIVE BREAST CANCER

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Background: SUSD2 expression is associated with cancer metastasis in a variety of cancers including breast cancer. However, it is not fully elucidated that the clinical significance and functional role of SUSD2 expression in breast cancer.

Methods: Disease free survival and overall survival were analyzed through the clinical database of the breast cancer center at Samsung Medical Center. Differential gene expression was analyzed by cDNA microarray. Phosphokinase proteins were analyzed by Proteome Profiler Human Kinases Array. Levels of various genes mRNA and protein expression were analyzed real-time PCR and western blotting, respectively. Cell motility was analyzed by transwell chamber assay.

Result: We analyzed 115 EGFR and/or HER2 positive breast cancer patients. EGFR and HER2 positive breast cancer patients have poor disease free survival ($p = 0.011$) and overall survival ($p = 0.004$) compared with EGFR alone. We overexpressed HER2 into EGFR+ breast cancer cells. SUSD2 expression was significantly increased by HER2 overexpression. Although SUSD2 expression did not affect by trastuzumab treatment, neratinib decreased the levels of SUSD2 expression in HER2 positive breast cancer cells. In addition, SUSD2 expression also increased in EGFR and HER2 positive breast cancer patients as well as is associated with poor prognosis. To verify the regulatory mechanism of SUSD2, we observed that the activity of STAT3 increased in EGFR and HER2 positive breast cancer models. HER2-induced SUSD2 expression was decreased by stattic. Finally, we observed that cell invasiveness was increased by SUSD2 overexpression.

Conclusions: SUSD2 expression is regulated by HER2/STAT3 dependent pathway and may be a novel therapeutic target in HER2 positive breast cancer.

BREAST CANCER-DERIVED EXOSOMES MEDIATED CROSSTALK BETWEEN CANCER CELLS AND STROMAL CELLS TO PROMOTE METASTASIS

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Background: Cancer cells communicate with neighbouring stromal cells not only through direct cell-cell interaction, but also through indirect intercellular interaction. Exosomes are nano-sized extracellular vesicles that transport proteins, DNAs, RNAs and miRNAs to promote angiogenesis, cell proliferation, cell invasion and migration. This study aims to elucidate how exosome transfer to stromal cells contributed to cancer metastasis.

Methods: We established a breast cancer cell line (LM571) that prone to develop lung metastasis from MB-231 cells. Changes in protein abundance were compared in exosomes from MB231 and LM571 by liquid chromatography-mass spectrometry (LC-MS/MS) analysis. Purity of the exosomes was detected by western blot with the presence of exosomal markers (Alix and CD63). The expression of Arg-1 was used to determine the polarization of M2 macrophage by immunofluorescence staining and real-time PCR. Metastatic animal model was used to evaluate the metastasis.

Result: Results showed that more than 50 proteins were upregulated in LM571 cells, with a 3-fold cut-off, in which S100A11 is one of the top upregulated proteins associated with metastasis in breast cancer. Cells treated with exosome inhibitor (GW4689) inhibited cell proliferation in both MB-231 and LM571 cells. Cell proliferation was reduced in cells transfected with S100A11 siRNA. Interestingly, isolated exosomes co-cultured with undifferentiated macrophages increased Arg-1 expression (M2 marker). In animal model, cancer cells co-injected with exosomes results in larger tumor volume and increased in lung metastasis.

Conclusions: This study demonstrated that exosomes uptake promoted metastasis by increasing M2 phenotype, and blocking of S100A11 may offer a new treatment options for advanced breast cancer.

ESTIMATED OF BREAST CANCER DISTANT METASTASIS USING FATTY ACID METABOLISM AND OXIDATIVE PHOSPHORYLATION FUNCTION

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Background: The function of genes expressed in breast cancer is involved the behavior of cancer. The aim of this study was to investigate the fatty acid metabolism and oxidative phosphorylation functions between the initial metastatic status of breast cancer and the genetic differential event from the large cohorts.

Methods: 96 patients' data of breast cancer was obtained from TCG, the samples were classified into metastasis (M1) and non-metastasis group (M0). Differential expressed gene (DEG) assay was performed by DESeq2 and visualized by ggplot2 in R. The trimming was performed by differential expressed gene ratio and P-value. The gene module separation was calculated by GSEA. Modules were selected by functions related the breast cancer metastasis. Hub gene identification was performed with the selected modules by String with edge count.

Result: 1,503 genes were selected by genetic differential expression value and p-value (differential ratio over ± 2, $p < 0.05$). Fatty acid metabolism and oxidative phosphorylation function were selected as metastasis relate function. 73 genes were identified to be involved in the fatty acid metabolism function and 101 genes for oxidative phosphorylation. Total 15 genes were identified belong to the both functions. The fold change/edge count of DLST, SUCLG1, FH, and MDH1 as hub gene were -2.05/9, 2.06/9, 2.02/8, and -3.04/8, respectively.

Conclusions: Our results demonstrated that the implicated fatty acid metabolism and oxidative phosphorylation functions were related to the initial metastatic status of breast cancer. Further studies on the mechanism of breast cancer metastasis through functional gene modules and hub gene expression should be conducted.

BRUTON'S AGAMMAGLOBULINEMIA TYROSINE KINASE (BTK) REGULATES TPA-INDUCED BREAST CANCER CELL METASTASIS VIA PLCγ2/PKCβ/NF-κB/AP-1 DEPENDENT MATRIX METALLOPROTEINASE-9 ACTIVATION

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Background: Bruton's agammaglobulinemia tyrosine kinase (BTK) is an important cytoplasmic tyrosine kinase involved in B-lymphocyte development, differentiation, and signaling. Activated protein kinase C (PKC), in turn, induces the activation of mitogen-activated protein kinase (MAPK) signaling, which promotes cell proliferation, viability, apoptosis, and metastasis. This effect is associated with nuclear factor-kappa B (NF-κB) activation, suggesting an anti-metastatic effect of BTK inhibitors on MCF-7 cells that leads to the downregulation of matrix metalloproteinase (MMP)-9 expression. However, the effect of BTK on breast cancer metastasis is unknown.

Methods: In this study, the anti-metastatic activity of BTK inhibitors was examined in MCF-7 cells focusing on MMP-9 expression in 12-O-tetradecanoylphorbol-13-acetate (TPA)-stimulated MCF-7 cells. The expression and activity of MMP-9 in MCF-7 cells were investigated using real-time polymerase chain reaction analysis, western blotting, and zymography. Cell invasion and migration were investigated using the Matrigel invasion and cell migration assays.

Result: BTK inhibitors (ibrutinib [10 μM], CNX-774 [10 μM]) significantly attenuated TPA-induced cell invasion and migration in MCF-7 cells and inhibited the activation of the phospholipase Cγ2/PKCβ signaling pathways. In addition, small interfering RNA specific for BTK suppressed MMP-9 expression and cell metastasis. Collectively, our results indicated that BTK suppressed TPA-induced MMP-9 expression and cell invasion/migration by activating the MAPK or IκB kinase/NF-κB/activator protein-1 pathway.

Conclusions: Our results clarify the mechanism of action of BTK in cancer cell metastasis by regulating MMP-9 expression in MCF-7 cells.

NATURAL KILLER CELLS DOWNREGULATE UROKINASE-TYPE PLASMINOGEN ACTIVATOR LEADING TO INHIBITION OF BREAST CELL INVASION

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Background: Triple negative breast cancer (TNBC) is one of the most aggressive types of breast cancer, and there is no effective therapeutic target to date. Natural killer (NK) cells are functionally diverse lymphocytes that recognize and kill cancer cells. Although it is clear that NK cells exert antitumor activity in the tumor microenvironment, their role in the aggressive progression of TNBC has not been elucidated in detail.

Methods: We investigated the effect of NK cells on MDA-MB-231 TNBC cells using an indirect co-culture system.

Result: The invasive phenotype of MDA-MB-231 cells was significantly inhibited by co-culture with NK cells. Notably, the expression of urokinase-type plasminogen activator (uPA) was markedly reduced by NK cells. Cytokine array analysis showed that the levels of interleukin (IL)-10, IL-6, IL-8, CC motif ligand (CCL)5, and CCL2 were increased in conditioned media from the cocultured cells. Among these cytokines, IL-6 played a crucial role in the NK cell- induced uPA downregulation and inhibition of the invasive phenotype of MDA-MB-231 cells and Hs578T cells. We analyzed the Gene Expression Profiling Interactive Analysis database for correlations between IL-6 and uPA with the overall survival of breast cancer patients. The Kaplan-Meier survival analysis revealed that a low IL-6/uPA ratio was associated with the poor survival of breast cancer patients, suggesting it as an important factor for determining the overall survival of breast cancer patients.

Conclusions: Taken together, our findings demonstrate that NK cells in the tumor microenvironment inhibit the invasiveness of TNBC cells through the IL-6-mediated inhibition of uPA.

MOLECULAR CHARACTERIZATION OF TRIPLE NEGATIVE BREAST CANCER VIA TARGETED NEXT-GENERATION SEQUENCING

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Background: Triple negative breast cancer presents aggressive clinical course and poor prognosis. However, specific treatment for TNBC other than cytotoxic chemotherapy is almost lacking. We aimed to find molecular targets of TNBC using targeted next-generation sequencing.

Methods: We retrospectively reviewed electronic medical records of the patients with TNBC who underwent surgery between 2018 and 2020 at our institution. We collected available next-generation sequencing data. Patients with nodal disease without primary breast lesion, and locally recurrent cases were excluded.

Result: A total of 50 patients with TNBC were enrolled. The most frequently mutated gene was TP53 (n = 32/50; 64%), followed by PIK3CA (n = 7; 14%), BRCA1 (n = 7; 14%), and PTEN (n = 6; 12%). There were amplifications of KRAS (n = 3; 6%), MYC (n = 3; 6%), and FGFR family genes (n = 3; 6%). There was no identifiable molecular alteration in 4 patients.

Conclusions: Targetable molecular alterations of TNBC were frequently found in PI3K-AKT-mTOR pathway and BRCA genes. Drugs targeting these alterations seem promising in the management of TNBC.

HYPERTHERMIA DOWNREGULATES ABCG2 TRANSPORTER EXPRESSION VIA ROS PRODUCTION AND ENHANCES THE CYTOTOXICITY OF DOXORUBICIN

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Background: Hyperthermia (HT) is a non-invasive cancer therapy and often used with radiation therapy and chemotherapy. Compared to 37C, 42C is mild heat stress for cells and produces Reactive oxygen species (ROS) from mitochondria. We have previously reported that ATP-binding cassette sub-family G member 2 (ABCG2) expression was suppressed by increasing mitochondrial ROS, and induction of the cancer specific porphyrin accumulation. ABCG2 is a transporter of doxorubicin (DOX), therefore we hypothesized that synergistic effect of HT and chemotherapy would be induced by down-regulation of ABCG2 expression via intracellular ROS increase.

Methods: The human breast cancer cell line, MDA-MB-453 and MCF-7 were incubated at 37°C or 42°C for 1 hour. Intracellular ROS generation after HT was detected by electron spin resonance (ESR). 24 hours after HT, cells were incubated in medium containing 0.1, 1 and 10 μM DOX for 24 hours. Cell viability was measured using the water-soluble tetrazolium-8 based colorimetric assay. ABCG2 expression in whole cells was analyzed by Western blotting.

Result: ESR signal peak with HT became high as compared to without HT, indicating intracellular ROS level was increased by HT. Cell viability and ABCG2 expression were decreased by DOX exposure and by HT. The enhancement of HT effect by DOX is considered to be result of down-regulation of ABCG2 expression by ROS.

Conclusions: HT involved intracellular ROS production and down-regulated the expression of ABCG2 protein. HT also enhanced the cell damage by DOX. Cell death by DOX was enhanced by combination with HT, possibly via intracellular ROS generation, and was suppressed by addicting antioxidant.

CLINICOPATHOLOGICAL SIGNIFICANCE OF LATS2 IN BREAST CARCINOMAS

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Background: Large tumor suppressor kinase 2 (LATS2) is a core component in the Hippo signaling pathway, aberrant expression of the LATS2 has been observed in various cancers, including those of the breast. However, little is known about its role in carcinogenesis. This study aimed to investigate the potential prognostic value of LATS2 in breast cancer.

Methods: Formalin-fixed, paraffin-embedded tissues from a cohort of 445 patients were used. The LATS2 expression in patients with breast cancer was analyzed by immunohistochemistry (IHC) in tissue microarrays and correlated with clinicopathological characteristics to determine its prognostic implications.

Result: High LATS2 expression was found in 7.6% (34/445) patients. High LATS2 expression was significantly associated with high pT stage ($p = 0.008$), HER2 expression ($p = 0.012$), high Ki-67 proliferating index ($p = 0.030$), and high p53 protein expression ($p = 0.038$), but there is no statistical significance for the other clinicopathological parameters. In intrinsic subtype analyses, LATS2 expression correlated with luminal B, and HER2 types ($p = 0.055$). Univariate survival analysis using the Kaplan-Meier method showed that LATS2 expression were not associated with disease-free survival (DFS, $p = 0.752$) or overall survival (OS, $p = 0.574$).

Conclusions: Our findings collectively demonstrate that breast tumors with high LATS2 expression may have poor prognosis, especially HER2 positive type. These findings suggest that LATS2 may need to be analyzed to obtain complete prognostic information.

TUMOR MUTATION BURDEN, IMMUNE CHECKPOINT CROSSTALK AND RADIOSENSITIVITY IN SINGLE-CELL RNA SEQUENCING DATA OF BREAST CANCER

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Background: We analyzed transcriptional and mutational profile mainly focused on tumor mutation burden (TMB), immune checkpoint crosstalk, and radiosensitivity using scRNA-seq data derived from breast cancer and immune cells.

Methods: ScRNA-seq transcriptome data were acquired from the GEO database (GSE75688). The radiosensitivity index (RSI) was used to evaluate radiosensitivity of each cell. CD274 mRNA expression was used to surrogate PD-L1 expression status. Interactions between tumor and immune cells were identified. TMB and mutational signatures were compared between radiosensitive (RS) and radioresistant (RR) tumor cells.

Result: Most RR cells were a basal subtype and showed the higher rate of PD-L1 positivity. The patients with TNBC or HER2 subtype showed increased number of immune checkpoint ligand-receptor interactions between tumor and immune cells and PD-L1 ligand-receptor interactions between tumor cells and T cells were differentially increased in patients with the HER2 subtype compared to patients with the luminal subtype. Meanwhile, CTLA-4 ligand-receptor interactions were increased in patients with the TNBC subtype. TMB was significantly higher in RR cells than RS cells. Mutational signature related with tumors having microsatellite instability (MSI) and altered NRF2 pathway was observed in RR cells.

Conclusions: RR cells exhibited a basal subtype, high PD-L1 expression, and high TMB with mutational signature found in tumors having MSI. Differential crosstalk between tumor and immune cells was associated with subtypes of breast cancer. These findings could be useful to identify potential biomarker(s) and optimal combination strategies of immune checkpoint blockades and radiation therapy in the management of breast cancer.

Poster Presentation

TRIPLE NEGATIVE BREAST CANCER ARISING FROM BREAST ADENOMYOEPITHELIOMA

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Background: Breast adenomyoepithelioma is an uncommon tumor. It is characterized by a biphasic proliferation of myoepithelial cells around small epithelium-lined spaces. We aim to describe the features of breast adenomyoepitheliomas and triple negative cancer arising from them.

Methods: Cases of breast adenomyoepitheliomas diagnosed at the Department of Anatomical Pathology Singapore General Hospital from January 2000 to December 2019 were derived from the departmental records. Retrospective analysis of clinicopathological features and outcomes of these tumors were performed.

Result: Eleven cases of breast adenomyoepitheliomas were identified. The majority of patients presented with a palpable mass (n = 8, 72.7%). Histologically, 2 cases (18.2%) were malignant adenomyoepitheliomas, characterized by presence of necrosis, infiltrative borders and high mitotic rates. We could arrive at the diagnosis of adenomyoepithelioma on core biopsy specimens in only 2 cases (18.2%). Nearly half of the benign adenomyoepitheliomas (n = 4, 44%) were associated with synchronous ipsilateral breast malignancy. Four patients (36.6%) had mastectomy, 3 (27.3%) underwent wide excision, 3 (27.3%) had excision biopsy with positive margins and the remaining 1 patient (0.9%) declined surgery. Half of the patients who had surgery underwent sentinel lymph node biopsy (n = 5, 50%) and none of them revealed nodal metastasis. At a median follow up of 52.17 months, there was no locoregional recurrence but there was a case of systemic recurrence in a triple negative cancer arising from breast adenomyoepitheliomas at 51 months following treatment.

Conclusions: Breast adenomyoepitheliomas are mostly benign, but malignant transformation into triple negative cancer can occur leading to an aggressive clinical path.

REGULATORY MECHANISM OF NRH: QUINONE OXIDOREDUCTASE 2 (NQO2) IN AGGRESSIVENESS OF BREAST CANCER

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Background: NQO2 is reported to have two functions; detoxification of chemical stressors and oxidation of NRH and NAD(P)H, providing cellular protection against toxic agents in cancer cells. However, it has been associated with tumor progression, aggressiveness, therapeutic resistance, and poor prognosis of patients. The aim of this study is to investigate the biological activity of NQO2 related to tumor aggressiveness in breast cancer.

Methods: 10 different human breast cancer cell lines were used to select final cell lines that express NQO2. 4 final cell lines were chosen which express high levels of the protein of interest. The levels of NQO2 mRNA and protein were assessed by qRT-PCR and western blot. The knockdown of NQO2 was induced by using siRNA. Together, the relationship between NQO2 expression and cancer cell aggressiveness was evaluated by performing MTT assay, migration assay, invasion assay and proliferation assay.

Result: The levels of NQO2 mRNA and protein in ZR75-1, SK-BR-3, BT-20 and Hs578T cells were highest among 10 breast cancer cells. Migration rate of BT-20 and Hs578T with siRNA transfection deceased to 6.3% and 8.3% from 20.55% and 27.12% respectively. NQO2 knockdown in BT-20 and Hs578T cells resulted in a significant reduction in their migration, invasion and proliferation ability.

Conclusions: These data indicated that NQO2 has a functional role in the aggressive behaviours of breast cancer cells in vitro. Further studies will be needed to understand why each subtype has different treatment response and prognosis depending on the existence of NQO2.

PHENOTYPIC ANALYSIS OF PATIENT-DERIVED BREAST CANCER CELLS GROWN IN VARIOUS CULTURE MEDIUM USING FLOW CYTOMETRY

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Background: Immunophenotyping is a useful tool for diagnostic and therapeutic assessment of heterogenous breast cancer cells that depend on external factors and growth conditions. We performed flow cytometry to investigate the phenotypes of patient-derived breast cancer cells (PDBCCs) grown in different culture media.

Methods: PDBCCs were harvested from fresh surgical specimens of luminal A breast tumors. PDBCCs were grown in various culture media under monolayer conditions. Immunophenotypic analysis of PDBCCs was performed by flow cytometry.

Result: Removal of A83-01 (a potent inhibitor of TGF-β type I receptor superfamily activin-like kinase ALK5 and its relatives ALK4 and ALK7) or EGF resulted in a relative increase in mature luminal cells with EpCAM+CD24+ and EpCAM+CD49f-, whereas removal of R-spondin decreased mature luminal phenotypes. Bipotent potential cells with EpCAM+MUC1- was increased by removal of noggin. A83-01 removal caused a decrease in breast cancer stem cells with CD44high/+CD24-. Senescent cells with high β-galactosidase activity was observed in A83-01 or FGF7/10 removal.

Conclusions: Our data demonstrated an important interdependence between TGF-β-, EGF-, or R-spondin-mediated pathways and PDBCC phenotypes. Future studies to explore the specific molecular mechanisms underlying these observations may provide new molecular targets for the development of therapies for heterogenous breast cancer.

COMBINATION OF TUBACIN AND DULOXETINE INDUCES CELL DEATH BY DOWNREGULATION OF CLASPIN IN BREAST CANCER CELLS

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Background: Drug combinations with a synergistic effect are attractive treatment for cancer therapy. Tubacin is a small molecule selectively targeting histone deacetylase 6 (HDAC6), one of the cancer therapeutic target proteins. Duloxetine is a dopamine re-uptake blocker approved by the FDA. However, the dual effect of tubacin and duloxetine in breast cancer cells has not been investigated until now.

Methods: The anticancer effect of tubacin and duloxetine in breast cancer cells, T-47D and MDA-MB-231, was evaluated using Annexin V staining. To identify the related molecules in these effect, we performed the Proteome Profiler Human Apoptosis Array. Protein expression levels were detected by Western blot and the mRNA levels were measured by qRT-PCR. Small interfering RNA (siRNA) was used for suppressing specific gene expression.

Result: In the present study, we showed that the combined treatment of tubacin and duloxetine synergistically induced the cell death in breast cancer cells, T47D and MDA-MB-231. These synergistic effects were associated with reduced claspin protein levels and induced G0/G1 cell cycle arrest. The downregulation of claspin in the cells treated with the drugs induced dephosphorylation of Rb and the downregulation of E2F1 protein levels. Our results indicated that the combined treatment of tubacin and duloxetine induced the cell death by downregulation of claspin through Rb/E2F1 signalling pathway.

Conclusions: The combination of tubacin and duloxetine induces synergistic anticancer effects by inhibiting claspin through Rb/E2F1 signallig pathway in human breast cancer cells. Based on these findings, tubacin and duloxetine may have potential as a combination therapy in breast cancer.

PI3K INHIBITORS MIGHT BE ABLE TO RESTORED THE EXPRESSION OF ER IN ENDOCRINE THERAPY RESISTANT CELL LINES

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Background: The therapeutic effects of PI3K-mTOR inhibitors have been clarified in clinical trials for ER-positive MBC. However, the effects of these drugs on ER signal pathways have not been fully elucidated. We investigated the changes in the expression and functions of ER when endocrine-resistant cell lines, were treated with PI3K-mTOR inhibitors.

Methods: Long-term estrogen deprivation-resistant (EDR) cell lines and fulvestrant-resistant cell lines (MFR) were established from MCF-7 cells in our previous studies. We used buparlisib (pan-class1 PI3K inhibitor) and alpelisib (α-specific PI3K inhibitor) as PI3K inhibitors and everolimus as an mTOR inhibitor. Tamoxifen and fulvestrant were used in anti-estrogen therapy. The procedure to examine histone modifications was CHIP-qtPCR analysis.

Result: EDR-1, -2 and MFR were treated with the PI3K-TOR inhibitors for 24h. There were no changes in ER expression and ER activity on EDR-1 and MFR, interestingly, ER expression and activity in EDR-2 increased after the addition of PI3K-mTOR inhibitors. Next, using PI3K-mTOR inhibitors, each drug resistant cell lines were established from EDR-2. EDR-2 which showed re-expression of ER on adding the PI3K inhibitors, showed cell growth-inhibitory effects with the addition of anti-estrogen agents. Previously, we reported that epigenetic regulation contributes to ER expression in EDR-2. Therefore, we investigated the possibility that epigenetic regulation could contribute to the mechanism of ER re-expression when PI3K inhibitors were used in EDR-2. It was revealed that the change of H3K27me3, correlated with the expression of ER.

Conclusions: PI3K inhibitor could restore the expression of ER and sensitivity to anti-estrogen drugs in EDR cell line in which ER expression was lost during acquired resistant period. This restoration might be due to a histone modification.

COMPARISON OF GENOMIC ALTERATIONS BETWEEN PRIMARY BREAST CANCER AND LOCAL RECURRENCE AFTER SURGERY

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Background: Advancement in sequencing technique and targeted therapy based on genomic information, to identify targetable genomic abnormalities is becoming more common. However, it remains challenging to optimize treatment for the patients with second breast malignancies after receiving treatment of primary cancers. We assessed genomic properties between primary and recurrent tumors of ipsilateral breast or chest wall after curative resection.

Methods: We reviewed the records of patients with invasive breast cancer underwent operations for both of primary and relapsed tumor from 2002 to 2015 at the SNUH. We performed a targeted NGS assay on 40 FFPE samples both of primary breast cancer and matched recurrent tumor by using a multi gene panel consisted of 121-breast cancer related genes.

Result: Genomic alterations showed highly concordant between paired samples, regardless of clinicopathological manifestation known as factors impacting on recurrent tumor attributes such as the interval to relapse, change of molecular subtype and therapeutic interventions. The analysis based on targeted exome sequencing results revealed that most of primary tumors and matched local recurrences clustered together and had strong positive linear correlation. We found that 16 out of 20 patients had at least one shared somatic mutation or CNAs between the primary and local recurrence.

Conclusions: We found the molecular characteristics consistently retained in majority of local recurrence within the territory of remnant breast or ipsilateral chest wall, showing small number of changes in driver mutations. Based on this findings, genomic profiling on primary cancer may give useful information when considering target therapy in patients with local recurrence.

IN VITRO CONSTRUCTION OF THREE-DIMENSIONAL TNBC STUDY OF TUMOR DRUG RESISTANCE MECHANISM

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Background: Triple negative breast cancer (TNBC) is prone to drug resistance, which leads to poor prognosis. The efficacy of candidate drugs in vivo and in vivo is far less than that in vitro model. It is necessary to develop in vitro models that can simulate the human body microenvironment.

Methods: MDA-MB-231 3D cell sphereoids culture model based on Matrigel (3D-M) was constructed. The cell proliferation and sensitivities to anticancer drugs were detected by alamar blue assay. The cell uptake of epirubicin was measured by flow cytometry. RT-PCR was used to detect drug-resistance related genes (Bcl-2, MRP2, MRP3, MDR1), apoptosis genes, and adhesion-related genes (FAK, AKT, FOXO3, NF-κβ, Survivin). The expression difference of stem maintenance genes (LEF-1, FN1, SNAIL1/2, SOX9, TGF-β) was analyzed.

Result: MDA-MB-231 cells formed more higher 3D sphereoids with Matrigel, which could promote cell proliferation. 3D-M model showed higher drug resistance. Cellular uptake showed that the positive cell rate and the median fluorescence intensity of endocytosis drugs in 3D were lower than in 2D culture. The percentage of 3D-M positive cells and the median fluorescence intensity were lower with 20% and 75%, respectively, with epirubicin for 30 minutes. 3D-M promote the expression of adhesion receptor genes and drug resistance genes, inhibit apoptotic genes, promote the adhesion of drug resistance genes and stem cell maintenance related genes.

Conclusions: In vitro 3D-M cells could form a tumor-like microtissue and accurately reflect the reactivity of anticancer drugs. The resistance to MDA-MB-231 cells may be related to FAK-AKT pathway and Wnt, Notch, Hedgehog and TGF-β signaling pathways.

EXPERIENCE AND OUTCOME OF BREAST RECONSTRUCTION IN BREAST CANCER PATIENT: A RETROSPECTIVE REVIEW

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Background: Breast cancer is the leading cause of cancer-related deaths in Asia. Oncoplastic breast conservation surgery (OBCS) is increasingly becoming part of routine breast cancer surgical management. The objective of this study was to analyze the outcome of patient that undergoes breast reconstruction in breast cancer.

Methods: Retrospective study involving all patients who had breast cancer who had surgical treatment at Putrajaya Hospital from 2006 to 2017.

Result: A total of 1,171 patients with a mean age of 52 years had undergone surgical treatment for breast cancer. Majority of them where Stage II breast cancer (44.8%). 75.0% of them underwent mastectomy, followed by 20.4% of level 1 OBCS and 4.4% of level 2 OBCS. Level 1 OBCS has been performed majority in clinical staging II (49.8%) and level 2 OBCS in clinical staging IV (37.0%). Locoregional recurrence (LRR) noted lowest in level 1 OBCS (5.9%) followed by mastectomy (9.5%) and level 2 OBCS (15.7%). 5 years survival rate is higher in patient undergo level 1 OBCS (97.1%) compared to mastectomy (95.7%) and Level 2 OBCS (88.2%).

Conclusions: Clinical staging affects the choice of surgery thus the outcome of patient in terms of LRR and death. Previously, the aim of level 2 OBCS in our centre was mainly for wound covering for locally advanced and advanced breast cancer, therefore majority had poorer outcome compared to most of early breast cancer group who had undergone level 1 OBCS or mastectomy.

CLINICAL CHARACTERISTICS AND PROGNOSIS OF PATIENTS WITH IPSILATERAL BREAST TUMOR RECURRENCE AFTER BREAST CONSERVATION THERAPY

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Background: To analyze the clinical features and prognosis of the ipsilateral breast tumor recurrence (IBTR) after breast conserving surgery.

Methods: Retrospectively, 352 women in stages 0-3 who experienced IBTR after breast conservative surgery at Asan Hospital from 1990 to 2013 were reviewed. This study excluded patients with neoadjuvant chemotherapy. Data extraction was performed using the Asan Biomedical Research Environment system to obtain clinical data without personally identifiable information.

Result: All patients had undergone lumpectomy, including 157 cases with additional axillary lymph node dissection. There were 85.5% (301/352) had adjuvant radiotherapy, 50.9% (179/352) underwent adjuvant chemotherapy and 49.4% (174/352) received hormonal therapy. Two hundred thirty-one cases (75.7%) had recurrence in the same quadrant, and 74 cases (24.3%) had elsewhere recurrence. One case recurred at the same quadrant and the other at one time, with 46 unknowns. The median time to IBTR of same quadrant recurrence and elsewhere recurrence groups were 53.3 months and 66.1 months ($p = 0.048$), respectively. Of all cases, the overall 5-year IBTR-overall survival (OS) rate was 81.2%. There were no significant differences in 5-year IBTR-OS (82.8% vs. 76.4%, $p = 0.682$) between same quadrant recurrence and elsewhere recurrence groups. OS-after-IBTR was significantly different according to ILR-free intervals (HR 7.05, 95% CI 0.983-0.997, $p = 0.008$).

Conclusions: The IBTR after breast conserving surgery mainly occurred at the original quadrant. Short IBTR-free-intervals represent a strong prognostic factor for OS. These results may help to select and manage the initial treatment in IBTR breast cancer patients.

REPEATED RESECTION OF FROZEN SECTION POSITIVE MARGIN DURING BREAST CONSERVING SURGERY AND IPSILATERAL BREAST TUMOR RECURRENCE

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Background: The intraoperative cavity shave margin assessment is an effective tool to help patients to avoid secondary surgery. Multiple margin re-excision indicates multifocal aspects of tumor that were not presumed from preoperative imaging, therefore likely to leave residual disease after lumpectomy. Here, we investigated ipsilateral breast tumor recurrence (IBTR) according to additional margin re-excision during a single surgery.

Methods: We identified breast cancer patients who received breast-conserving surgery (BCS) in a single institution (Gangnam Severance Breast Cancer Center, Korea) between January 2011 and December 2014. Pathology reports of resected margins from fresh frozen sections were reviewed. If tumor margins were positive, re-excised margins were sent to frozen sections in a single procedure until margins were tumor-free. Patients who eventually had additional surgery or conversion to total mastectomy were excluded.

Result: The data of 530 patients were retrospectively reviewed. Median follow-up was 71 months (SD: ± 21 months, range: 1-106 months) and nineteen IBTR occurred with an overall rate of 3.6%. Ninety-nine (18.7%) patients had margin involvement at the frozen section and among those 6 patients experienced IBTR (6.1%). Although there was no statistical significance ($p = 0.142$), the percentage of IBTR declined by half in patients who obtained tumor-free margin at once (13/431, 3.0%), demonstrating a trend towards lower IBTR rate. Local recurrence-free survival (LRFS) from Kaplan Meier curves were also comparable between the two groups ($p = 0.249$).

Conclusions: Repeated margin resection during single breast surgery raises concern for the possible residual disease of tumor. Investigation with larger samples is necessary to assure the safety of repeated margin resection regarding IBTR.

POST NEO-ADJUVANT CHEMOTHERAPY RESPONSE, BREAST CONSERVING SURGERY IN LOCALLY ADVANCED BREAST CANCER (PROSE)

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Background: In the developing world, 45% of women with breast cancer (BC) present with locally advanced BC (LABC). Current evidence favouring Breast conserving surgery (BCS) post neo adjuvant chemotherapy (pNACT) in LABC is fraught with bias as responders undergo BCS and poor responders undergo Mastectomy (MRM). We present an audit of surgery in LABC pNACT at our institution.

Methods: We evaluated patients presenting with LABC who underwent surgery at our institution in 2018. Data was collected from electronic medical records.

Result: Of the 1,374 women operated in 2018, 419 were LABC operated pNACT. Of these, 42 (10%) were T2, 149 (35.6%) were T3 and 227 (54.2%) were T4b at presentation; median clinical tumor size was 6 cm pre-NACT and 2 cm post NACT. pNACT clinico-radiological (CRx) complete response (CR) was noted in 29/419 (6.92%) and partial response (PR) in 390/419 (93.1%). Of the partial responders 17/390 (4.35%) had only peau d'orange and no mass on CRx. Overall 198/419 (47.73%) were deemed eligible for BCS pNACT and 113/198 (57.07%) underwent BCS. Of those eligible for BCS, 165/198 (83.33%) were T3/T4 at presentation. 65/198 (32.82%) patients opted for MRM citing lack of oncological safety. CRx and pathological CR at primary concordance was seen in only 24 out of 104 patients (23.07%) who achieved pCR.

Conclusions: Less than 50% of LABC are eligible for BCS pNACT and even among them, concerns on safety of BCS in LABC results in low acceptability of BCS as seen in our practice. We have thus embarked on a non-inferiority trial to compare BCS versus MRM pNACT in women undergoing treatment for LABC. (CTRI/2018/06/020433)

CORRELATION BETWEEN CLINIC-RADIOLOGICAL AND PATHOLOGICAL RESPONSE POST NEOADJUVANT CHEMOTHERAPY IN WOMEN WITH BREAST CANCER: A SINGLE INSTITUTION AUDIT

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Background: In this era of de-escalation of surgery, studies are evaluating the role of omitting surgery in those that achieve clinico-radiological (CRx) complete response (CR). We evaluated the correlation between CRx complete response (CR) in the primary with pathological CR (pCR) post NACT.

Methods: Data was collected from electronic medical records. pCR was defined as absence of invasive tumour and DCIS. CRx was assessed with clinical examination and mammographic findings.

Result: We included 419 were operated pNACT in 2018. Of these, 42 (10%) were T2, 149 (35.6%) were T3 and 227 (54.2%) T4b at presentation, median cT 2 cm post NACT. pNACT CRx CR was noted in 26/419 (6.9%) and partial response (PR) in 390/419 (93.1%) and 17/390 (4.35%) had only peau d'orange and no mass on CRx. Patients received a median of 8 cycles of NACT, with some receiving part of the chemotherapy as NACT and the rest as adjuvant. pCR was noted in 104/419 (24.82%), of which 24/104 (23.07%) had CRx CR and 80/104 (76.92%) had PR on CRx. Of those with pCR, 8/104 (7.7%) had only peau d'orage on CRx. The sensitivity of CRx in predicting PCR accurately was 23.08%, with specificity and NPV of 98.41% and 79.43% respectively. The correlation of CRx CR and pCR was in 22.01%.

Conclusions: The low sensitivity of current clinic radiological evaluation in accurately identify pCR suggests more appropriate response assessment is required. Current literature does not support the role of tumour bed biopsy either , so we will need to offer surgery to confirm pCR.

NIPPLE-SPARING MASTECTOMY FOR BREAST CANCER CLOSE TO THE NIPPLE: A SINGLE INSTITUTIONS 11-YEAR EXPERIENCE

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Background: Nipple-sparing mastectomy (NSM) is the latest advancement for both the treatment and prevention of breast cancer. However, controversy exists regarding the oncologic safety of NSM when the tumor is relatively large or distance between tumor and nipple is close. This study aimed to analyze our 11-year experience using NSM with immediate breast reconstruction in breast cancer.

Methods: Between January 2007 and December 2015, 272 NSMs were performed on 258 women with breast cancer for therapeutic or prophylactic purpose at Pusan National Univ. Hospital. All patients data were collected retrospectively.

Result: The mean patient age was 44 years. The clinical and pathologic mean tumor size was 3.2 cm. The tumor sizes were >2 cm in 115 patients (44.6%) and 122 patients (42.3%), respectively. Based on preoperative imaging, mean distance between tumor and nipple was 2.5 cm. Among 258 tumors, 120 cases (46.5%) and 70 cases (27.1%) with a distances <2 cm and <1 cm respectively were detected. There were 11 patients (4.3%) with locoregional recurrences during the mean follow-up period of 67.4 months. Of these 11 cases, one (0.4%) had local recurrence in the retained NAC, and the others had recurrence in the chest wall or skin. Postoperative complications occurred in 14 patients (5.4%). No additional surgical treatments were needed, and all were resolved with local wound care only.

Conclusions: Without clinical and histologic evidence of nipple involvement, NSM can be an oncologically safe surgical option for breast cancer close to the nipple.

LOCAL INSTITUTION EXPERIENCE OF ENCAPSULATED PAPILLARY CARCINOMA OF THE BREAST AND REVIEW OF THE LITERATURE

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Background: Encapsulated papillary carcinoma of the breast (EPC) is a rare entity of breast cancer that accounts for 0.5-1% of breast cancer. Diagnosing it is often challenging, especially core biopsy and resulting in patients undergoing excision biopsy before definitive surgery. Evidence-based guidelines on the management of EPC are sparse. We would like to further elucidate the clinic-pathological characteristics, treatment and survival outcomes.

Methods: 58 patients were identified, with a median follow up duration of 48 months. Patients demographics data, radiological and clinicopathological characteristics, treatment, adjuvant therapies as well as survival data were analyzed.

Result: Excision biopsy were performed in 13 (27.1%) patients due to inconclusive core biopsy results. 25 (43.1%) cases were pure EPC, 15 (25.9%) were EPC associated with ductal carcinoma *in situ* (DCIS) and 18 (31.0%) cases had concurrent invasive ductal carcinoma (IDC). Common radiological features of EPCs were mixed solid cystic mass lesion with increased vascularity in the solid lesions. Median tumor size was largest in the EPC with IDC group (25 mm). 47 patients (81.0%) had positive estrogen and progesterone receptor (ER/PR) status in all subgroups and only 3 patients were HER2 receptor positive. Lymph node evaluation was performed in 38 patients across all groups. 2 patients (11.1%) from the IDC group had metastatic lymph node involvement. One patient developed loco-regional recurrence and none had distant metastasis. Overall survival was longest in pure EPC group.

Conclusions: EPC is a rare tumor with excellent prognosis. Long term outcome in patients with pure EPC is good and the tumor should be managed in a similar manner to DCIS.

RESECTION MARGIN AFTER SINGLE OR DOUBLE MARKER INSERTION FOR TUMOR LOCALIZATION IN BREAST CANCER PATIENTS UNDERGOING NEOADJUVANT CHEMOTHERAPY

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Background: The insertion of radiopaque marker is helpful for tumor localization and associated with better local control in patients receiving Neoadjuvant chemotherapy (NACT) followed by breast conserving surgery (BCS). We aimed to investigate the pathologic margin status after BCS in patients with single or double marker insertion for tumor localization before NACT.

Methods: We retrospectively reviewed the medical records of 154 patients with marker insertion prior to NACT followed by BCS from January 2016 to September 2019. Under ultrasonography guidance, single or double markers were inserted to localize a breast tumor. Of the 154 patients, 24 patients with marker in daughter nodules were excluded. The incidence of additional resection after frozen biopsy and re-excision after permanent pathologic diagnosis were analyzed between two groups.

Result: After propensity score matching for tumor size before NACT and tumor subtypes, 52 patients with single marker and 26 patients with double marker were analyzed. Additional resection rates after frozen biopsy were not different between two groups (single vs. double markers; 7.7% vs. 19.2%, $p = 0.139$). Rates of re-excision after final pathologic diagnosis were not different as well (0% vs. 3.8%, $p = 0.308$). Among 40 patients with residual invasive tumors, the additional resection rates were not different between two groups (7.4% vs. 23.1%, $p = 0.180$). After median follow-up of 19 months (range, 8-48 months), local recurrence-free survival was not different between two groups (Log-rank $p = 0.423$).

Conclusions: Double marker insertion did not have additional benefits to secure negative margins in breast cancer patients who underwent NACT followed by BCS.

B3 LESION UPGRADE RATES: AN 8 YEAR EXPERIENCE IN A TERTIARY AUSTRALIAN BREAST CENTRE

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Background: B3 lesions, which constitute approximately 7% of breast lesions, are benign but have uncertain malignant potential. Traditionally, they have been managed with surgical excision, but there has been growing interest in less invasive and cost-effective alternatives such as vacuum-assisted excisional biopsy. Determining the rates of malignant upgrade for B3 lesions is important as it may alter approach to management.

Methods: A retrospective study was conducted of women undergoing elective surgical excision for a B3 lesion at a single institution between 2012 and 2019. Data collected included age, radiographic findings, pre-operative needle biopsy diagnosis, and surgical excisional biopsy diagnosis. The pre-operative and post-operative biopsy diagnoses were used to calculate positive predictive values for malignancy.

Result: A total of 331 eligible patients were identified. Atypical ductal hyperplasia (ADH) was associated with the highest upgrade rate (26.76%, n = 71). The next highest rates were in those with papillary lesion with atypia (21.05%, n = 19), followed by atypical epithelial lesions (16.13%, n = 31), classical lobular carcinoma in situ (LCIS) (11.54%, n = 26), and papillary lesion without atypia (6.45%, n = 124). Those with radial scars (n = 53) and mucocele-like lesions (n = 7) had no upgrades.

Conclusions: A multidisciplinary-based approach for vacuum-assisted excisional biopsy, rather than routine surgical excision, could be implemented for low risk lesions such as papillary lesion without atypia, radial scars, and mucocele-like lesions. Surgical excision remains essential for high risk lesions such as ADH, papillary lesion with atypia, atypical epithelial lesions, and classical LCIS.

ENDOSCOPIC ASSISTED BREAST RECONSTRUCTION WITH LD FLAP IN SWINE MODEL

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Background: For breast reconstruction following mastectomy, the most common autologous tissue used is latissimus dorsi (LD) flap. Although it is very useful, it has the shortcoming of leaving a long scar on the donor site. Meanwhile, endoscopic assisted LD flap was reported as a method for minimizing scar. This study is introducing endoscopic assisted breast reconstruction with LD flap in swine model as a useful preliminary experiment that can be conducted before actual clinical application before actual clinical application.

Methods: Between February and March 2019, four 3-month-old pigs were used in the experiment that combined bilateral mastectomy model, LD model in each individual. After creating the mastectomy model by dissecting the pectoralis profundus and subcutaneous plane, the position was changed to decubitus position and sono-guided marking was used to design the LD flap. An additional endoscopic hole was made in the inferior margin of the LD flap and 2 hole approach was used for endoscopic LD flap elevation. Dissected pedicle was left *in situ* and moved to the breast area to create the breast reconstruction swine model.

Result: Eight mastectomy modeling and LD flap elevation were performed on four pigs. Serious complications were not found. However, heat dispersion to the skin flap that became thinner from dissection by endoscopic approach caused a 2nd degree burn in one pig.

Conclusions: Swine model is very useful for pre-clinical experience due to anatomy similar to humans as well. Accordingly, endoscopic-assisted breast reconstruction with LD flap in swine model is considered to be a useful in preliminarily experiments.

PHYLLODES TUMOUR: A SINGLE INSTITUTION RETROSPECTIVE AUDIT IN 433 CASES

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Background: Surgery is the primary treatment of phyllodes tumor of breast and margins are most important risk factor associated with local recurrence. We conducted a retrospective audit of 433 patients treated at our center.

Methods: Women who presented between 1999 and 2017, with phyllodes were included in the analysis. Data was collected from the hospital medical records, telephonic interview and electronic mail.

Result: Of the 433 women included in this study 177 (40.9%) had benign phyllodes, 84 (19.4%) were borderline, 131 (30.3%) were malignant and 41 (9.5%) sarcoma. History of previous excision was noted in 154 (35.6%) of which 104 presented with local recurrence. Of these 209 (48.3%) underwent breast conservation surgery, median pT was 6 cm. At a median follow up of 37.9 months, the 5 year disease free survival (DFS) was 82.9%. On a Multivariate analysis, factors histology (HR 4.1, 95% CI 1.5-10.9, $p = 0.005$) and history of previous excision biopsy (HR 3.39, 95% CI 1.76-6.52, $p < 0.001$) impacted DFS. We analyzed 231 women who presented without any prior excision separately, wherein at a median follow up of 44.1 months DFS was 92.1% (95% CI 92.05-92.15). Also less recurrences were noted in this cohort. {5.6% (13/231) in no excision biopsy v/s 24% (37/154) with previous excision biopsy}

Conclusions: Previous history of excision and histological subtype of phyllodes tumor are factors that have an impact on DFS. Thus it is emphasized the need for appropriate surgical planning and en bloc excision of the phyllodes at presentation.

MAGSEED LOCALIZATION FOR NON-PALPABLE BREAST LESIONS

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Background: The extensive availability of breast cancer screening programs and improvement in diagnostic imaging has led to more frequent detection of clinically occult breast lesions. Currently the most widely adopted approach in excising non-palpable breast lesions is wire-guided localization. The objective of this study was to evaluate the feasibility of using a magnetic seed system for preoperative localization of nonpalpable breast lesions.

Methods: Magseed (Endomagnetics, Cambridge, UK) is composed of proprietary stainless steel and 5 × 1 mm in length. Magseeds were inserted into the centre of the target lesions using local anesthetic and ultrasound or stereotactic guidance. Intraoperative Magseed localization was performed by the surgeon using magnetometer (Sentimag). Accuracy of localization, re-excision rate, surgical margins and re-excision rate were evaluated.

Result: Twenty patients underwent breast occult lesion localization with using Magseed procedure. The mean age of the patients was 46.3 (31-63) years. Non-palpable breast lesions were localized and excised accurately in all cases. Pathologic examination revealed that 10 patients had malignant and 10 patients had benign breast lesions. Surgical margins were clear in all malignant case and none of them needed re-excision.

Conclusions: Early clinical experience suggests that Magseed is a feasible alternative method of breast lesion localization. This technique can be performed in clinics without need for a nuclear medicine department.

THE IMPACT OF ADDITIONAL POSITIVE NODES ON ONCOLOGIC OUTCOME AFTER POSITIVE SENTINEL LYMPH NODE BIOPSY IN PATIENTS WHO WERE CLINICALLY NODE POSITIVE BEFORE RECEIVING NEOADJUVANT CHEMOTHERAPY

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Background: The purpose of this study is to evaluate the effect of additional positive nodes apart from positive sentinel lymph nodes on overall survival and disease free survival.

Methods: We evaluated 147 patients who were clinically node positive and had positive sentinel lymph node biopsy after receiving neoadjuvant chemotherapy between January 2009 and December 2016. Patients who had distant metastasis or uncertain presence of distant metastasis at the time of diagnosis were excluded. Also patients with bilateral breast cancer before surgery were excluded because the TNM staging may differ depending on sides. Patients were divided into two groups; patients without additional lymph node metastasis apart from positive sentinel lymph nodes were placed in Group 1, and patients who had additional lymph node metastasis were placed in Group 2. We compared the overall survival, disease free survival and distant metastasis free survival between the two groups.

Result: Group 2 had longer disease free survival ($p = 0.02$) but overall survival was not significantly better ($p = 0.27$). Distant metastasis free survival was also significantly better in Group 2 ($p = 0.03$).

Conclusions: The presence of additional lymph node metastasis may not influence overall survival but did influence disease free survival and distant metastasis free survival. It is yet too early to de-escalate axillary surgery in patients with positive sentinel lymph nodes after neoadjuvant chemotherapy. All treatment options including axillary lymph node dissection should continue to be performed to patients who were clinically node positive before neoadjuvant chemotherapy and had positive sentinel lymph node biopsy to ensure local control.

DEVISING A NEW SURGICAL PROCEDURE OF BREAST-CONSERVING SURGERY USING ACELLULAR DERMAL MATRIX

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Background: A breast-wide excision may distort the breast shape even with fat saving, and the wider the excision the greater the distortion. To preserve the previous shape of the breast as much as possible and minimize distortion, we have devised a procedure using acellular dermal matrix (ADM), primarily used for implant-based breast reconstruction after nipple- or skin-sparing mastectomy, to adjust the breast shape after breast-conserving surgery.

Methods: Patients who underwent breast-conserving surgery after breast cancer diagnosis by core needle biopsy were included in the study. The patients' clinical TNM stage was 0-III, and the mean age was 49 years. We used two types of ADM, the sheet and pellet. The sheet type ADM, with 3 × 6 cm, required folding, and two sheets were used per patient. The pellet type ADM, with 0.5 × 0.5 cm pellets per bag, was used with two bags per patient. During this surgery, two steps were added to prevent infection.

Result: A total of 200 patients underwent reconstruction using two procedures: used sheet type ADM and pellet type ADM. The mean follow-up period was 1,800 months. The incidence of complications was very rare. Four complications occurred in the breast, including infection, hematoma, and granuloma at the ADM insertion site. The infection rate was lower because of prevention procedures.

Conclusions: Over a follow-up period, low complication rates and good outcomes were observed. These results suggest that using ADM is a safe method for breast-conserving surgery. In addition, ADM insertion via the pellet type resulted in better breast shape and higher patient satisfaction.

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MAGSEED LOCALIZATION FOR NON-PALPABLE BREAST LESIONS

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Background: Novel devices have been developed in recent years to overcome the limitations of wire-guided excision of non-palpable breast lesions. Magseed (seed) is a superparamagnetic seed that can be inserted and visualized under mammogram or ultrasound guidance, which can subsequently be detected using a magnetic detector, Sentimag.

Methods: The aim of this study was to evaluate the safety and the reliability of Magseed. Between June and December 2019, total of eleven Magseeds were inserted to nine patients. All lesions were inserted under ultrasound guidance.

Result: Seven patients had benign non-palpable lesions and the remaining two had Magseeds inserted prior to neoadjuvant therapy. There was a small initial learning curve regarding deployment of Magseed but it was very similar to previous marker insertion. All seeds were able to be detected transcutaneously. There were two patients with 2 seeds inserted to the same breast. The shortest distance between the seeds was 1.5 cm apart and separate signals were detected by Sentimag. Removal of localized lesions was confirmed with ultrasound and specimen radiography.

Conclusions: Our series showed that Magseed is safe to be used in non-palpable breast lesions with no migration observed even on dense Asian breasts. Further studies are needed to evaluate its effectiveness for use in wide local excision and mammogram detected breast lesions.

COMPARISON OF ENDOSCOPIC NIPPLE-SPARING MASTECTOMY AND CONVENTIONAL NIPPLE-SPARING MASTECTOMY FOR BREAST CANCER PATIENTS

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Background: Endoscopic breast surgery for patients with breast cancer was also introduced for its more cosmetic effect; it was initially studied in the field of breast-conserving operation, and more in nipple-sparing mastectomy (NSM) with robotic surgery recently. The main purpose of this study was to investigate the feasibility and safety of endoscopic NSM (E-NSM) in patients with breast cancer by comparing E-NSM and conventional NSM (C-NSM).

Methods: Between May 2017 and October 2020, we retrieved the records of 45 patients who underwent NSM with permanent silicone implant and divided them into 20 patients in the E-NSM group and 25 patients in the C-NSM group, depending on the use of the endoscopic device. We analyzed patients' demographic information, pathology, operative time, and complications.

Result: Based on demographic information and postoperative pathological data, no significant differences were observed between the two groups. Mean preparation time for the surgery was comparable between the two groups. However, the E-NSM group had a significantly longer mean total operative time because the meantime for a total mastectomy was significantly longer in the E-NSM group. The mean length of hospital stay showed no significant difference, and total cases of complications also showed no significant difference.

Conclusions: In conclusion, the results showed that E-NSM was feasible and safe with the more inconspicuous wound for patients with breast cancer. It had a comparable positive resection margin and complication rate to C-NSM, although the operative time was longer.

DETERMINANTS OF PATHOLOGICAL COMPLETE RESPONSE TO NEOADJUVANT CHEMOTHERAPY- IMPACT OF CHANGING PARADIGMS OF TREATEMENT

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Background: As per our previous report on pathological response (pCR) to neo adjuvant chemotherapy (NACT) tumor size and hormone receptor (HR) status were significant predictors. Over the last decade, some improvements in care like more accurate HER2 testing, better access to trastuzumab and taxanes in the NACT regimens have been incorporated. We re-evaluated impact of these changes on pCR.

Methods: A prospective database of 664 women with breast cancer who underwent NACT followed by surgery at our institution in 2017, was evaluated.

Result: Of the 664 patients, 87.7% were cT3/T4, 91.6% were grade III and 89.8% were node positive (54.4% cN1/35.4% cN2) at presentation. Median age was 46 years, 58.5% received HER2 targeted therapy, 31.2% patients received taxanes and anthracyclines based NACT; compared to our previous analysis in which $<1\%$ patients received Taxanes. Of these, 18.4% were triple positive (+ve), 30.3% HR+ve-HER2 negative (-ve), 14.9% HER2 enriched and 31.6% were triple-ve. Overall pCR rate was 22.4% (149/664), 15.6%, in triple+ve, 9.3% in HR+ve-HER2-ve, 35.4% in HER2 enriched and 33.4% in triple-ve. Duration of NACT ($p<0.001$), pre-NACT cN stage ($p=0.022$), HR status ($p<0.001$), and lymphovascular invasion ($p<0.001$) were associated with pCR. On logistic regression, HR status (OR 3.38, $p<0.001$), duration of NACT (OR 2.28, $p<0.001$), pre-chemo cN status (OR 0.6, $p=0.02$) and HER2 status (OR 1.6, $p=0.03$) were associated with increased pCR.

Conclusions: Response to chemotherapy depends on molecular subtype and duration of NACT. Lower rate of pCR in HR+ve patients warrants reconsideration of neoadjuvant strategies in this subgroup.

ALTERATION IN SKELETAL POSTURE BETWEEN BREAST RECONSTRUCTION WITH LATISSIMUS DORSI FLAP AND MASTECTOMY: A PROSPECTIVE COMPARISON STUDY

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Background: The latissimus dorsi (LD) flap is used in cases of immediate breast reconstruction after total or partial mastectomy. In this prospective comparison study, patients who underwent a mastectomy-only and breast reconstruction with an LD flap after mastectomy were compared.

Methods: From January 2018 to February 2020, a total of 54 patients were enrolled. The control group included 23 patients who underwent mastectomy-only and the experimental group included 31 patients who underwent breast reconstruction using an LD flap immediately after mastectomy. We assessed Cobb angle in spine X-rays, parameters derived from photometry, computed tomography, and 3D scanning at preoperatively (T0), 6 months post-surgery (T1), and 1-year post-surgery (T2). We evaluated functional assessments such as pain intensity, disability of the upper extremities, and quality of life.

Result: In the control/experimental groups, the average age, body mass index, and mass weight were 46.2/59.0 years, 22.5/24.8, and 191.9/524.9 g, respectively. In the control group, differences in the Cobb angle were significant between T0 and T2 ($p = 0.003$). There were significant differences in the Cobb angle and time interaction effects between the two groups ($F = 4.659$, $p = 0.015$). The amount of change in Cobb angle between T0 and T1 was positively correlated with change in the vertical distance from the 3D scanner midline to the nipple ($p = 0.009$).

Conclusions: The experimental group showed recovery in skeletal posture compared to the control group. Accordingly, performing breast reconstruction by unilaterally applying the LD muscle is a safe, reliable, and useful method of autologous tissue transfer for breast cancer patients.

A PROSPECTIVE COMPARISON STUDY OF EARLY FUNCTIONAL OUTCOMES AFTER IMPLANT-BASED BREAST RECONSTRUCTION: SUBPECTORAL VERSUS PREPECTORAL TECHNIQUE

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Background: After skin-sparing mastectomy, direct-to-implant breast reconstruction is divided into a subpectoral and prepectoral techniques. This study was conducted as a prospective comparison of the functional recovery and quality of life between the two techniques.

Methods: Patients who had undergone mastectomy were grouped based on whether the approach during direct-to-implant reconstruction was subpectoral or prepectoral. Functional outcomes were evaluated pre-operatively, 2 weeks, 1 month, 3 months, and 6 months post-operation. The evaluation included range of motion of the shoulder, maximal muscle power of the shoulder, pain intensity, disability of the upper extremity, quality of life and mood status.

Result: In the subpectoral/prepectoral groups, the average age, body mass index, preoperative breast volume, and implant volume were 45.5/45.1 years, 22.6/22.7 kg/m^2, 244.5/206.0 cm^3, and 258.6/234.8 cm^3, respectively. There were no significant differences in functional assessments between the two groups before the operation. There were significant differences in visual analogue scale, Disabilities of the Arm, Shoulder and Hand scores, and time interaction effects between the two groups. The prepectoral group exhibited lower visual analogue scale and Disabilities of the Arm, Shoulder and Hand scores than those in the subpectoral group at 2 weeks post-operation.

Conclusions: The prepectoral group showed favorable recovery of pain intensity and disability of the upper arm at the early phase post-operation. Both groups functionally recovered at 6 months post-operation. Therefore, the prepectoral technique can be considered as a useful alternative technique, compared to the classic subpectoral technique.

SCARLESS LATISSIMUS DORSI MUSCLE FLAP WITH ENDOSCOPIC ASSISTANCE FOR BREAST RECONSTRUCTION IN BREAST CANCER PATIENTS

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Background: In the case of immediate breast reconstruction surgery using autologous tissue after partial mastectomy of female breast cancer patients with medium to small breasts, the latissimus dorsi (LD) muscle flap has been commonly used. In this study, we report the usefulness of endoscopic assisted Latissimus dorsi muscle harvesting without a back scar for immediate breast reconstruction.

Methods: Sixteen patients with breast cancer underwent immediate LD muscle flap harvest for reconstruction after partial mastectomy by a single surgeon using endoscopy from November 2016 to December 2019. Patients who were expected to not need a large volume of reconstructive material were selected when partial mastectomy was performed. Breast reconstruction was performed by endoscopically assisted LD muscle flap harvesting through the subaxillary incision without a back scar.

Result: The mean patient age was 48.0 years, and the mean body mass index was 24.4 kg/m^2. Mean operative times were 364.6 minutes and 168.4 minutes for endoscope-assisted LD muscle harvesting, respectively. The total operative time included twice the position changing time. Most cases were invasive ductal carcinoma (62.5%). Donor site morbidities were mainly seromas (75%), which were treated conservatively or with aspiration in most patients. The mean follow-up period was 32.0 months. There was no locoregional or systemic recurrence.

Conclusions: In selected patients, immediate breast reconstruction surgery using an endoscopic LD muscle flap without incision on the back after partial mastectomy showed excellent cosmetic results. With only a 7-8 cm maskable scar under the axilla, a satisfactory reconstruction operation can be performed without a back scar.

AESTHETIC OUTCOMES AND COMPLICATION AFTER POSTMASTECTOMY RADIATION THERAPY IN PATIENTS UNDERGOING IMMEDIATE EXTENDED LATISSIMUS DORSI FLAP AND IMPLANT

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Background: It is widely known that when applying radiation therapy after implant-based reconstruction, the rate of complications, such as capsular contracture development, seroma formation, and reoperation for implant removal or replacement occurs frequently. However, studies on aesthetic outcomes and complication rates following radiation therapy for patients who undergo latissimus dorsi (LD) flap-based reconstruction through use of implants for volume shortage improvements are limited. This study aims to examine prognosis and aesthetic outcomes of patients who underwent postmastectomy radiation therapy (PMRT) among groups who received both LD flap reconstruction and implant insertion.

Methods: Overall, 66 patients who underwent a mastectomy and breast reconstruction from March 2014 to July 2019 were analyzed. Information on patient demographics was recorded. All patents were classified into two groups: the PMRT group versus no PMRT group to compare and analyze the results. Aesthetic outcomes were compared by using gross photographs, and the complications experienced by patients such as seroma formation, flap necrosis, nipple areola complex necrosis, hematoma development, capsular contractures were reviewed.

Result: The result of comparison using gross photos taken during the outpatient follow-up showed no difference in the aesthetic outcome between the radiation group and the control group. There was also no difference in the frequency of complications between the radiation group and the control group.

Conclusions: For some patients use of implants and LD reconstruction are inevitable owing to a lack of LD flap volume. For these patients, PMRT could be safe form of treatment if the necessary precautions are implemented.

COMPARISON OF MAGNETIC SEED (MAGSEED) LOCALIZATION AND RADIOFREQUENCY IDENTIFICATION (RFID) TECHNIQUES FOR NON-PALPABLE LESIONS BY USING A PHANTOM MODEL

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Background: Localization of nonpalpable breast lesions can be achieved with several techniques. We sought to compare magnetic seed (Magseed) localization and Radiofrequency identification (RFID) techniques by using a phantom model which can provide an accurate simulation for excision of nonpalpable breast lesions.

Methods: We designed 20 phantom models (10 Magseed group, 10 RFID) for localization. A manual magnetometer (SentiMag) for the Magseed group and a LOCalizer™ RFID tag system for the RFID group were used to test the ability of the modality to detect raisin grains in turkey breasts. Incision length, the excision time for each procedure, surgical margin status, re-excision rates, specimen size, and weight of the specimens removed from the turkey breasts were recorded.

Result: Both techniques resulted in 100% retrieval of the lesions. There was no difference between the groups in specimen volume, weight, and re-excision rates. The duration of operative excision was significantly shorter in the Magseed group; the length of the incision was shorter in the RFID group.

Conclusions: This experimental trial found similar success rates for Magseed and RFID in localization of occult lesions using the turkey breast phantom model. This phantom model study can provide preclinical information in the covid period when clinical studies are difficult.

IS IT SAFE TO PROCEED WITH SLNB ALONE IN BREAST CANCER PATIENTS WITH A CLINICALLY COMPLETE RESPONSE IN THE AXILLARY LYMPHNODE AFTER NEOADJUVANT CHEMOTHERAPY?

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Background: This study aimed to evaluate the outcome of sentinel lymph node biopsy (SLNB) compared to axillar lymph node dissection (ALND) on recurrence and survival in breast cancer patients who converted clinically node positive (cN+) to pathological node negative (pN0) after NAC.

Methods: This retrospective study at single institution included 223 (cT1-3, cN+) patients with conversion into clinically node negative (cN0) after NAC who underwent breast and axillary surgery from January 2006 to December 2015. 94 patients underwent SLNB only and 129 patients underwent ALND.

Result: The median follow-up time was 57 months (range, 6-155 months) in only SLNB group and 101 months (range 2-159 months) in ALND group. The five-year overall survival was 94% in those underwent only SLNB, and 95.7% in underwent ALND ($p = 0.786$), disease free survival rate of SLNB and ALND group was 91.9%, 91.6% ($p = 0.753$) which was not statistically significant. Total 13 patients experienced loco-regional recurrence, 4 patients (4.25%) in SLNB group and and 9 patients (6.97%) in ALND group. Ipsilateral axillary lymph node recurrence cases was 1 patient and 3 patients each. Distant metastasis occurred in 21 patients, 10 patients (10.63%) in SLNB group and 11 patients (8.52%) in ALND group, respectively. However, there were more complications in the ALND group than in the SLNB group. Among them, ALND group showed the 3 times higher rate of lymphedema than SLNB group (8.51% vs. 27%).

Conclusions: These findings suggest that as an alternative to ALND, SLNB is feasible and reliable in patients with axillary clinical complete response after NAC.

ONCOLOGIC SAFETY OF IMMEDIATE BREAST RECONSTRUCTION IN BREAST CANCER PATIENTS WHO UNDERWENT NEOADJUVANT CHEMOTHERAPY : LONG-TERM OUTCOMES

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Background: Although an increasing number of patients undergo immediate breast reconstruction (IBR) after mastectomy, this treatment is still controversial in neoadjuvant chemotherapy (NAC) setting. To evaluate the oncological safety of IBR with mastectomy after NAC, we conducted retrospective matched case-control study between patients who underwent conventional total mastectomy only and those who underwent IBR after mastectomy after NACT.

Methods: A retrospective review of 631 breast cancer patients who underwent IBR after mastectomy after NAC between 2008 and 2017 was conducted at Samsung medical center. These cases were matched 1:4 to patients who underwent conventional total mastectomy alone after NAC. Matching variables included age, clinical stage before NAC, response to NAC.

Result: Overall, 99 patients were enrolled onto the IBR after mastectomy group (study group) and matched to 376 patients (control group). Median follow-up duration was 55.1 months. There was no significant difference between 2 groups in overall survival, disease-free survival, distant metastasis-free survival and local recurrence-free survival.

Conclusions: The long-term oncologic outcomes of IBR after mastectomy after NAC appeared to be comparable to those of control group. IBR after mastectomy might be a feasible surgical treatment option in NACT setting.

ONCOLOGIC OUTCOMES OF NIPPLE-SPARING MASTECTOMY AND IMMEDIATE RECONSTRUCTION FOLLOWING NEOADJUVANT CHEMOTHERAPY FOR BREAST CANCER

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Background: The use of nipple-sparing mastectomy (NSM) and immediate reconstruction in breast cancer patients receiving neoadjuvant chemotherapy (NACT) is increasing. However, the oncologic safety of this approach is unclear. In this study, we evaluated the oncologic outcomes and risk factors for locoregional recurrence (LRR) and nipple-areola complex recurrence (NR) in a large series of breast cancer patients who underwent NSM and immediate reconstruction after NACT.

Methods: A total of 310 breast cancer patients (319 breasts) who underwent NACT and NSM between February 2010 and November 2016 were retrospectively analyzed. Clinical and pathologic factors associated with increased risks of LRR and NR were analyzed using univariate (chi-square or Fishers exact test) and multivariate (Cox proportional hazard regression model) analyses.

Result: During a mean follow-up of 63 ± 22 months, 38 cases had LRR as the first event, including 6 cases of NR as the first event. The 5-year cumulative LRR and NR rates were 11.0% and 1.9%, respectively. In univariate analysis, clinical T stage, pathologic nodal status, histologic grade, lymphovascular invasion, and post-NACT Ki67 status were associated with increased LRR risk, and post-NACT Ki67 status was the only significant risk factor for NR. In multivariate analysis, post-NACT Ki-67 $\geq 10\%$ (hazard ratio, 4.245; 95% confidence interval, 1.865-9.663; $p = 0.001$) was an independent risk factor for LRR.

Conclusions: NSM and immediate reconstruction seem to be oncologically safe with acceptable LRR and NR rates for appropriately selected breast cancer patients treated with NACT. Post-NACT Ki67 $\geq 10\%$ was associated with increased risk of LRR or NR, and therefore, necessitates cautious follow-up.

ENDOSCOPIC NIPPLE-AREOLAR COMPLEX SPARING MASTECTOMY: A SINGLE INSTITUTIONS EARLY EXPERIENCE

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Background: To introduce an early experience of endoscopic nipple-sparing mastectomy (NSM) combined with immediate breast reconstruction through simple single-port access that placed in axillary incision.

Methods: Between November 2018 and December 2019, 10 female patients with breast cancer (stage 0 in 8 cases, stage I in 1 case, stage II in 1 case) were treated with endoscopic NSM combined with immediate breast reconstruction through simple single-port access that placed in axillary incision. Six patients underwent breast reconstruction with silicone implant and one patient underwent TRAM reconstruction.

Result: The patients were 30-55 years old (mean, 43 years). The tumor located at the left breast in 3 cases and at the right breast in 2 cases. The diameter of tumor ranged from 1.5 to 5.2 cm (mean, 3.4 cm). After operation, nipple necrosis or skin flap necrosis was not observed. No subcutaneous emphysema occurred. There was no tumor involvement to nipple in intraoperative and postoperative pathological examination. All patients were followed up 1-9 months (median, 7 months). According to the Harris assessment criteria for appearance of reconstructed breast, there were 9 cases of excellent and 1 case of good. No tumor recurrence or metastasis occurred during follow-up.

Conclusions: It is a safe and feasible method of endoscopic NSM combined with immediate breast reconstruction through simple single-port access that placed in axillary incision, and can obtain good cosmetic results. It is a new option to breast reconstruction.

SAFETY OF MASTECTOMY WITH IMMEDIATE BREAST RECONSTRUCTION AFTER NEOADJUVANT CHEMOTHERAPY

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Background: As the Skin sparing mastectomy (SSM) or nipple-areolar skin sparing mastectomy (NSM) increases, the incidence of immediate breast reconstruction (IBR) is also increasing, but still controversy about the stability and utility of neoadjuvant chemotherapy in case of SSM and NSM. This study was designed to assess the overall survival rate and disease free survival rate between NSM and SSM with IBR patients and BCS patients according to chemotherapy type.

Methods: A retrospective review was conducted to identify all who pathologically diagnosed with invasive breast cancer 2,478 patients distant metastasis-free and TNM stage I-III from 2010 to 2018 in a single hospital. The patients were divided into three groups by neoadjuvant chemotherapy 1) Neoadjuvant chemotherapy: 315, 2) Adjuvant chemotherapy: 1,541, 3) No chemotherapy: 732.

Result: The study sample consisted of 2,478 patients diagnosed with stage I to III breast cancer. The median follow up period is 55.8 months (TM+R; 27 months, TM; 70.3 months, BCS; 53.7 months). The clinical characteristics of patients with TM+R, TM, and BCS patients are shown in Table 1. On multivariate analysis for DFS & OS adjusted with age and T, N stages, TM+R patients no different outcome compared to BCS patients in neoadjuvant chemotherapy groups. TM patients showed the higher RR compared to BCS patients in neoadjuvant chemotherapy groups (Table 2, 3).

Conclusions: The result of disease free and overall survival prognosis according to the surgical method, NSM or SSM with IBR is considered oncological safe procedure in received neoadjuvant chemotherapy patients.

SURGICAL STRATEGIES FOR PARTIAL BREAST RECONSTRUCTION IN MEDIAL-LOCATED BREAST CANCER: A 12-YEAR EXPERIENCE

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Background: Partial breast reconstruction is especially challenging in medial-located breast cancer, particularly in terms of achieving satisfactory aesthetic coverage. Thus, we aimed to investigate surgical strategies for filling medial defects resulting from breast-conserving surgery in order to improve patient satisfaction and aesthetic outcomes.

Methods: One hundred and thirteen patients (114 cases) with medial-located breast cancer were retrospectively evaluated from 2007 to 2018. We analyzed patients' information such as breast size, tumor weight, complications, and aesthetic results using a questionnaire.

Result: The mean patient BMI and tumor weight were 23.43 kg/m^2 and 86.86 g, respectively. The tennis racket and round block techniques were chosen for small defects (< 10-15%) in small- to moderate-sized breasts. The rotational flap and perforator flap techniques were selected for moderate defects. The latissimus dorsi flap technique was used for large defects (> 30%). There was 1 hematoma case, 1 linear skin necrosis case, 8 seroma cases in latissimus dorsi flaps, 2 fat necrosis cases in rotational flaps, and 1 fat necrosis case in an anterior intercostal artery perforator flap. Most of the patients were satisfied with their aesthetic results.

Conclusions: In medial-located breast cancer, the technique used in this study can produce superior aesthetic outcomes with regard to breast size and resection volume and can do so with few complications.

ANALYSIS OF THE RISK FACTORS AFFECTING POST-OPERATIVE COMPLICATION AFTER IMMEDIATE RECONSTRUCTION WITH IMPLANT FOR OPERABLE BREAST CANCER PATIENTS

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Background: The National insurance system reimbursed about reconstruction for breast cancer patient since 2015. The reconstruction rate for breast cancer patients increased rapidly after modification of the system. The purpose of this study was to analyze the risk factors which are related to complications after immediate reconstruction with implants after the modification of the national insurance system.

Methods: We reviewed the medical records of prospectively maintained cohort. Patients who underwent immediate implant reconstruction after nipple areola (NAC) sparing mastectomy at the national Cancer Center between January 2012 and April 2016 were enrolled. A total of 277 breasts was analyzed in 253 patients. Risk factors such as age, implant size, obesity, cancer stage, treatments, and the usage of acellular dermal matrix were analyzed to infer relations between risk factors and complications.

Result: The implant size more than 250 mL (odds ratio (OR) 2.01 ; 95% confidence interval [CI], 1.09 to 3.71) and acellular dermal matrix (ADM) used in reconstruction (OR 7.13 ; 95% CI, 2.72 to 18.72) were significantly associated with complications. Only a small portion of patients (13.6%, 9 patients) received revision about contracture. Adjuvant treatments such as neoadjuvant chemotherapy ($p=0.724$), adjuvant chemotherapy ($p=0.646$), and radiotherapy ($p=0.514$) were not significantly associated with complications.

Conclusions: Large implant size and ADM usage were related with postoperative complications in implant based immediate reconstruction. Standard adjuvant treatments were not related with complications.

BREAST CONSERVING SURGERY AND VOLUME REPLACEMENT USING FOLDED ACELLULAR DERMAL MATRIX

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Background: Acellular dermal matrix (ADM) has been used to fill tissue defects in various parts of the body and its safety has been acquired. In this study, we evaluated the safety and effect of ADM which was applied to patients with volume defect after BCS.

Methods: ADM was applied to patients with 30 to 40 percent parenchymal resection. After resection of the parenchyme with preserving skin and subcutaneous fat, ADM was folded into a funnel shape, then inserted on the retromammary fat tissue. If negative resection margin was confirmed through the frozen section, ADM was sutured to the side of the remnant parenchyme. Antibiotics were used and the drainage tube was inserted or not. Postoperative complications and the breast shape were evaluated.

Result: From July 2018 to December 2019, ADM was applied to a total of 28 patients. Six (21.4%) patients were diagnosed with ductal carcinoma in situ (DCIS), 22 (78.6%) were invasive carcinoma. In invasive carcinomas, the mean tumor size was 1.5 (0.8-4.0) cm and 7 (31.8%) were multifocal and 9 (40.9%) were accompanied by DCIS. The location of tumor was UIQ or UCQ in 39.3%. The mean resected volume was 73.9 (12-193) cm^3 and, depending on the volume resected, $2\times3\times0.3$, $4\times6\times0.3$, and $4\times8\times0.3$ cm sized ADM was applied. The drainage tube remained for 6.6 (2-10)days. The patients without drainage have mild seroma. There was no evidence of infection during chemotherapy or radiation therapy in all patients. Some patients reported foreign body sensation after radiation, they improved over time.

Conclusions: ADM can be applied safely to patients with volume defects after BCS while avoiding mastectomy or autologous tissue harvest.

PRIMARY LUNG CANCER SECONDARY TO BREAST IRRADIATION

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Background: Radiation-induced lung cancer is a major concern in breast cancer patients treated with adjuvant radiotherapy. This meta-analysis aims to investigate the risk of developing primary lung cancer after breast irradiation.

Methods: Bibliography databases such as Medline, EMBASE, CINAHL and Cochrane; trials registries, and meeting proceedings, were searched. Publications that compared primary lung cancer incidence after breast surgery (with and without breast irradiation) were searched, using predefined strategy. Retrieved studies were independently screened and rated for relevance. Data were extracted and analyzed by two researchers according to the PRISMA protocol. Meta-analysis was performed by fixed-effect model with STATA12.0 software.

Result: 303,836 patients from 6 studies were included. Standardized incidence ratio (SIR) in the radiation group was 1.11 (95% CI: 1.03-1.20, $p = 0.008$), while that in the non-radiotherapy group was 0.88, (95% CI: 0.83-0.94, $p = 0.000$). Funnel plot suggested no evidence of publication bias ($p > 0.05$).

Conclusions: Incidence of lung cancer is increased in breast cancer patients with breast irradiation.

PARTIAL BREAST IRRADIATION (PBI) USING STRUT ADJUSTED VOLUME IMPLANT (SAVI)

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Background: Adjuvant radiation therapy (Whole breast irradiation [WBI]) to residual breast for the early breast cancer patients received partial mastectomy be able to prevent local recurrence and recommended by guideline. Partial breast irradiation (PBI) is more reasonable than WBI because of decreasing the overall time of treatment, increasing the dose per fraction delivered to the tumor bed, and reducing the volume of tissue receiving treatment.

Methods: We report our experience of SAVI.

Result: Case 1. Age 73 years old, Right breast cancer, cT2N0M0. She was received partial breast mastectomy (Bp) with sentinel lymph node biopsy (SNB). Pathological diagnosis was apocrine carcinoma (pT2 N0, ER-, PgR-, HER2 -, Ki67 $< 5\%$). The cancer involvement in cut end was negative. 8 weeks after surgery, she was received the PBI by SAVI without severe AE (G1 pain, nausea and appetite loss). Case 2. Age 66 years old, Left breast cancer, cT1N0M0. She was received Bp with SNB. pT1bN0 (ER+, PgR+, HER2 0, Ki67 $< 5\%$). Cut end involvement(-). She was received the PBI by SAVI (2 Fr./day, 3.4Gy/Fr. Total 10 Fr. 34Gy.) without severe adverse event (AE) (G1 pain, appetite loss). Case 3. Age 55 years old, she was diagnosed severe atopic dermatitis and left breast cancer, cT1N0M0. She was received Bp with SNB. pT1cN0 (ER+, PgR+, HER2 0, Ki67 30%). Cut end involvement(-). She was received the PBI by SAVI without serious AE (G1 pain and skin reddish).

Conclusions: SAVI is new and safety system of PBI as adjuvant radiation therapy for early breast cancer patients with Bp and suitable for elderly or patients with difficulty for WBI.

IMPACT OF ONCOTYPE DX RECURRENCE SCORE ON LOCOREGIONAL RECURRENCE IN NODE-NEGATIVE, HORMONE RECEPTOR-POSITIVE/HER2-NEGATIVE BREAST CANCER PATIENTS UNDERGOING BREAST CONSERVATION TREATMENT (KROG 19-06)

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Background: The purpose of this study was to evaluate the impact of Oncotype DX recurrence score (RS) on the patterns of locoregional recurrence in node-negative, hormone receptor-positive/human epidermal growth factor receptor 2 (HER2)-negative breast cancer patients undergoing breast conservation treatment.

Methods: Three hundred and thirty-nine patients were enrolled from four large-volume institutions in Korea and analyzed retrospectively. All patients underwent breast conserving surgery followed by whole breast irradiation, and regional nodal irradiation was given to only two patients. Median age was 47 (range, 29-77). Pathologic tumor size ranged from 0.4 cm to 5.5 cm (median, 1.6).

Result: Fifty-five (16.2%) patients had a RS < 11, 241 (71.1%) had a RS of 11-25, and 43 (12.7%) had a RS of > 25. Sixty-two patients received adjuvant chemotherapy. All but 4 patients received hormonal therapy. With a median follow-up period of 62 months (range, 17-109), there were one invasive local recurrence, three regional recurrences, and seven distant metastases. All locoregional recurrences were observed among those patients with a RS of > 25, resulting in a 5-year locoregional recurrence rate of 7.3% in this subgroup. Regional recurrence sites were axillary lymph nodes in two patients and supraclavicular lymph node in one patient, none of whom received regional nodal irradiation initially.

Conclusions: Excellent locoregional control was achieved in node-negative, hormone receptor-positive/HER2-negative patients undergoing breast conservation treatment plus risk-adapted systemic therapy according to Oncotype DX RS. Although overall outcomes were favorable, regional nodal irradiation might be considered in patients with a high RS. Further study with larger population and long-term follow-up is warranted.

SPONTANEOUS RIB FRACTURES AFTER BREAST CANCER TREATMENT

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Background: Spontaneous rib fractures are defined as fractures without apparent blunt-force trauma. This study aimed to evaluate the incidence and risk factors of spontaneous rib fractures after treatment in breast cancer patients.

Methods: We retrospectively reviewed 1,265 patients with breast cancer who underwent surgery in 2015 at our institution and were followed up with at least three times of bone scan. The endpoint was spontaneous rib fractures detected by bone scan. In this study, 867 (69%) patients were treated with radiotherapy (RT): hypofractionated RT (n = 548; 63%), conventional fractionated RT (n = 302; 35%), and accelerated partial breast irradiation (APBI, n = 23; 3%). Regional nodal irradiation was conducted in 303 (35%) patients and 647 (75%) patients underwent tumor bed boost.

Result: Median follow-up time was 37.5 months (0.2-56 months). Two-hundred-nine (16.5%) patients experienced spontaneous rib fractures during their follow-up. The incidence steadily increased for 4 years after treatment. In multivariate analysis, chemotherapy ($p < 0.001$) and RT ($p < 0.001$) were significant risk factors for spontaneous rib fractures. In the subgroup analysis of patients who were treated with RT, 159 (18%) rib fractures occurred: 127 (80%) patients in the ipsilateral breast. Ipsilateral rib fractures occurred in 84 patients receiving tumor bed boost, of which 95% occurred in the boost field. Multivariate analysis of RT subgroup showed that hypofractionated RT ($p < 0.001$) was a significant risk factor for spontaneous ipsilateral rib fractures.

Conclusions: Most of the rib fractures that occur after treatment were spontaneous. The significant risk factors for spontaneous rib fractures in breast cancer patients were chemotherapy and RT. Hypofractionated RT showed an increased risk of ipsilateral rib fractures.

Poster Presentation

INTERNAL MAMMARY LYMPH NODE MANAGEMENT IN CLINICALLY INTERNAL MAMMARY LYMPH NODE POSITIVE BREAST CANCER AFTER NEOADJUVANT CHEMOTHERAPY

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Background: The management of the internal mammary lymph node (IMN) in initial clinically IMN-positive breast cancer patients after neoadjuvant chemotherapy is controversial. This study investigated the treatment outcomes of initial clinically IMN-positive breast cancer patients without distant metastasis.

Methods: We identified 9 breast cancer patients with clinically detected IMNs and without distant metastasis at diagnosis treated with neoadjuvant chemotherapy, surgery and radiotherapy (RT) without between January 2014 and December 2018. Patients received adjuvant RT to the whole breast/chest wall, regional lymph nodes and IMN areas.

Result: The median follow-up was 19 months (range, 1-61 months). After neoadjuvant chemotherapy, 8 patients showed IMN normalization, 2 patients showed a partial response to IMN. Of two patients with partial response to IMN, one had received surgical excision of IMN and had a recurrence in lung and supraclavicular and axillary lymph nodes, and the other one had received RT to IMN without surgical excision of IMN and had a recurrence on the multiple lymph nodes including IMN. Of 7 patients with IMN normalization after neoadjuvant chemotherapy, 6 did not show any recurrence and one patient had a recurrence in liver and multiple lymph nodes including IMN.

Conclusions: Our study showed RT to the regional lymph nodes including IMN area provides favorable results for initial clinically IMN-positive breast cancer patients with IMN normalization after neoadjuvant chemotherapy without the support of IMN surgery. However, patients who did not reach IMN normalization after neoadjuvant chemotherapy had poor results regardless of IMN surgery.

HYPOFRACTIONATED VERSUS CONVENTIONAL FRACTIONATED RADIOTHERAPY FOR BREAST CANCER IN PATIENTS WITH RECONSTRUCTED BREAST: TOXICITY ANALYSIS

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Background: This study investigated whether hypofractionated adjuvant radiotherapy (RT) increased breast-related complication(s) compared to conventional fractionated RT in reconstructed breast cancer patients.

Methods: We conducted a retrospective review including 349 breast cancer patients who underwent immediate breast reconstruction following mastectomy or breast-conserving surgery (BCS) between 2009 and 2018 at two institutions. All patients were treated with adjuvant RT via either a conventional fractionated or hypofractionated regimen. We defined a major breast complication as a breast-related toxic event requiring re-operation or re-hospitalization during the follow-up period after the end of RT.

Result: The median follow-up was 32.3 months (4.8 to 118.5 months); 126 patients had conventional fractionated RT, and 223 patients received hypofractionated RT. In patients with mastectomy, there was no significant difference in the occurrence of any or major breast-related complications between the two fractionation regimens. In patients undergoing BCS, incidence of any breast complication showed no difference between two RT groups and no major breast complication was reported as well. Hypofractionated RT did not increase major wound problem (infection and dehiscence) compared to conventional RT. Incidence of major contracture was significantly lower in hypofractionated RT.

Conclusions: There was no significant difference in the occurrence of any or major breast-related complications between the two different fractionation regimens, even in patients with mastectomy. Hypofractionated RT may be used comparable to conventional fractionated RT in terms of breast-related complications in reconstructed breast cancer patients. The prospective randomized trial would be necessary to clarify this issue.

THE ROLE OF POSTOPERATIVE RADIOTHERAPY AFTER PRIMARY TUMOR RESECTION IN PATIENTS WITH DE NOVO STAGE IV BREAST CANCER: MULTI-INSTITUTIONAL RETROSPECTIVE STUDY OF THE KOREAN RADIATION ONCOLOGY GROUP

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Background: The standard of care for stage IV breast cancer is systemic treatment, as the disease itself is regarded as incurable. However, local treatment including primary tumor resection (PTR) and/or postoperative radiotherapy (PORT) has been commonly performed in real world practice. The present study investigated the role of PORT in stage IV breast cancer patients who underwent PTR.

Methods: This study enrolled 426 patients diagnosed with de novo stage IV breast cancer who were treated with potentially curative PTR with or without PORT in 15 institutions. The primary outcome was cancer survival (OS), and the secondary outcomes were locoregional recurrence-free survival (LRRFS) and distant progression-free survival (DPFS).

Result: At a median follow-up of 53.7 months (range, 3.1-194.4 months), 5-year OS rate was 73.2%. Low clinical T stage (T1-2) was significantly predictive of longer OS. The 5-year LRRFS and DMFS rates were 84.3% and 34.1%, respectively. Ki-67 labeling index $<30\%$ and administration of PORT were significant predictor of longer LRRFS. Low metastatic burden, low pathologic N stage (N0-1), and administration of PORT significantly predicted longer DPFS.

Conclusions: De novo stage IV breast cancer patients who received planned PTR showed favorable survival outcomes compared with historical cohorts. PTR may be predictive of good prognosis, especially in patients with low clinical T stages. PORT was significantly predictive of better LRRFS and DPFS, suggesting that patients may benefit from this treatment.

A MULTICENTER ANALYSIS ON PATTERNS OF REGIONAL RECURRENCE IN N1 BREAST CANCER TREATED WITH MASTECTOMY WITHOUT RADIOTHERAPY

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Background: This study was performed to report the patterns of regional recurrence (RR) in pT1-2N1 breast cancer treated with mastectomy without post-mastectomy radiotherapy (PMRT).

Methods: Medical records of 1,828 patients with pT1-2N0 breast cancer, treated with mastectomy without PMRT from 2005 to 2010 at 10 institutions were reviewed. We defined RR as recurrence in ipsilateral axillary, internal mammary (IMN), and supraclavicular (SCN) lymph-nodes as first site of failure, irrespective of chest wall or distant failure. Univariate and multivariate analyses for each RR were performed according to clinicopathologic factors and biologic subtypes.

Result: Seventy patients (3.8%) developed RR during a median follow-up period of 5.9 years (range: 0.7-10.4 years); 36 in axilla, 27 in IMN, and 33 in SCN. Recurrence at axilla, IMN, and SCN only were 18, 15, and 14, respectively. Recurrence at axilla and IMN, at axilla and SCN, and IMN and SCN were 4, 11, and 5, respectively. Synchronous recurrence at all nodal regions were 3. The 5-year and 7-year RR-free survival rates were 95.5% and 94.3%, respectively. Multivariate analysis revealed that resection margin ($p=0.021$), tumor grade ($p=0.007$) and tumor location ($p=0.010$) were independent risk factors for overall RR. Resection margin ($p=0.018$) and hormone receptor ($p=0.012$), and hormone receptor ($p=0.032$) and tumor location ($p=0.036$) predicted axillary and SCN recurrence, respectively. T-stage ($p=0.048$) was only independent risk factors for IMN recurrence.

Conclusions: Inner quadrant tumor location was an important clinical risk factor predicting RR. Comprehensive regional nodal irradiation might be needed for high-risk patients. However, further study is warranted for individualized radiation field design.

EVALUATION OF DEEP LEARNING-BASED AUTO-SEGMENTATION OF ORGANS-AT-RISKS FOR BREAST CANCER RADIATION THERAPY

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Background: Previous KROG 1901 study showed a large inter-physician variation in breast RT. We previously developed a deep learning-based auto-contouring system (ACS) for breast RT. To externally validate the performance of ACS, we compared it with the contours of 11 experts from two institutions.

Methods: Experts were asked to delineate 9 organ-at-risks (OARs) of 10 cases. Then, auto-contours were provided to the experts for correction. Dice similarity coefficient (DSC) and Hausdorff distance (HD) was used to compare each contour with the best manual contour, where higher DSC and lower HD means better geometric overlap.

Result: Total mean time for 9 OARs was 37 ± 20 minutes for manual and 6 ± 5 minutes for corrected-auto-contours. Among experts' manual contours, DSC of auto-contour ranked second place and HD ranked first place. Better performance was shown in corrected-auto-contours than in manual contours (median DSC: 0.88 vs. 0.90; median HD: 6.5 vs. 4.5 mm). The inter-physician variations among experts were reduced (DSC range: 0.86-0.90 vs. 0.89-0.90; HD range: 5.1-9.1 mm vs. 4.3-5.7 mm). Among manual OARs, breast contours had the largest variations, which were most significantly improved with an aid of ACS.

Conclusions: ACS showed at least similar performance in OARs compared with experts' manual contouring, which anticipates further applications of ACS to target volumes. ACS can be a valuable tool for improving the quality of breast RT and reducing inter-physician variability in clinical practice. Our results call for continued training to ensure adherence to the guideline when applying ACS.

LONGITUDINAL IMPACT OF POSTMASTECTOMY RADIOTHERAPY ON ARM LYMPHEDEMA IN PATIENTS WITH BREAST CANCER: AN ANALYSIS OF SERIAL CHANGES IN ARM VOLUME MEASURED BY INFRARED OPTOELECTRONIC VOLUMETRY

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Background: Yet, there is no report on long-term prognosis of lymphedema after postmastectomy radiation therapy. This study was conducted to evaluate the longitudinal impact of PMRT on lymphedema using arm volume measurements by an infrared optoelectronic volumetry.

Methods: Of the patients who underwent mastectomy at our hospital between 2008 and 2016, we included 330 patients with secondary arm lymphedema whose percentage of excessive volume (PEV) of the arm were serially assessed. PEV was measured using an optoelectronic volumetry 1, 3, 6, 12, 18, 24, 36, and 48 months after the lymphedema diagnosis. We defined persistent severe lymphedema (PSL) as 2 or more episodes of PEV $\geq 20\%$. The characteristics of lymphedema were compared according to PMRT ($n = 202$). Risk factors for PSL were evaluated using stepwise regression analyses.

Result: The median follow-up duration was 72.5 months. At the time of lymphedema diagnosis (Tlymh_Dx), patients who received PMRT were more likely to have stage II/III lymphedema than those who did not receive PMRT (69.8% vs. 47.6%, $p < 0.001$). After 6 months, the median PEV value was consistently higher in patients with PMRT than in those without PMRT, and the trend lasted for the 48-month follow-up (18.0% vs. 9.5% at 48 months, $p = 0.043$). PSL occurred in 71 (21.5%) patients. The risk of developing PSL was significantly associated with PMRT, lymphedema stage, and PEV at Tlymh_Dx, cellulitis, and compliance with physical therapy.

Conclusions: PMRT was associated with a consistent increase in PEV in patients with arm lymphedema. Therefore, timely physical therapy is necessary for this patient population.

THREE-YEAR RESULTS OF EXTERNAL BEAM PARTIAL VERSUS WHOLE BREAST IRRADIATION WITH THE ONCE PER DAY REGIMEN

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Background: To compare external beam APBI using the once per day regimen and accelerated hypofractionated whole breast irradiation (AWBI) for early stage breast cancer.

Methods: This is a single institution retrospective cohort study. Patients ≥ 50 years with pTisN0 or pT1N0 breast cancer who underwent lumpectomy and adjuvant radiotherapy were included. APBI was delivered to patients strictly "suitable" to the ASTRO-APBI guidelines, as 38.5 Gy in 10 fractions once per day. AWBI was delivered up to 40.5-43.2 Gy in 15-16 fractions with or without boost.

Result: Between October 2015 and December 2018, 173 patients received APBI and 300 received AWBI. At a median follow-up of 34.9 months (range, 7.1 to 55.4), the 3-year recurrence free survival of APBI and AWBI groups were 99.23% and 99.24%, respectively ($p = 0.63$). Acute toxicity occurred less frequently in APBI group (grade 195 [54.9%] in APBI vs. 233 [77.7%] in AWBI; grade 27 [4.0%] in APBI vs. 44 [14.7%] in AWBI, $p < 0.001$). Late toxicity was less common in APBI group, compared to AWBI group (grade 1112 [64.7%] in APBI vs. 197 [65.7%] in AWBI; grade 29 [5.2%] in APBI vs. 64 [21.3%] in AWBI; grade 3none in APBI vs. 5 [1.7%] in AWBI, $p < 0.001$). Multivariate analysis showed that AWBI was significantly associated with higher grade ≥ 2 late toxicity compared to APBI (OR 4.17, $p = 0.006$).

Conclusions: The once per day APBI showed excellent locoregional control and lower toxicities in comparison with AWBI. This scheme could be an attractive alternative to AWBI, in patients who met ASTRO-APBI guidelines.

DOSIMETRIC COMPARISON OF RADIATION TECHNIQUES FOR COMPREHENSIVE REGIONAL NODAL RADIATION THERAPY FOR LEFT-SIDED BREAST CANCER: A TREATMENT PLANNING STUDY

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Background: Comprehensive regional nodal irradiation (c-RNI) increases disease-free survival by 3-5%. A major concern is that the increased risk of cardiac toxicity by extensive RT could offset its effect, as cardiac toxicity increases linearly by 7.4% per 1 Gy increase in the mean heart dose (MHD). However, how modern cardiac sparing techniques and beam delivery systems using advanced x-ray and proton therapy can reduce these toxicities individually or in any combination is poorly investigated.

Methods: In a dataset of 15 patients with left-sided breast cancer, partially wide tangential 3DCRT delivered in conventional fractionation (CF, 50 Gy/25) and in hypo-fractionated (HF, 40 Gy/15) schedules as well as proton beam therapy delivered in CF and two-partial arc VMAT delivered in a HF schedule, each under continuous positive airway pressure (CPAP) and free breathing (FB) conditions were extensively examined.

Result: Target volume coverage was within acceptable levels in all interventions, except for internal mammary lymph nodes D90 (99% in proton, 90% in VMAT-CPAP, 84% in VMAT-FB, and 74% in 3DCRT). MHD was the lowest in proton (< 1 Gy) and VMAT-CPAP (2.2 Gy) and highest in 3DCRT-FB (7.8 Gy). Mean lung dose was the lowest in proton and VMAT-CPAP (5-6 Gy) and highest in 3DCRT-FB (20 Gy). Mean doses to the contralateral breast were 0, 1, and 2.1 Gy in proton, 3DCRT, and VMAT, respectively.

Conclusions: Both proton and VMAT in combination with CPAP can minimize the radiation exposure to heart and lung with optimal target coverage in RT for left-sided breast cancer with c-RNI, although the clinical relevance of these differences is yet to be elucidated.

A DOSIMETRIC ANALYSIS OF INCIDENTAL RADIATION TO THE INTERNAL MAMMARY NODES WITH A THREE-FIELD CHEST WALL TECHNIQUE

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Background: Elective internal mammary node (IMN) irradiation in breast cancer is controversial because of the low incidence of IMN failures and the technical difficulties in its safe delivery. Dosimetric studies investigating incidental dose to the IMNs found it to be insufficient with standard tangential fields. Our institution uses a three-field chest-wall technique (TFCWT) with narrowed tangents matched to a medial anterior electron field, which is similar to the techniques used in large studies that investigated intentional treatment of the IMNs. This study aims to conduct a dosimetric analysis of the incidental radiation dose to the IMNs using the TFCWT to determine if it fulfills recommended parameters used in guidelines for IMN treatment.

Methods: This retrospective study utilized 3D-conformal radiotherapy plans of 50 post-mastectomy patients (25 left-sided and 25 right-sided). All plans used the TFCWT (described above) with a dose of 50 Gy utilizing standard fractionation. The IMNs were not intentionally treated in all included plans.

Result: The mean dose to the IMN-PTV was 45.1 Gy (range 26.4 to 55.6, SD 6.5). Minimum doses received by 95% and 90% of the IMN-PTV were 29.3 Gy and 34.0 Gy, respectively. Percent volume of IMN-PTV receiving 100%, 95%, 90%, and 80% were 47.4%, 55.6%, 61.92%, and 72.61%, respectively.

Conclusions: Although our results suggest increased IMN radiation doses with the TFCWT compared to historical standard tangents, the incidental doses are less than traditionally prescribed to the IMNs in high risk patients. It is unknown whether this incidental IMN dose confers any clinical benefit.

5-FLUOROURACIL EFFICIENTLY ERADICATES RADIO-RESISTANT BREAST CANCER CELLS BY TARGETING THE ACSL4-FOXM1 AXIS

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Background: Radiotherapy is widely used for cancer treatment but overcoming radio-resistance is still challenging. 5-Fluorouracil (5-FU) is well known to exert cytotoxic effect on various cancer cells by targeting thymidylate synthase essential for DNA synthesis. However, its effect and molecular targets in radio-resistant cancers remains to be explored. Herein we investigated effect of 5-FU on radio-resistant breast cancer cells and relevant targets.

Methods: Radio-resistant SK-BR-3 (SR) cells were established by repeatedly exposing SK-BR-3 cells to radiation and resistance acquisition of SR was assessed by colony forming assay. Chemo-sensitivity was measured using MTT assay and protein expressions were estimated by western blot analysis. In vivo study was performed in immunodeficient nude BALB/c mice implanted with SR cells.

Result: SR cells were resistance to targeted therapies, but 5-FU efficiently inhibited viability of SR cells. 5-FU induced apoptosis and cell cycle arrest at G0/G1 phase by down-regulating cyclin D1 expression. Its cytotoxic effect was accompanied by inhibition of ACSL4 expression. This inhibition led to down-regulation of FOXM1, the DNA repair proteins (RAD51, survivin), and pro-survival protein (Bcl-xL), but increased phosphorylation of H2A.X, a DNA damage marker. ACSL4 inhibition with Triacsin-C had the same effects as 5-FU in SR cells, indicating that 5-FU targets ACSL4-FOXM1 axis to induce apoptosis. Furthermore, 5-FU efficiently suppressed tumor growth in SR-tumor bearing nude BALB/c mice.

Conclusions: 5-FU targets the ACSL-FOXM1 pathway to selectively eradicate radio-resistant breast cancer cells. Therefore, 5-FU could be an effective therapy to improve clinical response of radio-resistant breast cancers.

TAILORX-CLINICAL IMPLICATION IN DEVELOPING WORLD

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Background: The results of the TAILORx trial have suggested benefit of Oncotype Dx (recurrence score (RS) 11-25) to avoid adjuvant chemotherapy in over 70% women with ER positive PR positive HER2 negative node negative (N0) early breast cancer (EBC). However this may be an inaccurate assumption for women presenting with EBC in the developing world.

Methods: To understand the applicability of TAILORx results in our population, we reviewed the clinicopathological reports of women with EBC at our institution.

Result: In 2017, 4,196 women registered for BC management. of these 30% presented with EBC and 1,063 were included in the analysis with all relevant information available. Of 1,063, 593 (55%) were pathologically N0. Of those 189/593 (17.7%) were ER and/or PR positive and HER2 negative. Ninety-five of 189 had grade III (50.2%) disease. Of 189 women who fit the TAILORx trial criteria, 75 (40%) were < 50 years of age, 114 (60%) were > 50 years. Applying the same ratios as in the published article, 40% of < 50 years (31/75) and all 114 (> 50 years) would benefit with Oncotype Dx and avoid chemotherapy. Thus 145 of 1,063 would benefit, in other words 13.64% patients of the women EBC and not 70% as reported by TAILORx trial would avoid chemotherapy.

Conclusions: In our population of EBC, 13.64% as compared to the 70% would possibly benefit with RS testing. Also, in this group of patients information regarding risk stratification would be available using less expensive tools like IHC4, thus limiting applicability of the test and study results in our population.

UNDERTREATMENT OF BREAST CANCER IN ELDERLY PATIENTS

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Background: While breast cancer occurs in almost one third of cases occur over 70 years old, optimal management of breast cancer in the elderly remains controversial. We studied undertreatment ratio for elderly patients.

Methods: Patients over 75 years old at the time of diagnosis who diagnosed breast cancer and underwent surgery for primary breast cancer at our institution from January 1, 2009 to October 31, 2019 were included. Medical record review was conducted of these patients. Our criteria for undertreatment included lack of hormone therapy, chemotherapy, HER2 targeted therapy and radiation therapy. We defined the indication of hormone therapy was patients with positive for ER or PR. The indication of chemotherapy was defined as invasive tumor 5mm of TNBC and invasive tumor 1cm of HER2 positive. The indication of radiation therapy was defined as post breast conserving surgery and the number of positive lymph node was over 4.

Result: The total of 330 patients ranged from 75 to 97 years was included. The number of patients with hormone receptor positive, TNBC, HER2 positive was 275, 37, and 39 patients, respectively. The number of patients who were candidate for hormone therapy, chemotherapy, HER2 targeted therapy and radiation therapy was 245, 61, 32, and 214 patients, respectively. Among them, the number of patients who undertreated was 27 patients (11%) for hormone therapy, 41 patients (67.2%) for chemotherapy, 9 patients (28%) for HER2 targeted therapy, and 117 patients (54.7%) for radiation therapy, respectively.

Conclusions: Elderly patients tended to be undertreated.

CLINICAL UTILITY OF ONCOTYPE DX (ODX) AND CLINICAL RISK (CR) FOR GUIDING TREATMENT IN HORMONE RECEPTOR (HR) POSITIVE AND HUMAN EPIDERMAL GROWTH FACTOR RECEPTOR 2 (HER2) NEGATIVE BREAST CANCER

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Background: Sparano et al. proposed the classification by ODX and CR based on pathological factors, which was considered to be useful to determine a pharmacotherapy for HR positive and HER2 negative breast cancer, but its clinical utility remained unclear.

Methods: We retrospectively identified 189 patients who underwent ODX among 656 patients who met the practical criteria of ODX at our hospital from January 2007 to December 2015. We analyzed their pathological factors and prognosis and also compared the recommended treatment based on the classification with the actual treatment.

Result: 6-year DFS was 95/98% without/with lymph node metastasis ($p=0.04$), 97/91% with Low/High CR ($p=0.08$), 100/95% Low/Inter+High RS ($p=0.07$). Multivariable analysis showed that independent prognosis factors were RS (Inter+High vs. Low, HR 6.5×108, 95% CI 0.74-0.97, $p=0.08$) and lymph node metastasis (4.4, 1.08-21.6, 0.04). Additionally the analysis showed that high CR tend to be predictive factor ($p=0.01$). Out of 26 patients who were required tamoxifen (TAM) plus ovarian depression (OFS) or chemotherapy, 8 had TAM alone, 12 had TAM with OFS, 5 had chemotherapy and one had no adjuvant treatment. In this group only one patient who had been treated wit TAM alone had recurrence.

Conclusions: There was a significant difference in prognosis by the lymph node metastasis, RS, and CR. Our findings could support a clinical utility of the classification proposed by Sparano et al.

EFFICACY OF DIFFERENT ADJUVANT CHEMOTHERAPY REGIMENS IN HORMONE RECEPTOR-POSITIVE BREAST CANCER WITH T2-3N0

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Background: There are insufficient data of adding taxane after adjuvant anthracycline-cyclophosphamide in node-negative, hormone receptor-positive EBC. The aim of this study is to compare sequential anthracycline-cyclophosphamide, taxane regimen with anthracycline-cyclophosphamide (AC) and docetaxel-cyclophosphamide (TC) regimen in hormone receptor-positive, HER2-negative, T2-3N0 breast cancer.

Methods: Patients undergoing curative surgery for breast cancer in Seoul Saint Mary's Hospital between January 2009 and December 2017 were reviewed. Patients with pathologically confirmed hormone receptor-positive and HER2-negative breast cancer were analyzed, and efficacy of adjuvant chemotherapy was compared based on DFS.

Result: A total of 505 patients were included in the study. The median age was 49 (range: 27-86). 232 (45.9%) were luminal A-like and 273 (54.1%) were luminal B-like. 27 (5.3%) were T3N0. 302 (59.8%) of the cohort received adjuvant chemotherapy. 170 (33.6%) received AC regimen. 38 (7.5%) received doxorubicin and cyclophosphamide followed by taxane (ACT) regimen and 48 (9.5%) received TC regimen. The 5-year DFS rate for AC and TC group was 94.9% and 92.5% ($p = 0.42$). The 5-year DFS rate for AC and ACT group was 94.9% and 81.0% ($p = 0.053$). The 5-year DFS rate for TC and ACT group was 92.5% and 81.0% ($p = 0.82$). In multivariate analysis, T3 stage and young age (< 40) were associated with worse DFS.

Conclusions: Doxorubicin and cyclophosphamide with sequential taxane as adjuvant chemotherapy in hormone receptor-positive T2-3N0 breast cancer showed no benefit compared to AC or TC regimen. Further studies with larger cohorts are required to determine which patients are more likely to benefit from sequential taxane.

COMPARATIVE STUDY OF LONG TERM TREATMENT OUTCOME IN HORMONE RECEPTOR-POSITIVE METASTATIC BREAST CANCER WITH OR WITHOUT EVEROLIMUS AND EXEMESTANE AFTER PRIOR AROMATASE INHIBITOR

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Background: Everolimus/exemestane has been shown to improve progression-free survival in patients with endocrine-resistant metastatic breast cancer (MBC). The regimen has been well-accepted despite lack of survival benefit. In real-life setting, patients were not well-selected and hence benefit of such treatment may not be as robust.

Methods: This is a retrospective review of 143 hormone receptor (HR) positive, HER-2 negative MBC patients who progressed on nonsteroidal aromatase Inhibitors (NSAI). Patients who received everolimus/exemestane in any treatment lines (EE group) were compared to patients who never received everolimus (NE group). Primary end point was survival adjusted to prognostic factors.

Result: There were 52 patients in EE group and 91 in NE group with mean age of 58.6 years. Median follow-up time was 51 months. Unadjusted median overall survival was significantly longer in EE [33 vs. 25 months, HR 0.66 (95%CI 0.44-0.998); $p = 0.049$]. In univariate analysis, factors affecting survival included numbers of metastatic sites, bone metastasis, EE treatment and numbers of treatment lines. Independent factors that remained significant in multivariate analysis were treatment lines [HR 0.71 (95%CI 0.63-0.79); $p < 0.05$] and numbers of metastatic sites. Median numbers of treatment line after NSAI failure was 5.2 vs. 3.6 lines in EE and NE, respectively.

Conclusions: In this real-life practice data, patients with HR positive, HER-2 negative MBC who had progressed on NSAI, sequential use of multiple treatment regimens of endocrine and chemotherapy is essential to longer survival. Everolimus/exemestane may have contributed, to a lesser extent, to this improvement in survival.

DISCREPANCIES OF HER2 OVEREXPRESSION BETWEEN CORE NEEDLE BIOPSY AND SURGICAL BIOPSY IN BREAST CANCER PATIENTS AND ITS CLINICAL IMPLICATIONS

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Background: The correct determination of HER2 in Core needle biopsy (CNB) is crucial by allowing the addition of HER2 targeted therapy if indicated and avoid unnecessary therapy. In this study, we examined discrepancy rate of HER2 status between CNB and surgical biopsy, and the clinical factors that indicate such differences with or without preoperative chemotherapy.

Methods: We identified 757 breast cancer patients from 2012 to 2018 at Chung-Ang Univ. Hospital. We excluded *in situ* cancer, uncertain HER2 status, and patients who had pCR after NACT. HER2 status was assessed in CNB and surgical specimens. We assessed HER2 discrepancy in patients who received or not received NACT. The associations between the change in HER2 status and clinicopathological factors were assessed.

Result: In 447 patients who had not received NACT, HER2 status was concordant in 393 pairs (87.9%). Fifty-three (11.9%) of the HER2-negative tumors changed to HER2-positive, while one (0.2%) of the HER2-positive tumors changed to HER2-negative. In NACT patients, HER2 discordant rate was higher (23.7%). Twelve (20.3%) of the HER2-negative tumors changed to HER2-positive, while two (3.4%) of the HER2-positive tumors changed to HER2-negative. Larger tumor size (>2 cm), DCIS component in surgical specimen, ER/PR negativity and ER/PR status change were predictive factor for HER2 discrepancy in no NACT patients. However, larger residual tumor size (>1 cm) was the only relating factors for discrepancy in patients who received NACT.

Conclusions: HER2 discordant rate was higher (23.7%) in NACT patients. Most HER2 discrepancy cases were HER2-negative in CNB but confirmed to HER2-positive in surgical specimen, which resulted in insufficient treatment plan without proper HER2 targeted agents preoperatively.

OVERCOME OF ENDOCRINE RESISTANCE WITH COMBINATION OF CDK4/6 INHIBITOR AND β-CATENIN BLOCKADE IN BREAST CANCER CELLS

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Background: The Wnt/β-catenin signaling plays an important role in endocrine resistance in hormone receptor positive breast cancer. Palbociclib is a famous cyclin-dependent kinase 4 and 6 inhibitor, which activates retinoblastoma to inhibit growth in endocrine resistant breast cancer cell. We investigated dual inhibitory effects of CDK4/6 inhibitor, palbociclib, and β-catenin small-molecule inhibitor, ICG-001, in tamoxifen-resistant breast cancer cell line.

Methods: A tamoxifen-resistant MCF-7 (TamR) cells were established by continuously exposing tamoxifen to the MCF-7. The characteristics associated with cancer stemness were clarified with Western blot and cell cycle analysis and Mammosphere assay. The combinatory effects of palbociclib and ICG-001 were tested in control MCF-7 and resistant cell lines.

Result: TamR cells showed elevated protein levels including Nanog and Sox2, which indicate stem cell characteristics, and also elevated β-catenin activity compared with control cells. Besides, TamR cells had significantly higher mammosphere formation. Several stemness markers decreased when palbociclib and ICG-001 were treated together in TamR cells. Importantly, there was more reduction in stemness markers when treated with palbociclib and ICG-001 combination compared to palbociclib and ICG-001 alone (combination index value in palbociclib 25 μM and ICG-001 50 μM was 1.1 ± 0.02). TamR cells treated with palbociclib and ICG-001 combination demonstrated significantly reduced cell proliferation, mammosphere formation than those treated with drugs alone. Combination of both drugs could affect the proliferation inhibition and suppression of stemness characters additively.

Conclusions: These results suggest that β-catenin plays a role in endocrine resistant breast cancer and double inhibition of β-catenin and CDK4/6 can overcome the endocrine resistance in breast cancer cells.

IMPACT OF TRASTUZUMAB ON IPSILATERAL BREAST TUMOR RECURRENCE FOR HUMAN EPIDERMAL GROWTH FACTOR RECEPTOR 2-POSITIVE BREAST CANCER AFTER BREAST CONSERVING SURGERY AND ADJUVANT RADIOTHERAPY

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Background: Trastuzumab is well known to be effective to control locoregional recurrence and distant metastasis of human epidermal growth factor receptor 2 (HER2)-overexpressing breast tumor. However, few studies have reported the effect of ipsilateral breast tumor recurrence (IBTR) in spite of higher incidence for HER2-overexpressing subtype than other subtypes. The purpose of this study is to investigate the difference in the incidence of IBTR of HER2-overexpressing breast tumor according to adjuvant trastuzumab.

Methods: We retrospectively reviewed 988 patients who had done surgery and radiotherapy for HER2-overexpressing breast cancer between January 2000 and December 2017 in our institution. As regarding IBTR as recurrence "in" the ipsilateral breast, only patients who had done breast conserving surgery were included.

Result: Propensity score matching left 501 patients in completed trastuzumab group (CTG) and 167 patients in no trastuzumab group (NTG). Median follow-up period for all patients was 70.7 months (range 12.7-227.6 months). The 10-year IBTR-free survival rate showed a significant benefit for CTG than NTG (95.1% vs. 98.1%; $p=0.002$). Multivariate analysis revealed young age at operation, axillary lymph node metastasis, closed or involved resection margin status, positive hormone receptor (HR) and omitted adjuvant trastuzumab (Hazard ratio, 2.97; 95% Confidence interval, 1.36-6.48) are independent predictors of IBTR. Subgroup analysis showed small benefit of adjuvant trastuzumab for patients with HR-positive cancer or axillary node metastasis ($p=0.287$, 0.344, respectively).

Conclusions: Administration of trastuzumab is an independent factor of not only locoregional recurrence but also IBTR among HER2-positive breast cancer, especially when HR is negative and axillary metastasis doesn't exist.

MISTLETOE EXTRACT TARGETS THE STAT3-FOXM1 PATHWAY TO INDUCE APOPTOSIS AND INHIBITS METASTASIS IN 4T1 MOUSE BREAST CANCER CELLS

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Background: Mistletoe extracts (Viscum album L.) have been widely used as complementary medicines for the treatment of cancer and their cytotoxic effects have been reported on various types of cancer. However, the molecular targets of mistletoe extracts have not been well studied. Herein, we investigated molecules associated with anti-cancer effects of mistletoe extract (ME) using 4T1 murine breast cancer cells.

Methods: Cell viability and apoptosis of 4T1 cells treated with ME were measured by MTT assay and Annexin/PI staining, respectively. Cell invasiveness was estimated by Matrigel invasion assay. To evaluate in vivo anti-tumor effects of ME, ME 4 or 8 mg/kg were intraperitoneally administered to 4T1 tumor-bearing BALB/c mice 3 times per a week. Protein expression was measured by Western blot assay, while mRNA expression was estimated by qRT-PCR analysis.

Result: ME induced apoptosis and inhibited STAT3 phosphorylation. And this inhibition was accompanied by the down-regulations of FOXM1 and the DNA repair proteins, RAD51 and survivin. ME simultaneously increased the expressions of the DNA damage marker proteins, phosphorylated H2A.X and phosphorylated p38. Furthermore, ME effectively suppressed tumor growth in 4T1 tumor-bearing BALB/c mice. In addition to tumor growth inhibition, ME inhibited lung metastasis in the tumor-bearing mice and cell invasiveness by down-regulating the expressions of MMP3, MMP-9, uPA, uPA receptor, and markers of epithelial mesenchymal transition (snail and fibronectin).

Conclusions: Our results suggest that ME targets the STAT3-FOXM1 pathway for its cytotoxic effects, and that mistletoe extracts might be useful for the treatment of patients with cancers highly expressing the STAT3-FOXM1 pathway.

SUPPRESSIVE EFFECT OF LEUPRORELIN ACETATE 6-MONTH DEPOT ON SERUM ESTRADIOL LEVEL IN PATIENTS WITH HORMONE-RESPONSIVE BREAST CANCER

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Background: Leuprorelin acetate, a luteinizing hormone-releasing hormone agonist, is frequently used in pre-menopausal patients with hormone-responsive breast cancer. In this study, we aimed to evaluate the suppressive effect of leuprorelin acetate 6-month depot (LA-6M) on serum estradiol (E2) level in patients with hormone-responsive breast cancer.

Methods: Premenopausal patients with hormone-responsive breast cancer who selected LA-6M (22.5 mg) as the ovarian suppression method were included in this study. The serum levels of E2 were tested at time points of 24 and 48 weeks after first administration of LA-6M. The primary endpoint was the suppression rate of E2 to the level of ≤ 4 pg/ml over the 24 weeks.

Result: In total, 133 patients were included in this study. The median age was 42 years (26-52 years). The median E2 level before the administration of LA-6M was 27.8 pg/mL (mean E2, 104.1 pg/mL). In our cohort, 15.9% (n = 21) of patients received prior adjuvant chemotherapy and 17.3% (n = 23) received neoadjuvant chemotherapy. The mean E2 level at 24 weeks and 48 weeks after the administration of LA-6M were 6.6 pg/mL and 5.1 pg/mL, respectively. The E2 suppression rate was 67% over the 24 weeks.

Conclusions: In our study, most patients on LA-6M had E2 levels of ≤ 4 pg/mL, and the suppressive effect of LA-6M on serum E2 seems satisfactory.

REAL-WORLD EFFICACY OF PALBOCICLIB PLUS ENDOCRINE THERAPY IN ASIAN PATIENTS WITH ADVANCED BREAST CANCER

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Background: Palbociclib is a CDK 4 and 6 inhibitor which shows promising effect in hormone-receptor (HR)-positive, human epidermal growth factor receptor 2 (HER2)-negative advanced breast cancer. The purpose of this study is to evaluate the real-world efficacy and toxicity of palbociclib plus endocrine therapy in Korea.

Methods: This is a retrospective study performed in two tertiary referral hospital. Advanced breast cancer patients who were treated with palliative 1st line palbociclib plus endocrine therapy were enrolled.

Result: A total of 216 patients were treated with palbociclib plus endocrine therapy between August 2016 and May 2019. Seventy-five patients (34.8%) were premenopausal women with a median age of 56 (29-89) years. Median progression free survival (PFS) of palbociclib plus endocrine was 33.0 months and objective response rate (ORR) was 59.3%. The efficacy of palbociclib was not affected by age. However, luminal B patients had shorter PFS (Not reached vs. 33.0 months, $p = 0.019$) and tendency of lower ORR (58.3 vs. 62.0%, $p = 0.194$) compared to luminal A patients. Multivariate analysis revealed luminal B as an independent negative prognostic factor for PFS (adjusted hazard ratio 6.97, $p = 0.034$). The most common grade 3 or 4 adverse event was neutropenia (86.7%).

Conclusions: The efficacy and toxicity of palbociclib in the real-world was comparable to those of clinical trials. In addition, palbociclib with endocrine therapy was an effective treatment option for young (< 50 years) breast cancer patients. However, palbociclib plus endocrine therapy should be used in caution in luminal B patients with visceral crisis.

OMISSION OF CHEMOTHERAPY FOR HORMONE RECEPTOR-POSITIVE AND HER2-NEGATIVE BREAST CANCER: PATTERNS OF TREATMENT AND OUTCOMES FROM THE KOREAN BREAST CANCER SOCIETY REGISTRY

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Background: Although antihormone treatment (HT) is a major treatment option for hormone receptor-positive breast cancer, the National Comprehensive Cancer Network (NCCN) recommends adjuvant chemotherapy (CT) for selected high risk patients. Recent studies state that hormone-positive, human epidermal receptor (Her)-2 -negative women with low disease burden may be spared from CT. This study aims to evaluate treatment trends (CT+HT vs. HT alone) from 2000-2018 in Korea and to assess its impact on overall survival (OS) on this group of women.

Methods: The Korean Breast Cancer Society Registry was queried (2000 to 2018) for women with pT1-2N0-1 hormone receptor-positive and Her2-negative disease who underwent surgery and were given adjuvant systemic treatment (CT and HT). Patients' clinicopathologic factors, change of treatment pattern over time and OS were evaluated.

Result: A total of 40,938 women were included in the study; 20,880 (51.0%) received CT+HT while 20,058 (49.0%) received HT only. There is a steady incline in HT alone use being observed, from 21.0% (2000) to 64.6% (2018). On cox regression analysis, age, type of breast and axillary operation, T and N stage, BMI, histologic grade and presence of LVI were prognostic indicators for OS. There was no significant difference between CT+HT vs. HT alone in terms of OS ($p = 0.126$).

Conclusions: There has been a shift from CT+HT to HT alone in the treatment of the majority of hormone receptor-positive, Her2-negative women with low burden disease without significant difference in terms of OS. Therefore, HT alone could be a safe treatment option in some selected patients, even in T2N1 disease.

THE OCCURRENCE OF LOW RELATIVE DOSE INTENSITY IN CHEMOTHERAPY FOR BREAST CANCER AND ITS INFLUENCING FACTORS: A SINGLE-CENTRE STUDY IN INDONESIA

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Background: Chemotherapy-induced hematologic toxicity may lead to dose reduction and/or delay, which in turn compromise disease control and survival. There is a limited study of relative dose intensity (RDI) of chemotherapy for breast cancer (BC) in Indonesia. This study investigates the incidence of low RDI, its association with severe neutropenia and anemia, and its predicting factors in BC patients.

Methods: This study recruited 102 early BC patients who were diagnosed from July 2018 to April 2020. Low RDI was defined as $\leq 85\%$ of average RDI, dose reduction was $\geq 15\%$ decrease of chemotherapy dosage, and dose delay was ≥ 7 days delay in any chemotherapy cycle. Potential influencing factors included sociodemographic-, clinical-, and treatment-related variables. Chi-square, Mann-Whitney, and logistic regression tests were used for statistical analyses.

Result: The average RDI for all patients was 94.9%. Seven patients (6.9%) had a low RDI, six patients (5.9%) experienced dose reduction, and 35 patients (34.3%) experienced dose delay. During any chemotherapy cycle, severe neutropenia (absolute neutrophil count $< 500/\mu L$) and anemia (hemoglobin < 10 g/dL) were frequently observed (78.4% and 66.7%; respectively). Lower RDI was significantly associated with anemia ($p = 0.005$), but not with severe neutropenic event ($p = 0.169$). Multivariate analyses showed that older age and diabetes comorbidity were risk factors of low RDI (OR = 1.102, 95%CI 1.00-1.20, $p = 0.037$ and OR = 6.489, 95%CI 1.16-36.24, $p = 0.033$; respectively).

Conclusions: Low RDI chemotherapy occurred in 6.9% of the local early BC patients and it was significantly associated with anemia. We identified age and the presence of diabetes as predictors of low RDI.

ORAL PACLITAXEL AND ENCEQUIDAR (OPAC+E) VS. IV PACLITAXEL (IVPAC) FOR THERAPY OF METASTATIC BREAST CANCER (MBC) (STUDY KX-ORAX-001): PROGRESSION FREE SURVIVAL (PFS) AND OVERALL SURVIVAL (OS) UPDATES

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Background: OPac+E is oral paclitaxel with encequidar, a, p-glycoprotein inhibitor that enables the absorption of oral paclitaxel. Trial, KX-ORAX-001, was presented at SABCS, 2019, Abstract # GS6-01. The primary endpoint, confirmed tumor response was significantly higher in the oPac+E vs. IVPac (40.4% vs. 25.6%, $p=0.005$ mITT; 35.8% vs. 23.4%, $p=0.011$ ITT). An update of progression free survival (PFS) and overall survival (OS) analyses comprising an additional 14 months of follow-up are presented.

Methods: Study KX-ORAX-001 was a phase III, randomized study in women with metastatic breast cancer (mBC). Patients were randomized 2:1 to receive oPac+E 205 mg/m^2 3x/week or IVPac 175 mg/m^2 q3W.

Result: In the mITT, PFS for oPAC+E was 8.4 months vs. IVPac [HR 0.739 (0.561-0.974); $p=0.023$]. For mITT, median OS was 23.3 months for oPac+E vs. IVPac 16.3 months, [HR 0.735 (0.556-0.972); $p=0.026$]. For the ITT PFS, Hazard Ratio was 0.768 (0.584-1.010; $p=0.046$). For ITT OS, Hazard Ratio was 0.794 (0.607-1.037; $p=0.082$).

Conclusions: OPac+E achieved the primary endpoint, superiority in confirmed radiologic response rate vs. IVPac at the dose/schedule approved for mBC. Duration of responses were long. PFS and OS in the prespecified mITT was statistically significantly higher in the oPac+E treated patients. (NCT 02594371)

LOWER RATES OF NEUROPATHY WITH ORAL PACLITAXEL AND ENCEQUIDAR (OPAC+E) COMPARED TO IV PACLITAXEL (IVPAC) IN TREATMENT OF METASTATIC BREAST CANCER (MBC): STUDY KX-ORAX-001

Hope S. Rugo[1], Gerard Umanzor[2], Francisco Javier Barrios Schaeffer[3], Rosa Haydee Vasallo Veras[4], Marco Antonio Chivalan Castro[5], Suyapa Aurora Bejarano Caceres[6], Julio Roberto Ramirez Velasquez[7], Luis Fein[8], Ruben Dario Kowalyszyn[9], David L. Cutler[10], Ethan Douglas Kramer[11], John Goldfinch[12], Hui Wang[13], Taryn Moore[12], Rudolf Min-Fun Kwan[10]

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Background: Chemotherapy-induced peripheral neuropathy (CIPN) is a common dose-limiting toxicity associated with IVPac. Primarily sensory, CIPN is an often irreversible condition primarily affecting the hands and feet associated with pain, numbness, tingling, and sensitivity to cold and has a significant impact on quality of life and treatment tolerance.

Methods: Study KX-ORAX-001 was a phase III, randomized, international study in women with mBC for whom treatment with IVPac was recommended. Eligible patients were randomized 2:1 to receive oPac+E or IVPac.

Result: Incidence of neuropathy-related TEAEs were lower in patients receiving oPac+E vs. IVPac: Overall (21% vs. 64%; all grades), grade ≥ 3 (2% vs. 15%). Cumulative risk for neuropathy with IVPac was > 50% by week 8 and was 83% at week 88. In contrast, the cumulative risk of neuropathy with oPac+E rose slowly and plateaued at 34% at week 88. Treatment discontinuations due to neuropathy occurred only in the IVPac arm (8%). Dose reductions due to neuropathy were reported in 8% of IVPac treated patients and in 2% of oPac+E treated patients.

Conclusions: OPac+E was associated with greater efficacy in the treatment of patients with mBC and a lower incidence of neuropathy, slower onset and lesser severity of neuropathic events compared to IVPac 175 mg/m^2 administered every three weeks. Fewer patients receiving oPac+E required dose reduction due to neuropathy and no patients receiving oPac+E discontinued treatment due to neuropathy. Reduction in neuropathy may improve quality of life and allow longer administration of effective therapy while maintaining dose intensity.

ORAL PACLITAXEL AND ENCEQUIDAR (OPAC+E) IN THE TREATMENT OF METASTATIC BREAST CANCER (MBC): MANAGEMENT OF GASTROINTESTINAL ADVERSE EVENTS (GI AE). STUDY KX-ORAX-001

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Background: OPac+E is oral paclitaxel combination with encequidar, a p-glycoprotein inhibitor that enables the absorption of oral paclitaxel. mBC patients who received oPac+E had significantly greater confirmed tumor response and longer survival with lower rates and severity of neuropathy but increased GI AE compared to IV paclitaxel (IVPac) (Study KX-Orax-001 presented at SABCS, 2019, Abstract # GS6-01).

Methods: Study KX-ORAX-001 was a phase III, randomized, study in women with metastatic breast cancer (mBC). Patients were randomized 2:1 to receive oPac+E 205 mg/m^2 3x/week or IVPac 175 mg/m^2 q3W. IVPac patients received dexamethasone, antihistamine, and antiemetic premedication; oPac+E patients were not given premedication. The protocol was amended after approximately 30% of patients were enrolled to allow antiemetic premedications, and loperamide at onset of diarrhea, for oPac+E patients.

Result: Grades 2 or 3 vomiting for IVPac patients were 4% and 1%; for oPac+E patients prior to amendment were 24% and 7%, and after the amendment were 7% and 4% respectively. Grades 2 or 3+ diarrhea for IVPac patients were 7% and 1%; for oPac+E patients prior to amendment were 27% and 9%, and after the amendment were 16% and 3% respectively. Odansetron was most frequently prescribed for oPac+E patients. Oral NK1 inhibitor aprepitant (a CYP3A4 inhibitor) appeared to be associated with increased incidence of oral paclitaxel systemic toxicity.

Conclusions: Antiemetic premedication and early use of loperamide in oPac+E patients markedly decreased the incidence of ≥ Grade 2 vomiting and diarrhea. The use of the oral NK1 inhibitor aprepitant is not recommended. (NTC02594371)

NEW BRAIN METASTASES AFTER WHOLE-BRAIN RADIOTHERAPY OF INITIAL BRAIN METASTASES IN BREAST CANCER PATIENTS: THE SIGNIFICANCE OF MOLECULAR SUBTYPES (KROG 16-12)

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Background: To identify the risk factors leading to new brain metastases (BM) following brain-directed treatment for initial BM resulting from breast cancer (BC).

Methods: In this multi-institutional study, 538 BC patients with available follow-up imaging after brain-directed treatment for initial BM were analyzed. Tumor molecular subtypes were classified into: hormone receptor-positive/human epidermal growth factor receptor 2-negative (HR+/HER2-, n = 136), HER2-positive (HER2+, n = 253), or triple-negative BC (TNBC, n = 149).

Result: In 37.4% of patients, new BM emerged at a median of 10.5 months after brain-directed treatment for initial BM. The 1-year actuarial rate of new BM for HR+/HER2-, HER2+, and TNBC were 51.9%, 44.0%, and 69.6%, respectively ($p = 0.008$). Initial whole-brain radiotherapy (WBRT) reduced new BM rates (22.5% reduction at 1 year, $p < 0.001$) according to molecular subtype (HR+/HER2-, 42% reduction at 1 year, $p < 0.001$; HER2+, 18.5%, $p = 0.004$; TNBC, 16.9%, $p = 0.071$). Multivariate analysis revealed an increased risk of new BM for the following factors: shorter intervals between primary BC diagnoses and BM ($p = 0.031$); TNBC (relative to HR+/HER2-) ($p = 0.016$); presence of extracranial metastases ($p = 0.019$); number of BM (> 4) ($p < 0.001$); and BM in both tentorial regions ($p = 0.045$). Anti-HER2 therapy in HER2+ patients ($p = 0.013$) and initial use of WBRT ($p < 0.001$) significantly lowered new BM development.

Conclusions: Tumor molecular subtypes were associated with both rates of new BM development and the effectiveness of initial WBRT. Anti-HER2 therapy in HER2+ patients significantly lowered new BM occurrence.

PROGNOSTIC FACTORS AND RELATED TREATMENT STRATEGY FOR BRAIN CONTROL IN BREAST CANCER PATIENTS WITH BRAIN METASTASES

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Background: Brain metastasis (BM) is often associated with a dismal prognosis, yet little is known about features unique to the brain environment.

Methods: A retrospective study of 116 patients from January 2006 to December 2018 at Seoul St Mary's hospital with breast cancer and BM was done. We compared BM progression-free survival (BMPFS), and brain-specific overall survival (BOS) by tumor characters and treatment. Histological/molecular subtypes, pattern/characteristics of metastases, performance status, and treatment modality after the development of BM were studied.

Result: Local brain treatment, endocrine treatment, and systemic chemotherapy were all significantly related to better BMPFS/BOS. SRS-only and surgery-plus-WBRT treated patients showed better survival compared with surgery-only or WBRT-only patients; median BOS 37, 36, 13, 3 months, respectively. Interestingly in HR+ patients, only endocrine therapy was significantly related to prolonged both BMPFS/BOS in multivariate analysis; BOS HR 0.23, CI 0.103-0.503, $p<0.001$; BMPFS HR 0.41, CI 0.182-0.904, $p=0.027$. Having a higher disease burden with lung/liver metastasis (n = 27/66) did not make differences in this result. Patients who underwent endocrine treatment were responsive to it. Median BMPFS/BOS were shorter in ILC and HER2 negative type. The presence of lung or liver metastasis at BM diagnosis and poor performance status were poor prognostic factors. Leptomeningeal disease and a higher number of BM lesions were associated with shorter BMPFS/BOS.

Conclusions: Brain survival is affected by tumor nature, such as histology and molecular subtype. It is worthy to treat patients with BM actively as feasible. Local BM treatment as indicated, even combined, seems beneficial. Also for HR+BCBM, endocrine treatment is significantly predictive of better brain control.

THE FIRST-LINE TREATMENT FOR THE PATIENTS WITH HORMONE RECEPTOR POSITIVE, HER2 NEGATIVE METASTATIC BREAST CANCER

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Background: Endocrine therapy is recommend as the first-line treatment for patients with hormone receptor (HR)-positive, human epidermal growth factor receptor 2 (HER2)-negative metastatic breast cancer without visceral crisis. However, the recommendation has not been followed well in real world because survival issues. The combination of palbociclib and letrozole (PL) has been reimbursed since 2017 in Korea. In this study, the survival of patients with HR-positive/HER2-negative metastatic breast cancer was evaluated based on the type of first line treatment; PL, conventional endocrine therapy (ET), or chemotherapy (CT).

Methods: The medical records were reviewed for this retrospective analysis. The patients with HR-positive/HER2-negative metastatic breast cancer were included. The progression-free survival rate and overall survival rate was compared based on the type of first line treatment.

Result: The total number of included patients was 195. The first line treatments were PL for 56 (28.7%), ET for 40 (20.5%), and CT for 99 (50.8%). The progression free survival (PFS) of PL was significantly better than PFS of ET ($p < 0.001$), and PFS of CT ($p < 0.002$). The PFS rate after 24 months follow-up was 63.7%, 31.6%, and 46.6% in PL, ET, and CT, respectively. The PFS rate was not significantly different between the ET and CT ($p = 0.172$). The overall survival (OS) of PL significant better than ET ($p = 0.045$), and have a trend of getting benefit from PL than CT ($p = 0.062$). The OS rate was not different between ET and CT ($p = 0.362$).

Conclusions: The PL regimen would be recommended as the treatment of choice as the first-line therapy in patients with HR-positive/HER2-negative metastatic breast cancer.

SURGICAL TREATMENT OUTCOME OF IPSILATERAL SUPRACLAVICULAR LYMPH NODE RECURRENCE AFTER BREAST CANCER SURGERY

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Background: Despite the development of systemic therapy, recurrence of supraclavicular lymph nodes (SCLN) is known to have poor prognosis. Controversy over surgical treatment of SCLN still exists. In this study, we evaluated the prognosis of patients who underwent surgical treatment of ipsilateral SCLN recurrence.

Methods: From October 2007 to October 2016, 22 patients received ipsilateral SCLN dissection because of suspected recurrence after primary surgery of breast cancer. Among these patients, 9 patients had distant metastasis immediately after SCLN dissection. Curative resection was possible for 13 patients.

Result: The median interval between surgery of primary breast cancer and recurrence of SCLN was 32.5 months (range, 5-150 months). The mean primary tumor size was 2.8 cm and 50% (11/22) had axillary LN metastasis. Hormonal receptor was positive in 54.5% (12/22). Among 13 patients who received curative resection, 6 patients had ipsilateral breast recurrence (n = 1) or axillary or internal mammary LN recurrence (n = 5). They received mastectomy or regional LN dissection at the time of SCLN surgery. Mean number of removed SCLNs was 19.38 and metastatic SCLNs was 11.7. Radiotherapy was conducted in 6 patients and systemic therapy in 13. Mean progression free interval (PFI) was 23.5 months (ranges, 5-63), 5-years overall survival after based on the date of SCLN recurrence was 38.4 months. The mean progression free survival was 8.1 months in 9 patients with SCLN and distant metastasis.

Conclusions: Curative surgical resection and additional systemic therapy appear to play an important role to improve survivals of the patients with ipsilateral SCLN recurrence.

ASSOCIATION OF NEUTROPHIL TO LYMPHOCYTE RATIO (NLR) AND TUMOR-INFILTRATING LYMPHOCYTE (TIL) WITH PROGRESSION-FREE SURVIVAL FOR FIRST-LINE TREATMENT IN PATIENTS WITH RECURRENT BREAST CANCER

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Background: NLR and TIL are reported to be a prognostic factor for breast cancer. The purpose of this study is to investigate association of NLR and TIL with response to first line treatment in recurrent breast cancer patients.

Methods: The patients were eligible if they had primary surgery at our institute and the patients were eligible if they had primary surgery at our institute and their breast cancer recurred, and specimens of recurrent disease and information for first-line treatment were available. NLR at primary surgery and recurrence was investigated and defined as the absolute neutrophil count divided by the absolute lymphocyte count. The cutoff value of NLR was set at 3. High TILs were defined as ≥ 10%.

Result: Among 124 patients, 99 patients (79.8%) and 83 patients (66.9%) had low NLR at primary surgery and recurrence. On the other hand, 16 patients (12.9%) had high TIL at both primary surgery and recurrence. There was no significant correlation between NLR and TILs at primary surgery as well as recurrence. NLR and TIL at primary surgery and recurrence were not associated with progression free survival (PFS) for first-line treatment. In addition, TIL was not significant by subgroup analyses with endocrine therapy, chemotherapy, and anti-HER2 therapy for PFS. High NLR at primary surgery was a poor prognostic factor for PFS in patients treated with chemotherapy in the first-line setting.

Conclusions: NLR and TIL were not generally associated with PFS for first-line treatment. Analysis with more patient number and treatment regimen is warranted.

LABORATORY INDICATORS PREDICT AXILLARY NODAL PATHOLOGICAL COMPLETE RESPONSE AFTER NEOADJUVANT THERAPY IN BREAST CANCER

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Background: The purpose was to integrate pretreatment indicators include clinicopathological factors and laboratory indicators to predict axillary nodal pathological complete response (apCR) after neoadjuvant therapy (NAT).

Methods: From April 2015 to 2020, 416 breast cancer patients with clinical nodal positive disease underwent operation after NAT were included. The pretreatment clinicopathological factors and laboratory indexes were collected. The optimal cut-off values of age and laboratory indexes were determined by Youden index using receiver operating curve analyses. The logistic regression analysis was applied to examine predictive factors of apCR. A nomogram was then developed according to the logistic analysis.

Result: Among 416 patients, 37.3% (155/416) of them achieved apCR. The multivariate analysis showed that age, pathological grading, molecular subtype and neutrophil to lymphocyte ratio were indicated as independent predictors of apCR. A nomogram was established based on these factors showed its discriminatory ability (AUC = 0.702). In subtype analysis, the apCR rate was 23.8% (44/185), 47.1% (81/172), and 50.8% (30/59) in hormone receptor positive/HER-2 negative (HR+/HER2-), HER-2 positive (HER2+) and tripe-negative (TN) subgroup, respectively. According to the multivariate analysis result, pathological grade and fibrinogen level were indicated as independent predictors for apCR after NAT in HER2+ patients. In HR+/HER2- and TN subtype, we did not find significant predictors.

Conclusions: Except for traditional clinicopathological factors, the laboratory indicators could also be identified as predictive factors of apCR after NAT. Integrating the pretreatment indicators might help to predict apCR and guide individualized treatment options. The nomogram demonstrated its discriminatory capability with a fairly high AUC in our cohort.

THE PROSPECTIVE NOMOGRAM STUDY OF SHRINKAGE PATTERNS OF THE PRIMARY TUMOR AFTER NEOADJUVANT THERAPY IN BREAST CANCER

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Background: The aim of this study was to develop nomogram for predicting shrinkage patterns of primary tumor after neoadjuvant therapy (NAT) that can assist clinicians in treatment planning.

Methods: From April 2014 to 2018, 104 breast cancer patients underwent operation after NAT were included in this prospective study. Breast specimen after surgery was prepared with sub-serial section, residual tumors were microscopically outlined, and scanned by Photoshop software. The pathological three-dimensional (3D) nodes were reconstructed with 3D-DOCTOR software. According to the pathological 3D reconstruction modes, the clinico-pathological shrinkage patterns: concentric shrinkage modes (CSM) and non-concentric shrinkage modes (NCSM). The impact factors associate with clinical-pathological patterns were assessed. A nomogram to predict the likelihood of shrinkage patterns was constructed based on clinico-pathologic variables.

Result: The surgical pathology complete response, solitary lesions without surrounding lesions, multinodular lesions, solitary lesions with adjacent spotty lesions and diffuse lesions were observed in 34 (32.7%), 16 (15.4%), 19 (18.3%), 25 (24.0%), and 10 (9.6%) patients by pathological 3D reconstruction. The CSM and NCSM was observed in 70 (67.3%) and 34 (32.7%) patients. Primary tumor stage, lymph nodes down-staging, molecular subtypes and mammographic malignant calcification were independent predictors of clinico-pathological shrinkage patterns (all $p < 0.05$). The nomogram based on these factors predicting the clinical-pathological shrinkage patterns showed a good concordance index (0.833) and good calibration.

Conclusions: The nomogram based on the clinical, imaging, pathological and NAT effects showed a good concordance index in predicting the clinical-pathological shrinkage patterns, and it could help to guide the individualized selection of patients receiving breast conserving surgery and extent of resection after NAT.

NEOADJUVANT CHEMOTHERAPY FOR HER2NEU POSITIVE OPERABLE BREAST CANCER INCREASE NUMBER OF BREAST CONSERVING SURGERY: RETROSPECTIVE COHORT ANALYSIS AT SINGLE INSTITUTION EXPERIENCE

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Background: The purpose of this study was to evaluate the efficacy, cardiotoxicity profile and reducing extend of breast cancer surgery in neoadjuvant therapy human epidermal growth factor receptor 2-positive operable breast cancer patients.

Methods: A total of 152 patients diagnosed from 2010 to 2017 were included in the study. The treatment consisted of a sequential regimen of taxanes and anthracyclines plus trastuzumab. The clinical, pathological responses and type of breast cancer surgery were evaluated and correlated with clinical and biological factors. The cardiotoxicity profile and long-term benefits were analyzed.

Result: The median age was 49 years. 6%, 24%, and 64% of patients had stage I, II and III breast cancer while 6% had inflammatory breast cancer. Hormone receptor (HR) status was negative in 43%, and 62% had grade III breast cancer. The clinical complete response rate was 49% and 63% as assessed using ultrasound and magnetic resonance imaging. We found the incidence of breast conservative surgery was increase (66%). The pathological complete response (pCR) rate was 52%, higher in HR-negative (64%) patients than in HR-positive (41%) patients and in grade III breast cancer (53%) patients than in grade III breast cancer (45%) patients. Patients who achieved pCR had longer disease-free survival. A total of 2% of patients showed a 8% decrease in left ventricular ejection fraction to < 50% during treatment.

Conclusions: A sequential regimen of taxanes and anthracyclines plus trastuzumab was effective with high pCR rates and increase possibility to do BCS and had tolerable cardiotoxicity profile.

NEOADJUVANT CHEMOTHERAPY IN ASIAN BREAST CANCER PATIENTS: HALF A DECADE EXPERIENCE OF A NEOADJUVANT PROGRAM IN A TERTIARY CANCER CENTRE

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Background: Neoadjuvant chemotherapy (NACT) enables down-staging of tumors, conversion of inoperable tumors, and efficacy assessment. Complete pathological response (pCR) is associated with improved survival. We describe our institutions experience with NACT.

Methods: Retrospective review of non-metastatic breast cancer female patients in the Joint Breast Cancer Registry treated with NACT prior to curative breast surgery between October 2014 and October 2019 at National Cancer Centre Singapore. Demographic data, clinicopathological data and details of NACT were recorded. We examined pCR rates (defined as absence of invasive cancer and *in situ* cancer in the breast and axillary) and disease recurrence confirmed radiologically or with histology. Chi-square was used in variables analysis.

Result: A total of 290 patients were offered NACT followed by surgery. 43 (14.8%) did not complete NACT, 7 due to disease progression and 36 due to toxicities. 84 (26.5%) patients were HER2-positive(+)/HR negative(-), 54 (17.0%) were HER2+/HR+, 93 (29.4%) were HER2-HR+, and 59 (18.7%) were triple negative (TN). 80 (27.5%) patients had pCR. There were 31 (38.8%) HER2+/HR-, 18 (22.5%) HER2+/HR+, 21 (26.2%) TN and 9 (11.2%) HR+ patients with pCR ($p < 0.001$). 4 (5.0%) patients with pCR had disease recurrence compared to 32 (14.4%) among those without pCR ($p = 0.026$). There was no significant association between tumor subtypes and recurrence ($p = 0.215$).

Conclusions: Our results were consistent with historical suggesting highest rates of pCR with HER2+ disease followed by TN. pCR was associated with improve disease recurrence. Data on NACT prescribing practices will be presented in further detail.

THE EVALUATION OF EFFECT OF NEOADJUVANT CHEMOTHERAPY IN METAPLASTIC BREAST CANCER

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Background: Metaplastic breast cancer (MBC) is a rare pathologic entity accounting for < 1% of all invasive breast cancers and is generally negative for hormone receptors and HER2. Although triple negative breast cancers (TNBCs) usually show good response to neoadjuvant chemotherapy (NAC) and pathologic complete response (pCR) rate of about 40%, chemo-responsiveness of MBC to NAC is not well known. The aim of this study was to compare NAC response between MBC and other TNBC.

Methods: Retrospective chart review of TNBC patients who underwent NAC and surgery at Seoul National Univ. Hospital between January 2000 and December 2019 were included for analysis. Tumor size on ultrasound evaluation before NAC and pathologic size of residual tumor was used to assess responsiveness to NAC and categorized as complete response (CR), non-CR, and progressive disease (PD).

Result: Of 3,277 TNBC patients included in analysis, 89 (2.7%) were MBC and 3,188 (97.3%) were non-MBC. There was no statistically significant difference in response to neoadjuvant chemotherapy between the two groups. However, there was a tendency for less CR (0 (0%) vs. 81 (2.54%)) in MBC.

Conclusions: Metaplastic breast cancer is associated with less CR and more PD after NAC compared to non-MBC TNBC. Upfront surgery for MBC may be more beneficial than NAC. In addition, we are trying to identify the metaplastic breast cancer through vimentin and pan-CK stain. This stain will allow patients with pCR in non-MBC group to reclassify into MBC groups, which will once again confirm the pCR of MBC patients and analyze the response of NAC.

DEVELOPMENT OF INFORMATION TOOLS FOR PATIENTS WITH BREAST CANCER DURING PREGNANCY IN JAPAN

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Background: Before visiting specialized breast cancer team it is difficult for patients with breast cancer during pregnancy to get the information about standard treatment course and their individual one, especially for the advantages and disadvantages to go on pregnancy or abortion. We developed the information tools to support making their decision at optimum time.

Methods: The member of editor were made by surgeon and medical oncologist of breast cancer, psychologist, obstetrician and maternity nurse of perinatal medical care, pediatrics, specialized nurse for abortion and web designer. This work was supported by Japanese Breast Cancer society (JBCS).

Result: We discussed how desirable explanation not only phrases but also illustrations and putted all our energy into resourcing patients with non-biased information. To focus on sending messages for patients before they make an important choice, medical jargon use was minimalized. Our tool composed of the pages complied all of things they should know before their decision and the pages for patients who are of two minds about going on pregnancy or abortion. Through our tools we want to send messages strongly for the patients that it is natural to be of two minds and that we are ready for supporting you no matter what choices you make.

Conclusions: We made information tools for pregnancy breast cancer patients. It provided free from JBCS homepage now. We want to revise after making a valuation after release in near future.

RISK OF ENDOMETRIAL CANCER AND FREQUENCIES OF INVASIVE ENDOMETRIAL PROCEDURES IN YOUNG BREAST CANCER SURVIVORS TREATED WITH TAMOXIFEN: A NATIONWIDE STUDY

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Background: Although the guidelines recommend gynecological assessment for symptoms of endometrial cancer in postmenopausal breast cancer survivors taking tamoxifen (TAM), the risk of endometrial cancer in young breast cancer survivors has not yet been fully assessed. This study aimed to investigate the risk of developing endometrial cancer and the frequencies of gynecological examinations in young breast cancer survivors taking TAM in South Korea.

Methods: A nationwide retrospective cohort study was conducted using the Health Insurance Review and Assessment Service claims data. Kaplan-Meier analysis, the log-rank test and multivariable Cox proportional hazards regression model were used to assess the probability of endometrial cancer, benign endometrial conditions, and the probability of invasive procedure and to analyze the risk of endometrial cancer.

Result: Between 2010 and 2015, 60,545 newly diagnosed breast cancer survivors were included. The total person-years were 256,099 and 140 (0.23%) patients developed endometrial cancer during the study. In subjects aged below 40 years, TAM did not significantly increase the risk of endometrial cancer (hazard ratio [HR], 2.05; 95% CI 0.65-6.37). However, among the TAM subgroups, symptomatic young breast cancer survivors aged below 40 years (HR, 12.46; 95% CI, 2.69-57.52) showed significantly increased risks of endometrial cancer. Among the TAM subgroup, the ratios of frequency of invasive diagnostic procedures to the incidence of endometrial cancer were higher in under 40 ages than 60 or more.

Conclusions: Symptomatic young breast cancer survivors taking TAM are at a high risk of developing endometrial cancer. Gynecological surveillance should be tailored in young breast cancer survivors to avoid unnecessary invasive procedures.

RELATIONSHIP OF PERIPHERAL BLOOD MARKERS BETWEEN NORMAL PATIENTS AND PATIENTS WITH BREAST CANCER

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Background: There is a growing evidence that peripheral blood markers, such as absolute neutrophil count (ANC), absolute lymphocyte count (ALC) and neutrophil to lymphocyte ratio (NLR), have a prognostic impact in various solid cancers. However, there is limited data on differences in peripheral blood markers between normal patients and patients with breast cancer.

Methods: From January 2010 to December 2018, we retrospectively reviewed the medical records of patients who underwent breast ultrasonography (US), mammography and complete blood count (CBC) at Seoul St. Mary's Hospital. The patients with BIRADS categories 1-3 in breast US and mammography defined as normal. Patients with medical history that affected CBC were excluded from the analysis. Students t-test was used to compare means between two groups.

Result: During this period, CBC data were obtained from 3,045 patients with breast cancer and 7,189 patients with normal breast. In a comparison of 3 markers of peripheral blood markers, patients with breast cancer had a higher ANC count (3,594.40/μL ± 2,039.01 vs. 3,335.44/μL ± 1,590.65, $p < 0.001$), lower ALC count (1,786.38/μL ± 666.24 vs. 1,920.61/μL ± 585.37, $p < 0.001$), and higher NLR (2.38 ± 2.45 vs. 1.93 ± 1.63, $p < 0.001$) than patients with normal breast.

Conclusions: Patients with breast cancer showed significantly higher ANC, lower ALC and higher NLR compared to normal patients. These findings were supporting the hypothesis that systemic immune cell status might be associated with the tumor-immune microenvironment.

ANALYSIS OF THE SERUM N-GLYCANS THROUGH MALDI-TOF-MASS SPECTROMETRY IN BREAST CANCER PATIENTS WHO UNDERWENT NEOADJUVANT CHEMOTHERAPY

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Background: We evaluated the prognostic implications of the serum N-glycan profiling using MALDI-TOF-MS in breast cancer patients who underwent neoadjuvant chemotherapy (NACT).

Methods: Glycans were isolated from the serum of breast cancer patients who underwent NACT using our optimized protocol involving denaturation and enzymatic deglycosylation followed by purification through solid phase extraction and finally analyzed by MALDI-TOF-MS. The data were visualized by heatmap and analyzed using NosQuest Inc.s proprietary software NosIDsys. The diagnostic potential of these biomarkers was determined using NosIDsys as well as receiver operating characteristic (ROC) curve.

Result: Serum N-glycan profiles were studied using MALDI-TOF-MS in non-cancer healthy volunteers (n = 176) and in subjects with IDC (n = 157). The results showed an efficient pattern recognition of invasive ductal carcinoma (IDC) patients with a very high diagnostic performance reflected by the ROC analysis (AUC: 0.94 and 95% CI: 0.887-0.963). The study exhibited an effective differentiation of breast cancer patients from the normal with 82% specificity, 84% sensitivity, and 83% accuracy for the diagnosis of breast cancer. Furthermore, the results analyzed to distinguish breast cancer patients before and after chemotherapy showed efficient pattern recognition by ROC analysis (AUC: 0.88 and 95% CI: 0.837-925). (AUC: 0.88 and 95% CI: 0.837-925).

Conclusions: MALDI-TOF-MS-based measurement and subsequent data analysis of serum n-glycans effectively distinguish between n-glycan patterns in breast cancer patients before chemotherapy and patterns in breast cancer patients after chemotherapy. The procedure mentioned above is also able to detect associated changes of n-glycan pattern in serum of breast cancer patients in response to treatment.

THE POTENTIAL VALUES OF THE MRM-MS-BASED THREE-PROTEIN SIGNATURE (MASTOCHECK) IN PREDICTING TREATMENT OUTCOMES OF BREAST CANCER PATIENTS

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Background: We have previously reported the diagnostic accuracy of three-protein signature using multiple reaction monitoring of mass spectrometry (MRM-MS) in breast cancer (BC). Here, we assess the prognostic value of the three protein markers in breast cancer patients.

Methods: The three protein marker (CA1, CHL1, and APOC1) values from serum/plasma samples and clinical information of 547 BC and 457 healthy women were collected in retrospective manner. The information about BC-related recurrence and survival outcome was available in 285 among the 547 BC patients. Statistical analyses were used to evaluate a diagnostic and prognostic value of the three-protein marker.

Result: The three-protein signature accurately classified 353 out of 547 BC patients and 351 out of 457 healthy controls (HC). The sensitivity and specificity of the assay was 64.5% and 76.8%, respectively. We observed that CA1 and CHL1 had significant role to classify BC and HC in more earlier stages ($p<0.001$). In terms of prognostic value, both CHL1 and APOC1 were found to be statistically significant prognostic factors in 285 BC patients with available survival data ($p<0.001$ and $p=0.003$, respectively). Additionally, CHL1 was significantly associated with distant metastasis free survival and overall survival ($p<0.001$).

Conclusions: This pooled analysis shows promising role of the three-protein signature as a diagnostic marker in BC patients. This results further shows that individual proteins consisting the three-protein signature have potential values as prognostic markers. As further validation study is ongoing to prove its prognostic value, serum protein biomarkers can provide clinically relevant information in predicting prognosis as well as in monitoring recurrence.

TUMOR-DERIVED EXOSOMAL MIRNAS AS POTENTIAL DIAGNOSTIC BIOMARKERS IN BREAST CANCER

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Background: A blood test for early detection of breast cancer in the general population with average cancer risk is an effective strategy for improving treatment outcomes. To date, however, no blood test has sufficient sensitivity and specificity to warrant their clinical use. Here, we developed the potential blood test for breast cancer screening by tumor-derived exosomal multiple miRNAs profiling.

Methods: We isolated tumor-derived exosomes (TDEs) expressing CD49f and EpCAM, which are known as breast cancer-specific surface markers, using a microfluidic device. Total 8 miRNAs (miR-9, miR-16, miR-21, miR-96, miR-155, miR-429, miR-484, and let7a) were selected based on tissue-originated public miRNA expression profiles from TCGA. Thereafter, miRNA candidates were validated in TDEs collected from 4 subtypes of breast cancer cell lines, and also in TDEs collected from breast cancer patients (n = 22) compared to healthy donors (n = 10).

Result: We confirmed the correlation between the expression level of miRNAs in tumor cells and those in TDEs, which indicating that TDEs can reflect the genomic characteristics of the tumor. We found that exosomal 4 miRNAs (miR-9, miR-16, miR-21, and miR-429) are highly enriched in breast cancer patients compared to healthy donors. The predictive accuracy of the 4-miRNA signature for cancer diagnosis measured by AUC was 0.9 with 90.91% sensitivity and 90.00% specificity.

Conclusions: Our results suggest that the use of miRNAs within TDEs has great potential for the early detection of breast cancer. Further validation is ongoing in the expanded cohort to develop a clinical-grade blood test for breast cancer screening.

INDOCYANINE GREEN FLUORESCENCE VERSUS BLUE DYE OR RADIOISOTOPE FOR DETECTION RATE OF SENTINEL LYMPH NODE BIOPSY AND NODES REMOVED IN BREAST CANCER: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Either blue dye (BD) or radioisotope (RI) is mainly used for sentinel lymph node biopsy (SLNB) in breast cancer patients. Unlike the BD, RI has lower false-negative rate of SLNB. However, its availability of lymphoscintigraphy, difficulty in preoperative injection and undetected sentinel lymph nodes in some cases cause surgeons to rely on BD only. Currently, indocyanine green (ICG) fluorescence method (ICG-SLNB) is increasingly used as an alternative to the conventional mapping methods in many centers. This systematic review focused on comparing the detection rate of SLNB and number of sentinel lymph nodes (SLNs) removed using ICG with the conventional BD or RI method.

Methods: We searched all relevant studies published between January 2000 and October 2019. All electronic data were extracted for evaluation of sentinel lymph node (SLN) detection rate, number of SLNs removed per patient, and tumor positive rate of SLNB.

Result: A total of 30 studies including 4,216 SLN procedures were retrieved and met selection criteria. There was a statistically significant difference in SLN detection rate between ICG and BD method (OR, 6.73; 95% CI, 4.20-10.78). However, there was not any significant difference between ICG and RI (OR, 0.90; 95% CI, 0.40-2.03). The number of SLNs removed per patient were 2.35 (1.46-5.4), 1.92 (1.0-3.64), and 1.72 (1.35-2.08) for ICG, BD, and RI, respectively. Only in 8 studies, the tumor positive rates in SLNB could be analyzed (ICG, 8.5-20.7%; BD, 12.7-21.4%; RI, 11.3-16%).

Conclusions: ICG-SLNB could be an additional or an alternative method for axillary node mapping in breast cancer.

ACCURACY OF MRI AND ULTRASOUND IN PREDICTING PATHOLOGIC AXILLARY RESPONSE AFTER NEOADJUVANT CHEMOTHERAPY IN PATIENTS WITH CLINICALLY NODE POSITIVE BREAST CANCER

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Background: The primary objective was to investigate the accuracy (false negative rate) of MRI and ultrasound (US) in predicting pathologic axillary status after neoadjuvant chemotherapy in patients with clinically node positive breast cancer.

Methods: Patients with clinically positive axillary node at diagnosis who underwent neoadjuvant chemotherapy and had pre- and post-treatment MRI and US were retrospectively included. All patients underwent axillary lymph node dissection during surgery. False negative rate (FNR) of MRI and US in predicting axillary response according to tumor subtype and axillary node involvement at diagnosis were analyzed.

Result: Eight hundred patients (345 ER+/HER2-, 277 HER2+, 178 ER-/HER2-) were included. Based on the post-treatment MRI alone, FNR was 24.2%. Based on the post-treatment US alone, the FNR was 38.3%. When the results of MRI and US were combined, FNR was decreased to 16.5%. Among 75 patients with false negative findings on MRI combined with US, 59 patients (78.7%) had ypN1 stage after axillary surgery. In patients with ER-/HER2- subtype, FNR was lower than other subtypes (10.9% vs. 17.6%). Patients with a positive axillary node in level 2 or 3 at diagnosis had lower FNR compared with patients who had a positive node in level 1 axillary area (8.6% vs. 19.5%).

Conclusions: Combination of MRI and US at pre and post neoadjuvant treatment in patients with clinically node positive breast cancer demonstrated low FNR in predicting pathologic axillary response, especially in patients with ER-/HER2- subtype.

SENTINEL LYMPH NODE BIOPSY MAY BE UNNECESSARY FOR DUCTAL CARCINOMA IN SITU OF THE BREAST THAT IS SMALL AND DIAGNOSED BY PREOPERATIVE BIOPSY

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Background: Current guidelines do not recommend that sentinel lymph node biopsy (SLNB) be routinely performed for ductal carcinoma *in situ* (DCIS); thus, indications for SLNB in patients with DCIS remain controversial. In this study, we investigated whether SLNB can be safely omitted when DCIS has been diagnosed by preoperative biopsy.

Methods: We retrospectively analyzed rates of SLN metastasis and upstaging to invasive cancer on operative specimens, receiver operating characteristic (ROC) analysis for DCIS lesion size, and correlations with preoperative clinicopathological factors of 311 patients with DCIS diagnosed by preoperative biopsy at our institution.

Result: Of the 311 patients, 277 (89.1%) underwent SLNB and six (2.2%) had SLN metastasis. All six were upstaged to invasive cancer by pathological examination of operative specimens (pN1n = 1; pN1mi with mastectomy: n = 2; pN1mi with breast-conserving surgery: n = 3). In all, 80 patients (25.7%) were upstaged to invasive cancer. The median size of DCIS lesions on preoperative imaging was significantly larger for the 80 upstaged (44.8 mm) than for the non-upstaged patients (27.5 mm; $p = 0.0001$). ROC analysis was performed to determine the cut-off value for DCIS lesion size as determined by preoperative diagnostic imaging that predicts pathological diagnosis of DCIS on pathological examination of operative specimens and 31.8 mm was identified as the cut-off.

Conclusions: Size of DCIS lesions on preoperative diagnostic imaging is a predictor of diagnosis of invasive cancer on pathological examination of operative specimens. SLNB may be unnecessary in DCIS diagnosed by preoperative biopsy in patients with small lesions.

INITIAL EXPERIENCE WITH SAVI SCOUT WIRE-FREE LOCALIZATIONS OF BREAST AND AXILLARY LESIONS IN SINGAPORE

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Background: SAVI SCOUT guidance system is a novel wire-free and non-radioactive localization guidance system that uses infrared-activated reflectors inserted percutaneously into the breast or axilla to localize lesions for surgical excision. It is an alternative to hookwire and radioguided occult lesion localization, where the reflectors can be deployed any time pre-operatively which allows optimization of procedural scheduling. SAVI SCOUT was introduced in Singapore in 2019 and Singapore is one of the first countries to use this localization technique. This study aims to report the initial experience of SAVI SCOUT deployments in Singapore.

Methods: The successful deployment and surgical retrieval rates of SAVI SCOUT reflectors in breast and axillary lesions were reviewed. Localization accuracy, complications and incidence of reflector migration were evaluated.

Result: A total of seven patients were included. Three patients had reflectors inserted in pathological axillary lymph nodes prior to neoadjuvant chemotherapy for breast cancer. Four patients underwent breast lesion localization with 1 benign and 3 malignant lesions. The reflectors were successfully deployed under ultrasound-guidance. They demonstrated low reflectivity on ultrasonography but were well-visualized on mammography. There were no complications or reflector migration encountered. Surgical retrieval of the receivers and excision of the correct lesion were made in all 4 cases. Likewise, the ease of retrieval, surgical retrieval rates, localization accuracy, complications and incidence of reflector migration for pathological lymph nodes in conjunction with the radiological appearance of the reflectors will be described.

Conclusions: The initial experience in Singapore shows that SAVI SCOUT is a safe wire-free localization technique for breast and axillary lesions.

RETROSPECTIVE AUDIT OF INTERNAL MAMMARY LYMPH NODE DISSECTION IN THE MANAGEMENT OF BREAST CANCER

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Background: Treatment of lymph node basins is therapeutic for axillary lymph nodes (ALN) as well as internal mammary nodes (IMLN) in breast cancer. IMLN can be first echelon node for inner/central quadrants of breast. We evaluated the yield of IMLN dissection mainly in patients with inner and central tumours.

Methods: IMLND was performed in 199 patients between 2000-2018, 164 with inner/central quadrant tumours. Clinico-pathological data was retrieved.

Result: Primary surgery was performed in 82 (41.2%) while 117 (58.8%) were operated post-chemotherapy. Overall, 124/199 (62.3%) had nodes identified in the specimen, more in primary (61/82, 74.4%) than post-chemotherapy settings (63/117, 53.8%) ($p = 0.003$). A median of 1 (average 1.24, 0-7) node was dissected and 1 (average 1.5, 1-4) was involved. IMLN was positive in 46/199 (23.1%) patients, not significantly different in primary (21/82, 25.6%) versus post-chemotherapy (25/117, 21.4%) setting ($p = 0.545$). IMLN was involved in 44.8% patients with ≥ 4 metastatic ALN. In the absence of ALN involvement, and < 2cm pT, only 9% patients had positive IMLN in inner quadrant tumours. In univariate analysis, ALN positivity ($p < 0.001$), pT ($p = 0.023$) and grade ($p = 0.041$) in primary and ALN involvement($p = 0.011$) in post-chemotherapy setting were associated with IMLN involvement. On logistic regression, tumor size (OR 13.914, $p = 0.017$), ALN involvement (OR 11.400, $p = 0.005$) in primary surgery and ALN involvement (OR 7.294, $p = 0.003$) in post-chemotherapy setting correlated with IMLN involvement.

Conclusions: In inner/central quadrant tumours, IMLN is more likely involved with high ALN burden and tumour size > 2 cm. Whereas those with ≤ 2 cm inner/central quadrant tumours and negative ALN may be spared IMLN treatment. Prospective, long term studies are necessary to evaluate the role of surgical IMLND and its potential impact on survival.

LONG-TERM ONCOLOGICAL OUTCOME COMPARISON OF SENTINEL LYMPH NODE MAPPING METHODS: DYE ONLY VERSUS DYE AND RADIOISOTOPE IN EARLY BREAST CANCER

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Background: It has been shown that dual use of dye and isotope for mapping of sentinel lymph node (DUAL) could decrease false-negative rate of sentinel lymph node biopsy (SLNB) compared to single use of either method in breast cancer. However, a comparison of long-term outcome between uses of dual vs. single mapping method has not been studied before.

Methods: In this retrospective single institution cohort study, we identified a total of 5,030 patients with Stage I-III breast cancer who underwent primary surgery with SLNB between 2005 and 2013 in Seoul National Univ. Hospital. For sentinel lymph node mapping, indigocarmine was used for dye method and 99mTc -antimony trisulfate was used for isotope. Both were injected periareolar area intradermally at the day of operation. Patients who received neoadjuvant therapy were excluded.

Result: 3,071 patients were DUAL group and 1,959 were DYE group. Median follow-up duration was 7.4 years. The median number of harvested sentinel nodes was 3.15 in DYE and 3.10 in DUAL group ($p=0.955$). There was no significant difference in lymph node-positive rate between DYE (17.5%) and DUAL group (18.2%) ($p=0.551$). 5-year axillary recurrence rate was 0.7% in DYE and 0.3% in DUAL group ($p=0.083$). 5-year Disease-free survival was 96.5% and 95.3% in DYE and DUAL group, respectively ($p=0.590$).

Conclusions: Use of dye alone for SLNB was not inferior to the dual mapping method for long term oncological outcome in breast cancer patients who didn't receive neoadjuvant therapy.

NOMOGRAM TO PREDICT THE EXTENT OF AXILLARY SURGERY USING PREOPERATIVE CLINICOPATHOLOGICAL VALUES

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Background: Since the results of the American College of Surgeons Oncology Group Z0011 published, the criteria for applying axillary lymph node (ALN) dissection was relaxed among early breast cancer patients who were scheduled for breast conserving surgery, adjuvant chemotherapy therapy, and adjuvant radiation therapy.

Methods: The records of 1,650 patients with clinical node negative and T1, T2 primary invasive breast cancer who were treated between January 2012 and December 2015 were selected from the medical database of Yonsei Univ. (Seoul, South Korea). Logistic regression analysis was performed to predict the three or more ALNs metastasis. The nomogram was developed with confirmed variables before surgery. Internal validation was carried out adopting bootstrap method by 500 times resampling. The primary end point of our study was prediction of ALN metastasis before treatment. Secondary end point was prospectively application of our nomogram to real practice.

Result: A total of 80 (4.8%) patients had three or more ALNs metastasis. Preoperative ALN suspicious image findings ($p=0.029$), clinical tumor size ($p=0.031$), ki67 ($p=0.008$) were statistically significant predictors in multivariate analysis. The nomogram was constructed from these three variables, ca153, estrogen receptor status. It had good discrimination performance (area under the receiving operation characteristic curve [AUC] 0.75, 95% confidence interval [CI], 0.70 to 0.81) and calibration fit. The nomogram was validated, indicating good predictive power. (AUC 0.77, 95% CI, 0.71 to 0.82).

Conclusions: Our nomogram might help predict the ALN metastasis in breast cancer patients. Patients with a low probability of ALN metastasis could be spared FSE.

THERMAL RADIOMICS FOR DETECTION OF AXILLARY LYMPH NODE METASTASES-A PILOT STUDY

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Background: Use of sentinel lymph node biopsy to detect axillary metastasis is prone to side effects and 60% of patients may have a negative axilla. Less invasive techniques are needed to detect axillary nodal involvement.

Methods: A pilot study on 39 patients was conducted to explore the use of computer-aided thermal imaging for detecting involvement of axilla in breast cancer patients using MRI as a reference standard. Every participant went through thermal imaging followed by mammography or ultrasound to identify participants suspicious of breast malignancy, who were then sent for an MRI and then histopathology to determine status of axillary lymph nodes (ALN). Thermalytix is an image-analysis software that uses thermal radiomics to detect and characterize the malignant lesions in the breast region. In this study, utility of these thermal radiomics to characterize and classify the malignant status of ALN was evaluated. An adaptive fusion histogram thresholding technique was used to identify high thermal activity in the axilla and a machine learning (ML) tree-based AdaBoost classifier for classification.

Result: Data from 29 patients was used to train the ML model and remaining 10 patients were used for testing. 8 out of 10 had biopsy confirmed breast lesions with 4 of them also having malignant ALN. Thermalytix detected 6 breast malignancies and the two missed cases had nipple discharge which affected their thermal signatures. Thermalytix detected 3 out 4 malignant ALN with 100% specificity.

Conclusions: This first ever study exploring use of thermal radiomics for classifying axillary metastases was promising with high true negative rate.

SURVEILLANCE MAMMOGRAPHY FOR WOMEN WITH A HISTORY OF BREAST CANCER

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Background: Women with a personal history of breast cancer (BC) are at risk of experiencing a second breast cancer (SBC) diagnosis. Cohort studies have shown that early detection of SBCs with yearly mammography surveillance improve prognosis and survival but there is also a higher interval cancer rate compared to women without history of BC. This study aims to determine the factors affecting the effectiveness of mammography surveillance in women previously treated for BC and identify the group of women who may potentially benefit from additional imaging surveillance adjunct to mammography.

Methods: BC patients who developed SBC between 2006 and 2017 were identified from SingHealth Joint Breast Cancer Registry for retrospective review. Univariate chi-square analysis was performed to evaluate association between the independent variables and detection of recurrence on mammography. Significant variables with p-value of < 0.10 were included in the multivariate logistic regression analysis. Variables of interest included patient characteristics, tumor characteristics and radiological features.

Result: There were 295 cases of SBC with complete medical records that were reviewed. 70 (23.7%) had SBCs not detected on mammography surveillance. Women with mammography occult first cancers (39.5% vs. 21.0%, $p = 0.014$) and mammographically dense breasts at diagnosis of SBC (26.6% vs. 10%, $p = 0.033$) were found to be more likely to have mammography occult SBCs.

Conclusions: There may be a role for adjunct imaging surveillance to mammography especially for women with a previous history of mammography occult breast cancers or have mammographically dense breasts. Further studies will be needed to assess the efficacy of adjunct screening in these groups.

FREQUENCY OF MALIGNANCY AND IMAGING FEATURES OF BI-RADS CATEGORY 3 MICROCALCIFICATIONS ON DIGITAL MAGNIFICATION VIEW

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Background: The purpose of this study was to evaluate the cancer rate of BI-RADS category 3 microcalcifications assessed on digital magnification view and imaging features associated with malignancy.

Methods: From March 2009 to January 2014, we reviewed digital magnification views assessed as BI-RADS category 3, and included initial studies rendering a BI-RADS category 3 solely for calcifications. Pathologic results and imaging findings were reviewed and the cancer rate was calculated.

Result: A total of 438 patients with BI-RADS category 3 calcifications without other associated findings on digital magnification view were identified. Of these, 459 lesions in 422 patients were followed for at least 48 months or until biopsy/excision, and were finally included in the study population. Fifty-four lesions underwent biopsy/excision, of which 11 cancers were identified (2.3%). Among them, six were DCIS and five were lymph node-negative invasive. Two malignant cases were diagnosed by immediate surgical excision following atypical results at core biopsy or in a patient with a concurrent high-risk lesion in the ipsilateral breast. One malignant case was upgraded and biopsied at 6 months follow-up, and the other 8 cases were diagnosed at a mean of 47.9 months. Calcification distribution and increase in number of calcifications were significantly associated with malignancy. of 108 patients with round grouped microcalcifications, the cancer rate was 1.8%, which did not differ with other BI-RADS category 3 calcifications.

Conclusions: Six-month follow-up for BI-RADS category 3 calcifications, including grouped round microcalcifications, remains necessary. Calcification distribution and increase in number of calcifications are associated with malignancy.

NEW TRIAL OF MICROVASCULARITY ASSESSMENT ACCORDING TO BI-RADS 5TH EDITION

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Background: 1)To provide a comprehensive review of microvascularity of benign and malignant breast tumors. 2) To find out whether microvascularity is helpful in classifying and diagnosing according to BI-RADS, 3) To evaluate microvessel redistribution in before and after neo-adjuvant chemotheraphy.

Methods: Angiogenesis is formation of new blood vessels from pre-existing blood vessels around tumors. It is a main mechanism of growth in breast tumors. There were many attempts to diagnosis it by ultrasound. But there were several limitations, so we tried new level of microvascular imaging. We find out microvascularity of benign and malignant masses, before and after neo-adjuvant chemotheraphy. We also evaluated number of microvessels, distribution of vessels, presence of penetrating vessels, investigated whether microvascularity changes after neo-adjuvant chemotheraphy.

Result: Category 2-3 lesions have absent or vessels in rim, otherwise, category 4-5 lesions have internal vascularity or both. Penetrating vessels were more frequently observed in suspicious lesions. And vessels were decreased after chemotheraphy.

Conclusions: Finally classifying these results based on BI-RADS 5th edition, we can conclude that microvascularity may be helpful in the diagnosis of various breast diseases and hope further research is needed.

ULTRASONOGRAPHIC ASSESSMENT OF BREAST IMPLANT RELATED COMPLICATION USING CHECKLIST

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Background: Author's purpose was to study the check list for breast implant evaluation with ultrasound.

Methods: Ultrasonographic evaluation was done on total of 540 women with breast implants who visited for a breast check-up. Women were evaluated with ultrasound plus the Breast implant related Checklist which was first introduced by the Korea Breast Implant Society (KoBIS).

Result: Women ranged from 20 to 55 years old (median 38) and 513 (95%) had breast augmentation for cosmetic purpose than reconstruction. Median follow-up duration from surgery was 14 months (range 1 month to 204 months). Breast implant inserted for cosmetic purpose were placed in submammary/subfascial (318, 61.9%) or subpectoral level (195, 37.1%). Implant types were saline (42, 7.8%) or silicone (498, 92.2%), implant shape was round (362, 67%) or anatomical (178, 32.9%). One-hundred seventy-two (31.8%) were found with single or multiple breast implant associated complications. Breast implant associated complication in ultrasonographic finding included peri-implant fluid collection (107, 19.8%), capsular thickening (49, 9.1%), folding (55, 10.1%), focal or diffuse detachment (83, 15.3%), rupture sign (76, 14%), hematoma 21 (3.8%), malrotation (59, 10.9%), and upside down of implant (31, 5.7%). Late seroma was found in 43 (7.9%) patients who had surgery 1 year ago or more, but none of the patients were diagnosed with BIA-ALCL with the peri-implant fluid so far.

Conclusions: Breast implant related checklist is useful but more studies are in need which could help step towards a thorough evaluation and diagnosis method for less miss of breast implant complication.

GRANULOMATOUS MASTITIS: THE GREAT MIMIC

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Background: Granulomatous mastitis (GM) is a rare, chronic, granulomatous process that often causes a diagnostic dilemma. Its clinical presentation is varied, ranging from mimicking benign infectious conditions to aggressive malignancies. Though rare, its incidence is increasing and recognition of the disease is important so that correct treatment can be instituted.

Methods: We use a case study to demonstrate the mimicker GM. A 35-year-old female with no family or personal history of breast disease, presented with a palpable left breast lump of 2 weeks duration. Examination of the left breast revealed a painless mobile mass in the lower outer quadrant. Contrast enhanced mammography (CEM) revealed a suspicious mildly enhancing mass measuring up to 3.7 cm in the left central breast. Corresponding ultrasound demonstrated a 2.5 cm hypoechoic lesion with irregular margins. Overall features were suspicious for an underlying malignancy. Ultrasound guided biopsy showed periductal acute and chronic inflammation with evidence of focal granulomatous inflammation. There was no evidence of in-situ or invasive malignancy. Special stains for acid fast bacilli and fungi were negative. The patient was successfully treated with corticosteroids.

Result: GM is a great mimic and histopathology is paramount in its diagnosis. In our patient, histology showing granulomas was pathognomonic, however, in cases where granulomas are not seen, diagnosis remains unclear and often results in repeated biopsies and delayed treatment.

Conclusions: Instead of depending on histology and trial of steroids withstanding its adverse effects, specialized imaging such as CEM should be further studied to distinguish features of GM.

DIAGNOSTIC VALUE OF CONTRAST-ENHANCED DIGITAL MAMMOGRAPHY VERSUS CONTRAST-ENHANCED MRI FOR DETECTING RESIDUAL DISEASE AFTER NEOADJUVANT CHEMOTHERAPY OF BREAST CANCER

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Background: This study aimed to compare the diagnostic performance of contrast-enhanced digital mammography (CEDM) and contrast-enhanced magnetic resonance imaging (CEMRI) for tumor response in breast cancer patients after neoadjuvant chemotherapy.

Methods: This single-center, prospective study was approved by the institutional review board, and informed consent was obtained from all patients. From November 2017 to October 2018, 30 patients who were diagnosed with invasive carcinoma and who underwent both CEDM and CEMRI were enrolled. Residual malignancy sizes after NACT were correlated with histopathological results and compared. The diagnostic performances of both modalities for detecting residual cancers were compared using Lin concordance and Pearson correlation coefficients.

Result: Thirty patients with breast cancer were included in the analysis. Mean tumor size after NACT was 1.22 cm (range: 07.0 cm) for CEDM and 1.13 cm (range: 05.1 cm) for CEMRI compared with 1.89 cm (range: 012.0 cm) at final pathology measurement. Sensitivity for identifying residual lesion was for CEDM and CEMRI is as follows (CEDM 62.5%, 95% CI 40.6-81.2, CEMRI 66.7%, 95% CI 44.7-84.4). The positive predictive value (PPV) for detection of residual disease was 93.8% (95% CI 69.8-99.8) for CEDM and 88.9% (95% CI 65.3-98.6) for CEMRI. CEDM had a mean difference from pathology measurement of 0.668 cm, with a concordance coefficient of 0.202 and a Pearson correlation coefficient of 0.231 ($p = 0.220$).

Conclusions: CEDM yielded diagnostic results comparable with CEMRI in depicting residual cancers and estimating residual tumor extent after NACT.

POSITIVE HORMONE RECEPTOR, DUCTAL CARCINOMA IN SITU AND BACKGROUND PARENCHYMAL ENHANCEMENT IN RELATION TO FALSE POSITIVE LESIONS DETECTED ON PREOPERATIVE MAGNETIC RESONANCE IMAGING IN BREAST CARCINOMA

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Background: Patients with false positive lesions detected on preoperative breast MRI require more core biopsies as well as delayed or more extensive surgery. This study aimed to characterize breast cancers with false lesions in MRI, and reported the sensitivity, and positive predictive value of MRI.

Methods: 103 patients who received MRI, ultrasonography and mammography, followed by mastectomy were eligible for this retrospective investigation of histopathological verification and imaging findings.

Result: 57 and 5 lesions were falsely positive and negative, respectively, while 138 lesions were truly positive. Patients with false positive lesions had invasive cancer with an *in situ* component ($p = 0.032$), hormone receptor-positive ($p = 0.040$), background parenchymal enhancement ($p = 0.034$). The sensitivity and positive predictive value of MRI were 96.5% and 71.5%, respectively.

Conclusions: Invasive breast cancer with an *in situ* component, a positive hormone receptor and background parenchymal enhancement are associated with false positive lesions in MRI.

LET'S LEARN ABOUT THE MULTIMODALITY IMAGING ANALYSIS OF SUPERFICIAL BREAST LESIONS

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Background: To evaluate benign and malignant superficial breast lesions with accurate location in breast. To emphasize the imaging findings, including USG, CT, MRI and PET/CT. To emphasize the imaging findings of superficial breast lesions with respect to pathological and clinical features.

Methods: Knowledge of this imaging findings and clinical features can assist in differentiating benign and malignant superficial breast lesions, and help determine appropriate treatment options and management. We classified superficial lesions by primary/secondary and benign/malignant; Primary superficial lesion means that the lesion is confined in subcutaneous fat layer or skin and secondary superficial lesion means that the lesions is located in the breast parenchyma and extends into the subcutaneous fat layer or skin.

Result: Benign - Primary located in superficial layer 1. Fibroadenoma 2. Phyllodes tumor 3. Epidermal inclusion cyst with/without rupture 4. Cavernous & capillary hemangioma 5. Neurofibromatosis in breast cancer patient 6. Accessory nipple 7. Intramammary LN 8. Abscess mimicking cancer 9. Fat necrosis, breast contusion 10. Pseudoaneurysm 11. Subcutaneous emphysema after nephrectomy 12. Seeding of follicular adenoma of thyroid to breast after endoscopic thyroidectomy 13. Paraffinomas - Secondary located in superficial layer 1. Polyacryl amide gel bleed with subcutaneous extension 2. Granulomatous lobular mastitis with subcutaneous extension Malignant - Primary located in superficial layer 1. Dermatofibrosarcoma protuberance which mimicking epidermal inclusion cyst 2. Synchronous angiosarcomas presented with skin thickening after breast cancer operation 3. IDC mimicking epidermal inclusion cyst - Secondary located in superficial layer 1. Huge breast cancer with skin invasion 2. Paget disease 3. Metaplastic carcinoma 4. Chondrosarcoma

Conclusions: Our study shows that the superficial lesions show the majority of benign and primary locations rather than malignancy and secondary locations.

A PREDICTIVE MODEL FOR HIGH RISK PATIENTS IN ONCOTYPE DX

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Background: Oncotype Dx (ODx), A 21-gene recurrence score (RS) breast cancer assay is helpful to make a decision whether to add chemotherapy or not in early breast cancer patients. However, it demands high cost and time. In this study, we aimed to present a model that can predict ODx high risk patients with clinicopathologic features.

Methods: 477 early breast cancer patients with ER positive, HER2 negative and lymph node negative patients who have been tested ODx from July 2016 to January 2020 in Severance Hospital were retrospectively reviewed. Ki67 was calculated automatically scanned as Roche-i value. Clinical risk group was analyzed with tumor size and grade as previously used in the MINDACT trial. Multivariate analysis and Receiver Operator Characteristic (ROC) curve were performed.

Result: Multivariate analysis revealed histologic grade, low PR and high Ki67 showed had a statistically significant association with high risk group in total patients. The area under the ROC curve (AUC) was 0.811 (95% CI 0.759-0.863), showing reasonable predictive power. Among 306 patients with age 50 and younger, clinical high risk group, low PR and high Ki67 were significant factors for ODx high risk group. AUC was 0.809 (95% CI, 0.735-0.883).

Conclusions: We developed predictive models that could represent ODx high risk patients with clinicopathologic features. This models would be useful tool to decide whether chemotherapy is considered for patients not affordable ODx.

EFFICACY OF MASSAGE CHAIR DURING AMBULATORY CHEMOTHERAPY IN PATIENTS WHO HAD TAXANE-INDUCED BACK AND LOWER LIMB PAIN: A PILOT STUDY

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Background: Although Taxane is one of the most effective chemotherapy on breast and gynecological cancer. Taxane caused numerous side effects both during and after the treatment for example, peripheral neuropathy, hair loss and limb pain. Taxane acute pain syndrome (TAPS) is characterized by arthralgia and myalgia during chemotherapy. This affects quality of life beyond the hair loss. This study is to examine the incidence of TAPS and the efficacy of massage chair during chemotherapy in reducing TAPS.

Methods: Fifty-one participants was recruited in the study from January 2019 to November 2019. 20 patients with TAPS were offered the massage chair. The massage chair was a mechanical rhythmic massaging device from lower back to lower limbs. The course was 15 minutes immediately after completion of Taxane. The visual analogue scale (0-10 score) was used to access the pain level. Wilcoxon test was used for statistic comparison.

Result: TAPS incidence was 66.67%, whereas moderate to severe pain was 29.41%. The median pain score was 4 before the massage and 1 after the intervention. There was a statistically significant decrease of pain score after using massage chair (median score 4 vs. 1, $Z = -3.77$, $p < 0.01$). Moreover, there were 35% (7 volunteers) whose pain caused activity limitation (pain score > 5). The proportion was declined to 10% (2 volunteers) after receiving massage chair.

Conclusions: The incidence of TAPS is high in Taxane given patients. But these side effects could be ameliorated by several treatments. This preliminary data showed the efficacy of massage chair in reducing TAPS.

DISTINCT FACTORS ASSOCIATED WITH EFFECTIVE COGNITIVE FUNCTIONING IN BREAST CANCER PATIENTS WITH AND WITHOUT COGNITIVE SYMPTOMS

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Background: Cancer- and treatment-related cognitive dysfunction is a commonly reported acute or late neurotoxic side effects. According to the International Cancer and Cognition Task Force, more effort should be given to identify modifiable factors for implementing effective and promising interventions. This study aimed to investigate the presence of cognitive symptoms and to examine factors of cognitive functioning in breast cancer patients with and without cognitive symptoms.

Methods: All participants were 506 women with non-metastatic breast cancer who were screened to ensure absence of severe depression and cognitive impairment such as dementia. Cognitive functioning was measured by using the Functional Assessment of Cancer Therapy-Cognition. Co-existing physical and psychological symptoms, cognitive demand, family support, engagement in restorative activities, and sociodemographic and clinical characteristics were assessed as covariates for hierarchical multivariable regression analyses.

Result: Only 20.5% of participants reported absence of cognitive symptoms. A membership of receiving chemotherapy, greater physical and psychological symptoms, worse family support, and more cognitive demand explained 40% in the variance of ineffective cognitive functioning in the regression model with participants with cognitive symptoms, whereas family support and cognitive demand accounted for 16% in the variance of cognitive functioning in the model with those without cognitive symptoms.

Conclusions: These findings indicate that chemotherapy, co-existing symptom burden, cognitive demand, and family support were associated with cognitive functioning in patients with cognitive symptoms while treatment-related factors were not related to cognitive functioning in patients without cognitive symptoms. Healthcare professionals should develop and tailor interventions to enhance survivorship by considering the distinct factors of cognitive functioning.

ACCESSIBILITY TO HEALTHCARE SERVICE OF CANCER PATIENTS AND THEIR DEPRESSION, ANXIETY, INSOMNIA TO COVID-19 VIRAL PANDEMIC

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Background: We aimed to investigate accessibility to healthcare service for cancer patients as well as depression, anxiety, and insomnia among them in COVID-19 pandemic era.

Methods: This online survey compiles questions for the disturbance of cancer patients to utilize the medical facilities in the pandemic era. Current mental health of cancer patients were assessed using the Stress and Anxiety to Viral Epidemic-6 (SAVE-6) scale, Patient Health Questionnaire-9, Insomnia Severity Index, Brief Resilience Scale, Cancer-related Dysfunctional Beliefs about Sleep scale, and one item question of "Are you more afraid of coronavirus than cancer?".

Result: Among 221 responders, 94 (42.5%) reported they felt disturbed to use the hospital utility during the COVID-19 pandemic era. The most common causes of disturbance includes "worry to visit the hospital because of the risk of COVID-19 infection (N = 63, 67.0%)", "repetitive COVID-19 swab screening tests and examination (N = 40, 42.6%)", "more disturbed than before when treated in the emergency room (n = 11, 11.7%)", and "delay of the appointment of outpatients department (OPD) schedule and delay in the treatment schedule (N = 9, 9.6%)". 22 patients reported that their OPD or treatment schedule was delayed. Logistic regression analysis revealed that high score of SAVE-6 scale (OR = 1.2, 95% CI [1.10-1.29]) and low level of resilience (OR = 0.88, 95% CI [0.80-0.97]) were significant expectors for the patients' disturbance for hospital utilization.

Conclusions: In this pandemic era, cancer patients felt disturbance to visit the hospitals. We should manage the care system for cancer patients during the pandemic era.

APPLICATION OF THE STRESS AND ANXIETY TO VIRAL EPIDEMICS-6 AND CORONAVIRUS ANXIETY SCALE TO MEASURE CANCER PATIENT ANXIETY IN RESPONSE TO THE COVID-19

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Background: This study investigated the usefulness of the 6-item Stress and Anxiety to Viral Epidemics (SAVE-6) scale and the Coronavirus Anxiety Scale (CAS) as tools to assess anxiety related to coronavirus disease (COVID-19) in cancer patients.

Methods: A total of 221 patients with cancer responded to an anonymous online questionnaire between July 15 and August 15, 2020. The functional impairment of the patients was assessed using the Work and Social Adjustment Scale (WSAS), and the SAVE-6 and CAS were also applied.

Result: Among these 221 cancer patients, 110 (49.8%) had SAVE-6 scores ≥ 15 and 21 (9.5%) had CAS scores ≥ 5. Within the study population, 104 (47.1%) and 29 (13.1%) patients had WSAS scores ≥ 11 (moderate to severe functional impairment) and ≥ 21 (severe functional impairment), respectively. The correlations between the SAVE-6 and WSAS ($p < 0.001$) and CAS ($p < 0.001$) scores were statistically significant. The cut-off for the SAVE-6 was 15 points, while that for the WSAS was 11.

Conclusions: Our results suggested that the SAVE-6 and CAS could be used to evaluate moderate and severe degrees of functional impairment related to mental health, respectively, in cancer patients during viral epidemics.

DEPRESSION, RATHER THAN CANCER-RELATED FATIGUE OR INSOMNIA, DECREASED QUALITY OF LIFE OF CANCER PATIENTS

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Background: Cancer-related fatigue is a common and distressing symptom that occurs during cancer treatment. This study aimed to find factors that are related to cancer-related fatigue, and its effect on patients' quality of life.

Methods: This study included 159 patients who completed questionnaires and interviews during their initial examination at the Cancer Stress and Sleep Clinic, Asan Medical Center, between December 2018 and January 2020. Their medical reports were reviewed retrospectively. Questionnaire data about depression, anxiety, and insomnia; fear of disease progression; and dysfunctional beliefs about sleep, pain, and quality of life, were reviewed. Additionally, patient sleep structure data were analyzed.

Result: Factors associated with differences in cancer-related fatigue included depression (PHQ-9), anxiety (STAI), insomnia (ISI), fear of cancer progression (FoP), dysfunctional beliefs about sleep (C-DBS), and pain (Pain Numeric Rating Scale), while only depression, anxiety, and fear of cancer progression were associated with differences in quality of life. These results were confirmed by logistic regression analysis. Total time in bed during 24 hours was not correlated with fatigue. In pathway analysis, fatigue did not act as a direct risk factor on quality of life. However, we could find depression as an overall risk factor for insomnia, fatigue, quality of life, and daily activity of cancer patients.

Conclusions: Cancer-related fatigue did not show significant effect on patient's quality of life in this study. However, the result of pathway analysis highlights the importance of assessing depression in the process of cancer treatment and providing appropriate interventions.

COMPARISON OF FATIGUE AND FATIGABILITY CORRELATES IN KOREAN BREAST CANCER SURVIVORS AND DIFFERENCES IN ASSOCIATIONS WITH ANXIETY, DEPRESSION, SLEEP DISTURBANCE, AND ENDOCRINE SYMPTOMS

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Background: Fatigability, which refers to the fatigue perceived by an individual according to the level of physical activity, offers potential benefits for intervention studies. This study investigated the effects of a 1-year exercise adherence intervention on breast cancer survivors (BCS)' fatigue and fatigability; explored the fatigue-fatigability relationship; and evaluated the impacts of fatigue and fatigability on anxiety, depression, sleep disturbance, and endocrine symptoms.

Methods: A randomized controlled trial design was applied to an exercise intervention referred to as the BLESS (Better Life after cancer, Energy, Strength, and Support) program. The intervention involved a 12-week exercise program and four follow-up contacts. The responses of 40 BCS to a survey after 1 year of the intervention were evaluated using the chi-square and multiple regression analysis.

Result: In this group of BCS with moderate or greater fatigue, neither fatigue nor fatigability showed significant differences between the experimental and control groups at 1 year following the start of the intervention. In the control group, fatigue and fatigability were significantly associated with anxiety, depression, sleep disturbance, and endocrine symptoms. In the experimental group, only the cognitive fatigue score and depression were significantly associated. Only endocrine symptoms influenced mental fatigability ($B = -0.185$, $p < 0.05$), and depression influenced cognitive/mood fatigue ($B = 1.469$, $p < 0.05$).

Conclusions: Fatigue and fatigability showed different correlations with cancer-related symptoms after the exercise intervention. Future assessments of fatigability in intervention studies will allow measurement of the spectrum of patients' abilities to overcome fatigue at physical activity levels while capturing different aspects of symptoms.

THE OUTCOME OF THE SERVICES FOR GOOD DEATH IN TERMINAL BREAST CANCER PATIENTS RECEIVING HOSPICE PALLIATIVE CARE

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Background: Patients with terminal cancer have severe physical-psychosocial-spiritual problems, especially in breast cancer patients. Using the questionnaire of the services for good death, we evaluated the satisfaction of these patients toward hospice palliative care.

Methods: The questionnaire with 12 items for patient's satisfaction is assessed for terminal breast cancer patients at weekly team meetings when the patient admitted to hospice ward and within a week of death. (Score ranging from 1-5 point, the higher, the better).

Result: A total of 90 terminal breast cancer patients died from January 2011 to October 2019 was enrolled. The results of the evaluation showed that the optimal level of the services for good death in symptom control is 88.9%, patient and family members' satisfaction in physical care is 91.1%, the respecting of patient's autonomy is 93.3%, the patient's willingness to participate in care is respected is 93.3%, releasing the feeling of anxiety is 91.1%, releasing the feeling of depression is 91.1%, using verbal to support patients is 92.2%, using non-verbal to support patients is 93.3%, to contact and communicate with friends and relatives is 92.2%, acknowledgement of previous life is 92.2%, to achieve patient's wish is 86.7%, and to provide grieved counseling for family is 92.2%.

Conclusions: Hospice palliative care provides appropriate physical-psychosocial- spiritual and emotional care for terminal breast cancer patients, and to provide grieved counseling for family and help them to face death. Overall the results of "the services for good death" showed a positive effect for hospice palliative care provider.

DIFFERENCES OF GOOD DEATH BETWEEN BREAST CANCER AND OVERALL CANCER DECEDENTS

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Background: Patients with terminal cancer suffer from a variety of physical-psychosocial-spiritual symptoms, however, there have been relatively few studies looking at the outcome of good death in different cancer patients. The objective of this study was to compare the differences of good death between breast cancer and overall cancer decedents and find out the influencing factors.

Methods: We use the questionnaire of the index of good death to evaluate the effectiveness of hospice palliative care in terminal patients. Five items about death faced by the individual are used to assess outcome of good death. The questionnaire is evaluated when the patient admitted to hospice ward and within a week after pass away in the weekly team meeting.

Result: From January 2011 to October 2019, 1,420 terminal patients were enrolled to this study. Comparing the highest score of the items of the index of good death between breast cancer and overall cancer decedents, the patient awareness of death was 83.4% and 76.1%, acceptance of the imminence of death was 78.9% and 77.0%, propriety corresponded whole family's willingness was 90.0% and 85.2%, timeliness of preparing to face the patients death was 90.0% and 88.8%, and the optimal comfort of the patient during hospitalization was 90.0% and 86.5%.

Conclusions: Hospice palliative care could alleviate the suffering of terminal patients and help patients experience good death. The score of the index of good death was higher in terminal breast cancer patients. Numerous factors might influence patients good death, and health providers should identify patients need and provide appropriate care.

THE EXPERIENCE OF WOUND CARE FOR ADVANCED BREAST CANCER PATIENTS WITH FUNGATING WOUND

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Background: The characteristics of fungating wounds are pain, bleeding, infection, odor, and much exudate. We used different wound care skills to make better in fungating wounds for advanced breast cancer patients.

Methods: We used special dressing techniques such as spray 2% Xylocaine on the wound to relieve pain before 20 minutes of wound care. Care skills include pressuring on the bleed wound by wet packing with Bosmin combined using Transamin injection and selecting the appropriate dressing for the bleeding problem. We used wound debridement, antibiotics treatment, the solution to clear away necrotic tissues, and covered the wound with activated carbon dressing, and used air purifier, aromatherapy to improve odor problem. Wound care frequently and used Convatec Aquacel Ag can improve much exudate.

Result: We evaluated 6 patients' wound caring status when the patients admitted to the hospice ward. Two patients were excluded who just accepted wound care for one time and passed away within a week. The wound care status of 4 patients showed that pain score from 5 down to 1 by Visual Analogue Scale, bleeding from grade 4 (moderate bleeding) down to grade 2 (spot bleeding), odor from grade 5 (the odor fills the entire room) down to grade 2 (smell odor when removing the dressing), exudate from grade 5 (leakage) down to grade 3 (wet).

Conclusions: Good fungating wound caring skills could help patients reducing discomfort and facing physical image disturbances, then to improve the quality of patients' life.

ASSESSING SLEEP-WAKE PATTERN OF CANCER PATIENTS TO GET A SHORT SLEEP ONSET LATENCY

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Background: We aimed to investigate sleep parameters and clinical factors that are related with the short sleep onset latency of cancer patients.

Methods: We retrospectively reviewed medical chart records of 235 cancer patients. Rating scales scores of PHQ-9, STAI, ISI, C-DBS, and FoP scale were collected. Sleep indices such as sleeping pills ingestion time, bedtime, sleep onset time, and wake-up time were collected, and calculated the duration variables are as follows; time in bed during 24 hours, duration from pills to bedtime, duration from pills to sleep onset time, duration from pills to wake up time, duration from wake-up time to bedtime, and duration from wake-up time to sleep onset time.

Result: Among cancer patients who were not taking sleeping pills ($n = 145$), early wake-up time and early sleep onset time of time variables and low ISI score were identified as the expecting variables for sleep latency ≤ 30 minutes. Longer duration from wake-up time to bedtime of duration variables and low ISI score predict sleep latency ≤ 30 minutes. Among cancer patients who were taking sleeping pills ($n = 90$), early sleep onset time of time variables and short duration from pills to sleep onset time of duration variables were predicting variables for sleep latency ≤ 30 minutes.

Conclusions: Cancer patients who fell asleep quickly show less time in bed during the day. It is necessary to explore cancer patients' sleep parameters to improve their sleep onset latency.

CLINICAL OUTCOME OF BREAST CANCER IN ELDERLY PATIENTS: PUTRAJAYA EXPERIENCE

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Background: Breast cancer is a disease associated with aging. The treatment challenge which affects the outcome depends on wide variation of health status in this age group. The objective of this study was to compare disease free survival (DFS) and locoregional recurrence (LRR) in elderly group (≥ 65 years old) and younger group (< 65 years old) and its predictive factors.

Methods: Retrospective study of all breast cancer patients who had surgical treatment at Putrajaya Hospital from 2005 to 2017.

Result: Out of 1,171 patients who had surgical intervention, 193 (16.5%) of them were elderly. The mean age for this group was 70 years old and majority of them (59%) presented with T2 tumor. Only 4.2% patients had negative ER, 6.3% negative PR and 10.4% negative HER2 status. The 5 years and 10 years DFS in elderly group were 97%, while in younger group the 5 years and 10 years DFS were 95% and 90% respectively. The 5 years and 10 years LRR incidences in elderly group were 2% and 6% respectively, while in younger group the 5 years and 10 years LRR incidences were 8% and 9% respectively. Cox regression multivariate showed ER positive and hormonal therapy were significant predictive factors for LRR in both age groups.

Conclusions: Elderly breast cancer patients have better DFS and LRR than younger patients. This favorable outcome should be considered during clinical decisions in elderly patients with breast cancer.

VALIDATION OF CTS5 (CLINICAL TREATMENT SCORE POST 5-YEARS) IN BREAST CANCER PATIENT FOR PREDICTING LATE DISTANT RECURRENCE: SINGLE-CENTER IN KOREA

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Background: Extended endocrine therapy is widely recognized as improving breast cancer outcome. It is very important for selecting proper patients not to increase complication of extending therapy. Clinical Treatment Score Post 5-years (CTS5) as a simple tool for selecting patients as candidates was introduced lately; however, CTS5 was mostly applied to postmenopausal women, so it should be needed to validate for applying CTS5 into premenopausal cancer patients. We aimed to validate CTS5 into breast cancer patients treated in Samsung Medical Center.

Methods: We identified primary breast cancer patients who operated in Samsung Medical Center from 1994 to 2014. After calculating CTS5 based on some parameter, we stratified rate risk according to CTS5 and analyzed the correlation between CTS5 and late distant recurrence (DR) by risk.

Result: The 1,749 patients (67.1%) were premenopausal women and 856 patients (22.9%) were postmenopausal women. Distant recurrence and annual DR rate was similar between pre- and postmenopausal group (1.40 vs. 1.42). Distant meta free survival was no difference between two groups (HR = 0.817, 95% CI, 0.547-1.221). In CTS5 of premenopausal women, the proportion of low risk was higher than postmenopausal women. AUC at 10-year of premenopausal patients was 61.75 [95% CI, 52.97-70.53] and postmenopausal patients was 72.71 [95% CI, 63.30-82.12].

Conclusions: CTS5 is a useful tool for determining extended therapy beyond 5 years. Although prognostic value of CTS5 showed fair results in overall patients, AUC at 10-year of premenopausal women showed poor results. Development of modified CTS5 was needed for predicting late recurrence in premenopausal women.

NOMOGRAM FOR PREDICTING LOW-RISK SUBGROUPS DEFINED BY THREE AGE- AND CLINICAL RISK-ADJUSTED RECURRENCE SCORE CUTOFFS IN THE ONCOTYPE DX TESTED BREAST CANCER PATIENTS

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Background: Several nomograms have been suggested to determine low-risk subgroups by Oncotype DX recurrence score (ODX RS), mostly focusing on a single cutoff without considering clinicopathological characteristics.We aimed to make a nomogram with three cutoffs according to both age at diagnosis and clinical risks (CR) by modified Adjuvant! Online.

Methods: A total of 753 patients who tested ODX at Asan Medical Center from 2010 to 2018 were categorized into three datasets: dataset 1 (age > 50 years, all CR), dataset 2 (age ≤ 50 years, low CR), and dataset 3 (age ≤ 50, high CR). The corresponding cutoffs for each low-risk subgroup were set at an ODX RS of ≤ 25, ≤ 20, and ≤ 15 for dataset 1, dataset 2, and dataset 3, respectively. A nomogram was constructed using multivariate logistic regression analysis and made internal validation with 1,000 bootstrap re-sampling.

Result: Significant variables such as age, estrogen receptor, progesterone receptor, grade, T stage, and Ki-67 were identified and incorporated into a nomogram predicting the low-risk subgroup with varying cutoffs according to age and CR. The areas under the ROC curve were 0.85 (95% confidence interval [CI], 0.82 to 0.88) and 0.84 (95% CI, 0.81 to 0.87) in the construction and validation, respectively.

Conclusions: This nomogram can calculate the possibilities for being low-risk subgroups based on ODX RS with additional consideration of age and CR. It can be a useful tool for identifying patients who would benefit from additional ODX testing.

DECREASE OF PHERIPHERAL BLOOD LYMPHOCYTE COUNT PREDICTS RESPONSE TO NEOADJUVANT CHEMOTHERAPY IN BREAST CANCER PATIENTS

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Background: Pathologic complete response (pCR) after neoadjuvant chemotherapy (NACT) could be considered a good prognostic factor in breast cancer patients. However, it is not fully studied about predictive factors of pCR. Peripheral blood lymphocyte (PBL) count may reflect the host immunologic environment of cancer patients. Some studies has been reported PBL as a predictor of response to NACT in breast cancer patients. In this study, we evaluated the relationship between pCR and the change of PBL during NACT.

Methods: A total of 66 patients histologically confirmed breast cancer treated with NACT followed by mastectomy between January 2010 and December 2019 were analyzed retrospectively. Logistic regression analysis was used to assess the association between PBL count and pCR. Receiver operating characteristics was used to determined optimal cut-off value.

Result: of sity-six patients, 16 (24%) patients achieved pCR. Most PBL count decreased after NACT and it was relevant to pCR. Logistic regression analysis revealed that low decrease of PBL was associated to pCR ([OR] = 1.0; $p = 0.0116$). Regarding ROC curve, the cut-off value of PBL decrease was 755×10^6/L, we divided high/low group. The pCR rate was 25% and 75% for the high and low group, respectively ([AUC] = 0.731; 95% CI, 0.590-0.872, $p = 0.006$). High decrease of PBL after NACT was found to have more difficulty achieving pCR.

Conclusions: The decrease proportion of PBL is significantly associated to pCR. Our data support that the decrease of PBL before and after NACT may be a one of the factors predicting a response to NACT in breast cancer patients.

PREDICTORS RELATED TO UPGRADE AFTER DIAGNOSED INTRADUCTAL PAPILLOMA ON CORE NEEDLE BIOPSY

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Background: Intraductal papilloma (IDP) is one of the common benign breast mass. But, the management of Intraductal papilloma is still controversial. We aimed to find factors associated with upgrade in Intraductal papilloma

Methods: We retrospectively reviewed 140 patients who were diagnosed with intraductal papilloma by core needle biopsy. The patients had core needle biopsy in Dong-A Medical center between December 2010 and December 2020. We investigated clinical, pathological and radiologic findings at initial diagnosis, as well as pathology after excision. According to the final histology, the patients were divided into two groups: benign and high risk lesion including cancer.

Result: 61 patients diagnosed with intraductal papilloma had surgical excision, and 45 had vaccum-assisted excision, and 10 had observation of 140 patients, 18 patients underwent an upgrade to cancer in 7.8% (11/140) or high-risk lesion in 5% (7/140) after excision. The mean age was 46.1 years (range, 18-80 years). Age has been significantly upgraded to a high-risk lesion ($p=0.037$). The upgrade rate was higher at 22.5% in older patients over 50 years, compared to 9% in young patients under 50 years of age. The initial ultrasound suspicious BI-RADS category and intraductal papilloma with atypia on core needle biopsy were significant factors for upgrading ($p=0.001, 0.003$).

Conclusions: Total upgrade rate to high-risk lesions and malignant in patient with intraductal papilloma was 12.8% (18/140). Age and BI-RADS category, atypia presence in initial diagnosis are a significant predictive factor of upgrade. Therefore, surgical excision is recommended for older patients, suspicious ultrasound findings and atypical intraductal papilloma patients.

THE VALUE OF SERUM METABONOMICS IN PREDICTION OF RESPONSE TO NEOADJUVANT CHEMOTHERAPY IN BREAST CANCER

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Background: The metabolism reprogramming is an important hallmark of cancer biology. However, the metabolites in serum for predicting the neoadjuvant chemotherapy (NAC) effect are scarce in breast cancer treatment. This study aims to assess the value of altered metabolic profile in serum for early predicting the response to neoadjuvant chemotherapy in breast cancer.

Methods: This study included a cohort of 92 women with locally advanced breast cancer who had received NAC. Post-NAC, the pathologic response was defined according to RECIST v1.1. The serum samples which obtained before NAC from patients were detected by GC/LC-MS. SPSS was used to analyze the difference of clinical parameters and prognosis.

Result: In this cohort, there were 80 patients gaining tumor remission (pCR/pPR) after NAC, while 12 patients with non-remission (pSD/PD). The peak intensity of proline, tyrosine, glutamine, dihydroxyacetone phosphate (DHAP) and S-adenosyl methionine (SAM) were significantly high in the serum of patients with remission after NAC, comparing to those with non-remission. The multivariable analysis showed that such metabolic profile had potential capacity of early predicting tumor response after NAC (AUC: 0.879, 95% CI: 0.707-0.998). Among them, there were much more DHAP and SAM found in the serum of patients with locoregional relapse-free patients than those with recurrence ($p < 0.001$, respectively).

Conclusions: The altered metabolites in serum which associate with the sensitivity to chemotherapy, have potential value for early prediction for chemotherapeutic efficacy after NAC. The further evaluation of such metabolic profile in breast cancer will improve the accuracy of tumor response prediction.

NECESSITY OF SENTINEL LYMPH NODE BIOPSY IN DUCTAL CARCINOMA IN SITU PATIENTS
: A RETROSPECTIVE ANALYSIS

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Background: This study aimed to evaluate the upstaging rates of DCIS to invasive cancer, determine the prevalence of axillary lymph node metastasis, and identify the clinopathological factors associated with upstaging and lymph node metastasis. We also examined surgery patterns among DCIS patients and showed whether sentinel lymph node biopsy (SLNB) guidelines were followed.

Methods: We retrospectively analyzed 307 consecutive DCIS patients diagnosed by preoperative biopsy in a single center between 2014 and 2018. Information from clinical records, including imaging studies, axillary and breast surgery types, and pathology results from preoperative and postoperative biopsies, were extracted. Univariate analyses using Chi-square tests and multiple logistic regression analyses were used to analyze the data.

Result: The rate of upstaging to invasive cancer was 19.2% (59/307). DCIS diagnosed by core needle biopsy (odds ratio [OR]: 6.861), presence of ultrasonic mass-forming lesions (OR: 2.782), and progesterone receptor-negative status (OR: 3.156) were found to be associated with upstaging. The rate of sentinel lymph node (SLN) metastasis was only 1.9% (4/202), and all were total mastectomy (TM) patients diagnosed by core needle biopsy. SLNB was performed in 37.2% in 145 breast-conserving surgery (BCS) patients and 91.4% in 162 TM patients. Among the 202 patients who underwent SLNB, 145 patients (71.7%) without invasive cancer on final pathology had redundant SLNB.

Conclusions: Only 2.7% of patients with DCIS undergoing TM were found to have SLN metastases. SLNB should not be performed for BCS patients and should be reserved only for TM patients diagnosed by core needle biopsy.

FACTORS PREDICTING LOCOREGIONAL RECURRENCE AFTER NEOADJUVANT CHEMOTHERAPY AND SKIN-SPARING MASTECTOMY WITH IMMEDIATE BREAST RECONSTRUCTION

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Background: There are very few data regarding the risk factors for locoregional recurrence (LRR) after neoadjuvant chemotherapy (NACT) and immediate breast reconstruction (IBR) for breast cancer. We evaluated the factors predicting LRR in a large series of patients who underwent nipple-sparing mastectomy (NSM) or skin-sparing mastectomy (SSM) and IBR after NACT.

Methods: A total of 609 breast cancer patients who underwent NACT and NSM/SSM with IBR between February 2010 and June 2017 were retrospectively analyzed. Factors associated with increased risk of LRR were analyzed using univariate (chi-square or Fisher's exact test) and multivariate (Cox proportional hazard regression model) analyses.

Result: During a median follow-up of 63 months, LRR as first event occurred in 73 patients and the 5-year cumulative LRR rate was 10.8%. Multivariate analysis revealed post-NACT Ki67 ≥ 10% (hazard ratio [HR], 2.208; 95% CI, 1.295-3.765; $p = 0.004$), high tumor grade (HR, 1.738; 95% CI, 1.038-2.908; $p = 0.035$), and presence of lympho-vascular invasion (LVI) (HR, 1.725; 95% CI, 1.039-2.864; $p = 0.035$) were independently associated with increased LRR risk. The 10-year rate of LRR was 8.5% for the patients with none of the 3 factors, 11.6% for those with one factor, 25.1% for those with two factors, and 33.7% for those with all 3 factors ($p < 0.001$).

Conclusions: Post-NACT Ki67 ≥ 10%, high tumor grade, and presence of LVI as being independently associated with increased risk of developing LRR after NACT and NSM/SSM with IBR. Future prospective trials are warranted to decrease the LRR risk in patients with these risk factors.

Poster Presentation

PROGNOSTIC VALUE OF HYPOXIA, MITOCHONDRIAL AND GLUCOSE METABOLISM IN INVASIVE DUCTAL BREAST CANCER

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Background: We evaluated the relationship between fluorine-18 fluoro-2-deoxy-glucose (F-18 FDG) uptake reflecting glucose metabolism, hypoxia and mitochondrial activity in cancer cells and investigated the prognostic implications of this relationship in patients with invasive ductal breast cancer (IDC).

Methods: One-hundred thirty nine female patients with IDC who underwent preoperative F-18 FDG PET/CT were enrolled. The pSUVmax reflecting glucose metabolism was compared with clinicopathological parameters including ER, PR, HER2, axillary lymph node metastasis, stage, GLUT-1, Carbonic anhydrase IX (CA), Caveolin and cytochrome C oxidase (COX) reflecting mitochondrial metabolism. The prognostic value of pSUVmax, GLUT-1, CA, Caveolin and COX activities for Disease-free survival (DFS) was assessed using the Kaplan-Meier method and Cox proportional hazard ratio.

Result: Twenty-nine of the 139 subjects (20.8%) showed tumor recurrence. There was a significant positive correlation between F-18 FDG uptake, hypoxia and the mitochondrial activity of cancer cells in patients with IDC. Additionally, results from the receiver-operating curve analysis demonstrated that the cut-off values of pSUVmax, GLUT-1, CA, Caveolin and COX activities for the prediction of DFS were 5.13, 2, 3, 5, and 6. Further, results from the Kaplan-Meier method revealed that pSUVmax ($p=0.0018$), GLUT-1 ($p=0.0324$), CA ($p=0.0005$), Caveolin ($p=0.05$) and COX ($p=0.0463$) activities were significantly associated with DFS; however, the Cox proportional hazard ratio analysis revealed that pSUVmax, CA and Caveolin were associated with DFS (HR, 5.00, 6.52, and 7.08; $p=0.0253$, 0.0106, and 0.0078).

Conclusions: The assessment of preoperative F-18 FDG uptake, post-surgical hypoxia and mitochondrial activity may be used for the prediction of DFS in patients with IDC.

CLINICAL IMPLICATIONS OF SERUM 25-HYDROXYVITAMIN D STATUS AFTER 5-YEAR ADJUVANT ENDOCRINE THERAPY FOR LATE RECURRENCE OF HORMONE RECEPTOR-POSITIVE BREAST CANCER PATIENTS

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Background: The prognostic implications of serum vitamin D status after 5-year adjuvant endocrine therapy on the risk of late recurrence in hormone receptor (HR)-positive breast cancer patient were previously undescribed. We investigated the association between serum vitamin D status after 5-year adjuvant endocrine therapy and the risk of late recurrence in Korean HR-positive breast cancer patients.

Methods: 455 patients with HR-positive, stage I-III invasive breast cancer who underwent curative surgery in St. Vincents hospital between February 2004 and April 2012 were included. The patients were categorized based on serum 25-hydroxyvimtain D (25(OH)D) level after 5-year adjuvant endocrine therapy. The initial recurrence site was categorized. The primary clinical outcome investigated in this study was late recurrence-free survival (LRFS).

Result: Among the 455 patients, 242 were included in the 25(OH)D-sufficient group and 213 were included in the 25(OH)D-deficient group. Out of 455 patients, 48 patients experienced late recurrence. Across all recurrence sites, the 25(OH)D-deficient group showed a significantly worse LRFS compared to the 25(OH)D-sufficient group (HR 2.284, 95% CI 1.155-4.515, $p=0.018$). After patient subgrouping by recurrence site, the 25(OH)D-deficient group showed a significantly worse LRFS at regional LN (HR 17.453, 95% CI 2.46-128.83, $p=0.005$), bone (HR 2.394, 95% CI 1.024-5.599, $p=0.044$), and visceral (HR 2.735, 95% CI 1.182-6.328, $p=0.019$) recurrence. There was no significant difference in local recurrence ($p=0.611$).

Conclusions: 25(OH)D deficiency after 5-year adjuvant endocrine therapy is associated with worse LRFS in ER-positive breast cancer patients than in 25(OH)D-sufficient patients, particularly in regional LN, bone, and visceral recurrence.

VDR MRNA OVEREXPRESSION IS ASSOCIATED WITH WORSE PROGNOSTIC FACTORS IN BREAST CANCER

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Background: The purpose of this study was to assess the relationship between vitamin D receptor gene (VDR) expression and prognostic factors in breast cancer, its prognostic value in breast cancer development is unclear. We performed bioinformatics analysis to investigate whether VDR can serve as a prognostic indicator in breast cancer.

Methods: VDR mRNA expression was compared to clinicopathologic variables, we explored VDR expression using the Oncomine analysis and GEPIA web. The prognostic roles of VDR in breast cancer were investigated using the PrognoScan database and Kaplan Meier plotter. The heat map and methylation status of VDR mRNA expression were determined using the UCSC Genome Browser. We analyzed clinicopathologic characteristics associated with the overall survival in The Cancer Genome Atlas (TCGA) patients using χ^2 test analysis and the Kaplan-Meier method.

Result: Increased VDR expression in breast cancer was significantly associated with age >51, ER, PR status. Kaplan-Meier survival analysis showed that VDR high had a worse prognosis. The prognostic value analysis revealed that VDR high correlated significantly with a poor overall survival (OS). Following data mining in multiple big data databases, we confirmed a positive correlation between VDR expression in breast cancer tissues.

Conclusions: VDR mRNA overexpression was correlated with worse prognostic factors such as subtypes of breast cancer. VDR could be adopted as a marker to predict the prognosis of breast cancer. However, large-scale and comprehensive research is needed to clarify our results.

THE PROGNOSTIC IMPACT OF CHANGE IN NEUTROPHIL TO LYMPHOCYTE RATIO (NLR) IN PATIENTS WITH EARLY BREAST CANCER WHO RECEIVED NEOADJUVANT CHEMOTHERAPY

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Background: There is growing evidence that elevated neutrophil to lymphocyte ratio (NLR) is associated with adverse clinical outcomes in breast cancer. However, the effects of change in NLR on prognosis remain mostly unknown. The aim of this study was to assess the relationship between change in NLR and survival in the neoadjuvant setting.

Methods: We retrospectively reviewed 1,031 early breast cancer patients who underwent neoadjuvant chemotherapy followed by surgery between January 2007 and December 2015. The NLR values were obtained twice for each patient, before neoadjuvant chemotherapy (T1) and one year after the breast surgery (T2). NLR was classified as low and high relative to the cut-off value of 2.75. Log-rank tests and Cox proportional hazards models were used to analyze the influences of NLR changes on survival.

Result: Both high NLR measured at T1 (HR 2.00; 95% CI, 1.33-2.87; $p = 0.001$) and high NLR measured at T2 (HR 1.95; 95% CI, 1.21-3.13; $p = 0.006$) were independent prognostic factors for poor disease-free survival (DFS). Patients were categorized into four groups according to the NLR change pattern from T1 to T2Low > Low NLR, High > Low NLR, Low > High NLR, High > High NLR, with estimated 6.5 year DFS 87.2%, 79.3%, 82.0%, and 64.0% ($p < 0.001$). Low > Low NLR pattern was an independent prognostic factor of prolonged DFS (HR 0.53; 95% CI, 0.37-0.76; $p = 0.001$) compared with other patterns.

Conclusions: The constant low NLR had a positive impact on survival in breast cancer, reflecting that the patients with well host immunity had a lower risk of tumor recurrence.

IMPACT OF DEVIATION FROM GUIDELINE RECOMMENDED TREATMENT ON BREAST CANCER SURVIVAL IN ASIA

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Background: Despite the established survival benefit of breast cancer treatments, some patients decline these evidence-based treatment recommendations. The compliance with the different treatments vary. In addition, treatment guidelines for older patients are unclear. We aim to identify predictors of noncompliance with recommended therapy in a large breast cancer population and assess the impact of noncompliance on survival.

Methods: Our study included 19,241 non-metastatic female breast cancer patients, of whom 3,158 (16%) died within 10 years post-diagnosis (median survival = 5.8 years). We studied the association between treatment noncompliance and factors with logistic regression, and the impact of treatment noncompliance on survival with a flexible parametric survival model framework.

Result: The highest proportion of noncompliance was observed for chemotherapy (18%). Predictors of noncompliance with chemotherapy, radiotherapy and endocrine therapy included age, tumor size, nodal involvement and subtype (except radiotherapy). Noncompliance with radiotherapy was associated with worse overall survival across all subtypes (adjusted $p < 0.001$). Chemotherapy noncompliance was associated with higher mortality, in patients with luminal A (HR: 1.57 [1.03 2.39]) and basal (HR: 1.48 [1.08 2.03]) subtypes. Noncompliant with recommended endocrine therapy had worse overall survival in in patients with luminal A (HR: 1.71 [1.15 2.53]), luminal B [HER2-negative] (HR: 1.81 [1.28 2.55]) and luminal B [HER2-positive] (HR: 1.79 [1.13 2.83]) tumors. Worse survival was similarly observed in older patients for whom guidelines generally do not apply.

Conclusions: Our results highlight the importance of following appropriate treatment as recommended by current guidelines. Older patients may benefit from similar recommendations.

ANALYSES OF TUMOR INFILTRATING LYMPHOCYTES, CLINICAL PARAMETERS AND THE SURVIVAL OF PATIENTS WITH HER2 POSITIVE BREAST CANCER TREATED WITH TRASTUZUMAB

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Background: Tumor infiltrating lymphocytes (TILs) have been observed to have clinical and prognostic importance in patients with breast cancer (BC), in particular those with human epidermal growth factor receptor 2 (HER2). Clinical and prognostic roles of TILs in Indonesian cases are still unclear. This study investigated associations between TILs and clinical parameters and the overall survival (OS) of patients with HER2 positive disease.

Methods: A retrospective study was performed in 73 patients with BC treated at Dr Sardjito Hospital Yogyakarta. Clinicopathological data of cases with stage I-III and HER2-overexpressing tumors were collected. Patients received trastuzumab-based adjuvant chemotherapy following surgical resection. Tumor tissues were analyzed using hematoxylin-eosin staining to identify stromal TILs. TIL score was classified as low ($\leq 30\%$) and high ($> 30\%$).

Result: The median age of the local cohort was 50 years. Median time of follow up period was 50.64 months (range, 8.6-127.8). Majority of patients (48, 65.8%) had low grade stromal inflammatory cell infiltrate. Proportion of high TILs was significantly higher in cases with older age compared to the younger ($p = 0.023$). No significant impact on OS observed according to TIL status ($p = 0.700$). Neither clinicopathological variables nor trastuzumab combination regimens influenced the risk of death.

Conclusions: In our local patients with HER2 positive BC, higher TILs were associated with older age. TILs did not significantly impact on the patients' OS.

BREAST CARCINOMA IN SITU IN PUTRAJAYA: SCENARIO IN 13 YEARS DATA COLLECTION

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Background: Breast Carcinoma *in situ* (CIS) is a pre-invasive carcinoma that if left untreated will progress to invasive breast carcinoma.

Methods: Retrospective data analysis performed using Kaplan Meier to identify factors affecting prognosis in 77 female patients with breast CIS from 2005 to 2018 in Hospital Putrajaya and National Cancer Institute (NCI).

Result: Among 77 patients who are diagnosed with breast CIS, all patients are alive till last appointment, and only one patient develop locoregional recurrence. This patient developed locoregional recurrence at 91 months of follow-up with DCIS type. Factors such as hormonal treatment, hormonal status (ER, PR, HER2), lymphovascular invasion, final margin, CIS component unable be prognostic factor as $p = > 0.05$ however noted CIS component is highest in age group 40-60, with percentage of multicentricity is 44.4%, solid architecture 61.4%, cribiform 65.9%, micropapillary 71.4%, and necrosis/comedonecrosis 70.5%. High grade CIS also is highest in age group 40-60. The one patient who developed locoregional recurrence had wide local excision for the first operation, in view of margin involved on first operation patient underwent reexcision of margin which results in no residual tumor seen, however no axillary surgery was done. It was a High Grade DCIS, with ER/PR and HER2 positive but no lymphovascular invasion. The DCIS shows cribiform and solid pattern with comedonecrosis. Patient received adjuvant radiotherapy and was started on tamoxifen. She developed recurrence at 91 months of follow up.

Conclusions: Attention should be made more for age group 40-60 as this group has highest percentage of high grade CIS, with mostly dominant for multicentricity, solid architecture, cribiform, micropapillary, and comedonecrosis.

DEL-1 AND MFG-E8 EXPRESSION DIFFERENTIALLY MODULATES PROGNOSIS OF PATIENTS WITH TRIPLE NEGATIVE BREAST CANCER

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Background: Del-1 was previously found to be prognostic biomarker in early breast cancer patients. To date, the biological functions of Del-1 and MFG-E8 have not been sufficiently compared in side-by-side experiments. MFG-E8 is a secreted glycoprotein from macrophages that promotes clearance of apoptotic cells. In this study, we investigated the function of MFG-E8 and Del-1 and prognosis in a large cohort of early breast cancer patients.

Methods: The MFG-E8 levels were measured using a qRT-PCR in breast cancer cells (MDA-MB-231, Hs578T, MCF7, SK-BR3, and T-47D), and tissues from 20 patients with triple negative breast cancer (TNBC).

Result: MFG-E8 and Del-1 levels were significantly elevated in MDA-MB-231 and Hs578T cell lines ($p < 0.001$). Given that MFG-E8 and Del-1 share similar protein structure, we wanted to explore the effect of dual knockdown of MFG-E8 and Del-1 in migration and invasion assay. As expected, knockdown of Del-1 alone decreased cell migration in TNBC cell lines, but dual knockdown of MFG-E8 and Del-1 showed reduction was restored. Dual knockdown of MFG-E8 and Del-1 showed consistent result in invasion assay. Down-regulation of Del-1 inhibited TNBC cells invasion and recovered by the MFG-E8 knockdown. Interestingly, for the 436 patients, Del-1 high- and MFG-E8 low- expression shows correlation with aggressive histologic grade, high Ki-67 ($p < 0.001$ and $p = 0.042$, respectively) and shorter survival outcome (distant disease free survival $p = 0.028$, breast cancer specific survival $p = 0.001$).

Conclusions: Overall, these findings suggest that MFG-E8 and Del-1 protein co-expression could be a prognostic marker for patients in TNBC.

SURVIVAL OUTCOME OF INVASIVE LOBULAR CANCER OVER TIME IN PREMENOPAUSAL WOMEN: A NATION-WIDE STUDY IN KOREAN BREAST CANCER SOCIETY

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Background: The survival outcome of invasive breast cancer by histology is variable. We analyzed the survival outcome of invasive lobular cancer (ILC) compared to invasive ductal cancer (IDC) in premenopausal women using population-based analysis.

Methods: Using Korean Breast Cancer Society Registry, we included 49,570 premenopausal patients (defined as < 50 years old) diagnosed between 1990 and 2010 with stage I to III pure invasive lobular and ductal cancer. Breast cancer-specific survival (BCSS) was analyzed using log-rank test and piecewise cox models. Annual hazard of BCSS calculated from year 0 to 20.

Result: IDC patients were 48,063 (96.9%) and ILC patients were 1,507 (3.0%). Median age was 44 years old and median follows up duration was 83 months. BCSS showed changes with time depending on histologic type. Compared with IDC, ILC had a better survival rate (HR 0.749, 95% CI 0.54-1.03) before 5 years after diagnosis and worse survival after 5 years (HR 1.641, 95% CI 1.15-2.33). In the annual hazard model of BCCS, IDC events tended to decline steadily after peaking 5 years before diagnosis. On the other hand, the annual peak event of BCSS of ILC was observed 5 years after diagnosis, and thereafter it tended to be maintained constatly.

Conclusions: In population-based study, ILC shows persistent poor survival after 5 years compared to IDC in premenopausal women.

HYPERGLYCEMIA DURING ADJUVANT CHEMOTHERAPY AS A PROGNOSTIC FACTOR IN BREAST CANCER PATIENTS WITHOUT DIABETES

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Background: Breast cancer treatments, including chemotherapy, administered in combination with glucocorticoids can induce hyperglycemia. This study aimed to investigate the effect of hyperglycemia during adjuvant chemotherapy on the prognosis of breast cancer patients without a known history of diabetes.

Methods: In this study, 936 patients who underwent breast cancer surgery from 2010 to 2015 were initially selected as participants. Chemotherapy-related hyperglycemia was defined as fasting plasma glucose levels ≥ 100 mg/dL or random blood glucose levels ≥ 140 mg/dL during 2 or more cycles of adjuvant chemotherapy. After dividing the patients into the euglycemia and hyperglycemia groups, univariate and multivariate analyses were performed, and survival outcomes were analyzed by propensity score matching.

Result: The mean age of the patients was 47.4 ± 7.7 years, and the median follow-up period was 70.1 months. Eighty-two patients (19.4%) were diagnosed as having hyperglycemia. There were significant differences between the euglycemia and hyperglycemia groups with respect to age, hypertension, BMI, axillary surgery extents, nodal stage, and total steroid dosage. T stage, vascular invasion, and hyperglycemia were identified as prognostic factors of relapse-free survival (RFS). The 5-year RFS rates were 92.0% and 82.3% in the euglycemia and hyperglycemia groups, respectively, and there was a statistically significant difference between the 2 groups ($p = 0.011$). The 5-year overall survival rates were 94.6% and 92.0% in the euglycemia and hyperglycemia groups, respectively, showing no statistically significant difference between the 2 groups ($p = 0.113$).

Conclusions: These data suggest that hyperglycemia during adjuvant chemotherapy is a prognostic factor for RFS in breast cancer patients without diabetes.

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THE SIGNIFICANCE OF MICROMETASTASIS IN AXILLARY LYMPH NODE IN BREAST CANCER PATIENTS WHO UNDERWENT NEOADJUVANT CHEMOTHERAPY

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Background: The association between survival and micrometastasis (≤ 2 mm) of axillary lymph node in patients with breast cancer who received neoadjuvant chemotherapy (NACT) has not yet been established. Our study aimed to analyze the survival of patients with micrometastasis in axillary lymph node in breast cancer patients after NAC.

Methods: From January 2007 to August 2018, the patients who underwent NAC followed by surgery were included. All patients were performed axillary lymph node dissection (ALND) with or without sentinel lymph node biopsy (SLNB). The effects of micro- and macrometastasis of axillary lymph node on Recurrence-Free Survival (RFS) and Overall Survival (OS) were analyzed.

Result: Of a total 978 patients, 480 (49.1%) patients did not have axillary lymph node metastasis, 81 (8.3%) patients had only micrometastasis, and 417 (42.6%) patients had macrometastasis. Patients with macrometastasis of axillary lymph node had worse prognosis in terms of RFS and OS than patients without lymph node metastasis or with only micrometastasis ($p < 0.001$). However, RFS and OS of patients with only micrometastasis was not statistically significant, compared to patients without lymph node metastasis ($p = 0.785$ and $p = 0.784$, respectively).

Conclusions: Patients with macrometastasis in axillary lymph node had worse survival than those without. However, micrometastasis was not associated with prognosis in breast cancer patients who underwent NACT.

COMPARISON OF CLINICAL CHARACTERISTICS AND PROGNOSIS IN BREAST CANCER PATIENTS WITH BI-RADS 3-5 CATEGORIES DEFINED BY PREOPERATIVE MAMMOGRAPHY OR ULTRASONOGRAPHY

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Background: The Breast Imaging Reporting and Data System (BI-RADS) facilitates a clear and consistent communication between clinicians and in patient follow-up. We analyzed the association of BI-RADS categories with the clinicopathological characteristics and prognosis of breast cancer.

Methods: 44,184 patients with BI-RADS 3, 4, or 5 invasive breast cancers with preoperative mammography or ultrasonography were analyzed retrospectively using a large-scale data from the Korean Breast Cancer Society registration system. The difference in the clinicopathological factors and prognoses according to the BI-RADS categories (BI-RADS 3-4 and BI-RADS 5) were compared between the mammography and ultrasonography groups. Comparisons of the clinicopathological factors in both groups were made using a logistic regression analysis, while the prognoses were based on the breast cancer-specific survival using the Kaplan-Meier method and Cox proportional hazards model.

Result: The factors associated with BI-RADS were T stage, N stage, palpability, histology grade, and lymphovascular invasion in the mammography group; and N stage, palpability, histology grade, and lymphovascular invasion in the ultrasonography group. In the survival analysis, there were differences in the breast cancer-specific survival of the BI-RADS category groups in both the mammography (HR = 3.366, $p < 0.001$) and ultrasonography (HR = 2.877, $p < 0.001$) groups, among the associated factors, T stage, N stage, palpability, histology grade, and lymphovascular invasion in the mammography group; and N stage, histology grade, and lymphovascular invasion in the ultrasonography group.

Conclusions: The BI-RADS categories of preoperative mammography and ultrasonography of patients with invasive breast cancer were associated with prognosis and could be an important factor in making treatment decisions.

A SYSTEMATIC REVIEW OF PROGNOSTIC FACTORS IN PATIENTS WITH HR+/HER2- ADVANCED BREAST CANCER IN JAPAN

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Background: The main objective of this systematic literature review (SLR) is to identify prognostic factors associated with HR+/HER2- advanced breast cancer (ABC) in patients in Japan.

Methods: MEDLINE and EMBASE were searched with keywords "breast neoplasms" AND "Japan" AND "advanced" or equivalent, and Japan Medical Abstract Society database with "breast cancer" AND "advanced/metastatic" for publications from 2010 Jan. to 2019 Oct. ASCO, ESMO, ABC4 abstracts and WHO website were hand-searched. Abstract, title and full-text of the identified studies were screened by two independent reviewers for eligibility. Studies were excluded if they did not include stage III and IV patients or if the most common subtype was not HR+HER2-. Overall survival (OS), progression free survival, post progression survival and tumor response were the endpoints of interest. Prognostic factors were evaluated based on the consistency (same direction in majority of the studies) and the strength (hazard ratios; HR) of association.

Result: Searches identified 4,530 publications, of which 27 met the eligibility criteria for further analysis. All 27 included studies were observational studies. Among the endpoints, OS was the most commonly assessed (n = 22). Short disease-free interval (DFI), multiple metastatic organs and the presence of liver metastasis were consistently associated with poor OS in HR+/HER2- ABC. The strength of the association was high (HR ≥ 3) for liver metastasis, moderate (HR:1.5-2.9) for DFI and the number of metastatic organs.

Conclusions: DFI, the number of metastatic organs and liver metastasis were identified as prognostic factors for OS in HR+HER2- ABC in Japan. These findings may help clinical decision-making to improve outcomes in patients with HR+/HER2- ABC.

PROGNOSIS OF BREAST CANCER PATIENTS RELATED TO HORMONE RECEPTOR LEVEL

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Background: The purpose of this study is to determine whether the level of hormone receptor(HR) expression is sufficiently related to prognosis.

Methods: 5,696 breast cancer patients treated between January 1997 and December 2013 in the Yonsei Severance hospital were included. The percentage of estrogen receptor (ER) and progesterone receptor (PR) expression was determined by immunohistochemistry. ER 1% to 10% was set as the low ER level, and PR 1% to 20% as the low PR level. The negative group defined as ER and PR < 1%, the low group as both receptors showed low level or one negative and one low, the single high group as only one of receptors was high level, and the both high group as both receptors highly expressed.

Result: Median follow up period was 104 months (range 1-282). Comparing with the both high group, the negative, the low, the single high group had a significantly poor prognosis in both DFS (HR = 1.557, 1.762, 1.571, respectively. $p < 0.001$) and OS (HR = 1.689, 1.846, 1.616, respectively, $p < 0.001$) by univariate Cox analysis. In the low group, hormone therapy showed a moderate effect on DFS (HR = 0.561. 95% CI; 0.255-0.867, $p = 0.056$). In the single high group, hormone therapy had significant effects in both DFS (HR = 0.484, 95% CI; 0.288-0.680, $p < 0.001$) and OS (HR = 0.518, 95% CI; 0.302-0.734, $p = 0.002$).

Conclusions: HR positive breast cancer has a poor prognosis when both ER and PR receptors are not in the high expression level at long term follow up. The effect of hormone therapy cannot be overlooked in the low group and the single high group.

KI-67 AND PROGNOSIS OF BREAST CANCER: DOES IT MATTER WHETHER KI-67 LEVEL IS EXAMINED USING PREOPERATIVE OR POSTOPERATIVE SPECIMEN?

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Background: The aim of our study is to identify an association of Ki-67 level which is examined using preoperative or postoperative specimen with prognosis in Breast cancer patients.

Methods: We selected 4,177 patients who had operation between January 2008 and December 2016. We investigated the Ki-67 level evaluated preoperative (Pre_Ki-67) and postoperative (Post_Ki-67) exam, and arbitrarily divided them into groups in the order of '<10', '10~<15', '15~<20', and '>20'. Multivariable analysis was performed to identify an association of Ki-67 level with other prognostic variables and prognosis in each independent subgroup with Ki-67 level preoperatively or postoperatively.

Result: 1,673 patients had Pre_Ki-67 and 2,831 patients had Post_Ki-67. In univariated analysis, statistically significant in both groups, the higher the Ki-67, the more the ratio of T stage >2 cm, Histologic grade 3, ER/PR(-), HER2(+), Endocrine therapy(-), Chemotherapy(+), and Biologic therapy(+). In multivariable analysis, higher Ki-67 levels were significantly associated with worse survival (hazard ratio for disease-free survival of Pre_Ki-67 with 10~<15, 15~<20, and >20: 2.227, 1.829 and 2.875, respectively; that of Post_Ki-67 with 10~<15, 15~<20, and >20: 1.626, 2.928, and 2.279, respectively).

Conclusions: Ki-67 can be considered as a significant prognostic factor, regardless of whether it is preoperative or postoperative examination. To decide treatment strategies as soon as possible at the time of diagnosis, Ki-67 should be evaluated using preoperative biopsy specimens.

HIGH APOBEC3C-H GENE EXPRESSION ASSOCIATE WITH BETTER SURVIVAL IN BREAST CANCER

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Background: APOBEC3 (A3) enzymes have been known to cause somatic mutation. A3B has been well understood to induce somatic mutagenesis during development in breast cancer, whereas the roles of the other APOBEC3s (A3C-H) are not yet clear. To assess these roles, we analyzed their association with clinical relevance in breast cancer.

Methods: Gene expression data for 55 breast cancer cell-lines was from Cancer Cell Line Encycolpedia. DNA and RNA-seq data for 1,091 primary carcinomas was from TCGA. Patients were divided into 3 groups by mRNA expression level for group comparison. Spearman methods for correlation analyses, Hallmark gene-sets for enrichment analysis and KM analysis was used with $p < 0.05$ deemed significant.

Result: A3B and A3C represented 91% of A3 gene expression in breast cancer cell-lines. In TCGA patients, A3B mRNA expression has not a little correlation with both mutation burden and neoantigen load (Spearman r = 0.34-0.31), whereas no correlation in A3C-H (r = -0.03-0.08). On the other hand, A3C-H mRNA expression correlated positively with tumor leukocyte fraction (r = 0.29-0.69) and high A3C-H expressors are associated with high infiltrated CD8 T cells, TCR diversity and immune cytolytic activity ($p < 0.01$). Gene expression of immune function like interferon response was enriched in high A3C-H expressors. Concordantly, high A3C-H expressors show significantly improved survival with hazard ratios of 0.43 to 0.66.

Conclusions: Although APOBEC3C-H enzymes are known as DNA mutators, higher A3C-H mRNA expressors had improved survival. It is suggesting that they can strength anti-breast cancer immune response by causing RNA editing in tumor infiltrated lymphocytes.

CLINICAL SIGNIFICANCE OF PIK3CA MUTATION IN HER2-POSITIVE BREAST CANCER

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Background: PIK3CA mutation is one of the most common pathologic aberration in breast cancer. Actionable PIK3CA mutations were previously known for one of the key resistance mechanism for HER2-targeted treatment. Here we conducted a retrospective study to find out whether PIK3CA aberration correlates treatment response or duration in HER2 positive breast cancer patients.

Methods: We collected clinical information of patients with HER2 positive breast cancer, and grouping them based on whether the patient had PIK3CA mutation or not. Next generation sequencing (NGS) based cancer panel was used to detect genomic variation via K-MASTER project.

Result: A total of 90 patients with HER2 positive breast cancer were analyzed. Among them, 33 had pathologic PIK3CA mutation (36.7%). The pCR rate of PIK3CAm group was lower than PIK3CAw group. (22.2% vs. 50.0%, $p=0.122$). The DFS after surgery or adjuvant therapy were 39.1 months in PIK3CAm group and 40.8 months in PIK3CAw group ($p=0.719$). In metastatic setting, the PIK3CAm group showed significantly shorter PFS for 1st-line anti-HER2 monoclonal antibody (6.9 vs. 18.8, $p<0.001$). The PFS of T-DM1 was 4.0m in PIK3CAm and 11.0 m in PIK3CAw group ($p=0.011$). When the PFS of HER2-targeted therapy and NGS data are combined, patients with worse outcome tended to have more pathologic mutation.

Conclusions: In our study, patients with activating PIK3CA mutation showed lower pCR rate and shorter PFS for anti-HER2 therapy than those who had wild type PIK3CA. PIK3CA aberration in HER2 positive breast cancer could be interpreted as poor prognostic marker.

THE ASSOCIATION BETWEEN THE EXPRESSION OF NUCLEAR YES-ASSOCIATED PROTEIN 1 (YAP1) AND P53 PROTEIN MUTATION STATUS IN BREAST CANCER PATIENTS

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Background: Yes-associated protein 1 (YAP1) is a key effector molecule regulated by the Hippo pathway and described as a poor prognostic factor in breast cancer. And tumor protein 53 (P53) mutation is well known as a biomarker with poor survival outcomes. However, clinical characteristics and survival outcome according to YAP1 and P53 mutation have been poorly identified in breast cancer.

Methods: Retrospectively, 533 breast tumor tissues were collected at the Seoul St Mary's hospital and Gangnam Severance Hospital from 1992 to 2017. Immunohistochemistry with YAP1 and p53 specific antibodies were performed, and the clinical data were analyzed.

Result: Mutant p53 pattern was associated with aggressive tumor features and advanced anatomical stage. Inferior overall survival (OS) and recurrence free survival (RFS) were related with mutant p53 pattern in low nuclear YAP1 expression ($p = 0.0009$ and $p = 0.0011$, respectively). Multivariate analysis showed that mutant p53 pattern was an independent prognostic marker for OS (hazard ratios [HRs]: 2.938, 95% confidence intervals: 1.028-8.395, $p = 0.044$) and RFS (HRs: 1.842, 95% CIs: 1.026-3.304). However, in high nuclear YAP1 expression, there were no significantly difference in OS and RFS according to p53 staining pattern.

Conclusions: We found that mutant p53 pattern is a poor prognostic biomarker in breast tumor with low nuclear YAP1 expression. Our findings suggest that interaction between nuclear YAP1 and p53 expression pattern impact survival outcomes.

THE DIFFERENT PROGNOSIS OF TRIPLE NEGATIVE BREAST CANCER ACCORDING TO TIME-SEQUENCING NLR

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Background: Although the treatment outcome of breast cancer has steadily improved, triple negative breast cancer (TNBC) still shows a poor prognosis because there is no specific target. Since TNBCs have various prognosis, it is important to find subgroups with particularly poor prognosis.

Methods: This study was conducted in TNBC patients who underwent breast cancer surgery from January 2005 to December 2016 at the Severance Hospital Breast Cancer Registry. The effects of neutrophil to lymphocyte ratio (NLR) and clinicopathologic factors on breast cancer recurrence and survival in patients who underwent both definitive local treatment (total mastectomy or breast conserving surgery with radiotherapy) and systemic chemotherapy were analyzed. For NLR, values at 4 time points (before surgery, before chemotherapy, before radiotherapy, and 1 year after surgery) were used.

Result: In the results of a univariate analysis of 601 TNBC patients, changes in NLR significantly increased the risk of recurrence or death before the start of radiotherapy (odds ratio: 1.115, confidence interval: 1.011-1.229) and 1 year after surgery (odds ratio: 1.196, confidence interval: 1.057-1.354). In multivariate analysis, the change of NLR and stage were also identified as significant factors.

Conclusions: Time-sequencing NLR may reflect the prognosis of TNBC patients. In the case of patients whose NLR value increases compared to the preoperative NLR value during treatment, a poor prognosis is expected, and additional treatment will be helpful in improving the prognosis.

SURVIVAL ANALYSIS BY PERIOD ACCORDING TO THE SUBTYPE OF RECURRENT BREAST CANCER PATIENTS

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Background: We performed this study to analyze changing survival patterns regarding recurrent breast cancer in Korea during the last 14 years (2000-2013). We also sought to determine factors possibly influencing outcomes and changes over time in the duration of survival after recurrence.

Methods: We retrospectively analyzed 17,776 patients with breast cancer treated between January 2000 and December 2013, comparing the periods 2000-2007 and 2008-2013.We retrospectively reviewed the collected database including the age at diagnosis, clinical manifestations, pathology report, surgical methods, types of adjuvant treatment modalities, type of recurrence, and follow-up period.

Result: There were 2,407 cases (13.5%) of recurrence. Median follow-up was 30.6 months (range 0-223.4) from the time of relapse. Median survival time was 42.3 months. Survival after recurrence (SAR) significantly improved in 2008-2013 compared to that in 2000-2007. Median survival time increased from 38.0 months in the period I to 49.7 months in period II ($p < 0.001$). In analysis performed according to the hormone receptor and HER2 status subtypes, SAR were higher in period 2 than period 1 in all types except triple negative subtype.

Conclusions: Outcomes of breast cancer have been improving recently, and survival time after the first recurrence of breast cancer has steadily increased in recent decades. We confirmed that advances in treatments have contributed to this improvement in survival after the first recurrence.

PROGNOSTIC VALUE OF P53 EXPRESSION IN HORMONE RECEPTOR-POSITIVE AND HUMAN EPIDERMAL GROWTH FACTOR RECEPTOR2-NEGATIVE BREAST CANCER PATIENTS WITH NEOADJUVANT CHEMOTHERAPY

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Background: The aim of this study was to determine the possibility of predicting the outcome of neoadjuvant chemotherapy (NAC) using the p53 expression in hormone receptor (HR)-positive and human epidermal growth factor receptor2 (HER2)-negative breast cancer patients.

Methods: Between 2008 and 2014, a total of 594 patients from Asan Medical Center diagnosed with stage IIII HR-positive, HER2-negative breast cancer and had NAC were retrospectively reviewed. The p53 expression was evaluated. We examined overall survival (OS), breast cancer-specific survival (BCSS) and compared them between the groups.

Result: At a median follow-up of 69.8 months, the OS and BCSS was better in p53(-) group than those in p53(+) group. The 5-year OS was 95.4% in p53(-) group while it was 92.1% in p53(+) group and the BCSS was 96.2% in p53(-) group while it was 93% in p53(+) group (OS, $p=0.005$; BCSS, $p=0.008$).

Conclusions: High expression of Immunohistochemically detected p53 associated significantly with a lower OS and BCSS than low p53, suggesting that p53 accumulation might be a strong prognostic factor in HR-positive, HER2-negative breast cancer patients with NAC.

MULTI-GENE SIGNATURE OF MICROCALCIFICATION AND RISK PREDICTION AMONG TAIWANESE BREAST CANCER

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Background: Microcalcification is one of the most common radiological and pathological features of breast ductal carcinoma in situ (DCIS), and to a lesser extent, invasive ductal carcinoma. We evaluated messenger RNA (mRNA) transcriptional profiles associated with ectopic mammary mineralization.

Methods: A total of 109 breast cancers were assayed with oligonucleotide microarrays. The associations of mRNA abundance with microcalcifications and relevant clinical features were evaluated.

Result: Microcalcifications were present in 86 (79%) patients by pathological examination, and 81 (94%) were with coexistent DCIS, while only 13 (57%) of 23 patients without microcalcification, the invasive diseases were accompanied with DCIS (chi-square test, $p < 0.001$). There were 69 genes with differential mRNA abundance between breast cancers with and without microcalcifications, and 11 were associated with high-grade (comedo) type DCIS. Enriched Gene Ontology categories included glycosaminoglycan and aminoglycan metabolic processes and protein ubiquitination, indicating an active secretory process. The intersection (18 genes) of microcalcificaion-associated and DCIS-associated genes provided the best predictive accuracy of 82% with Bayesian compound covariate predictor. Ten genes were further selected for prognostic index score construction, and five-year relapse free survival was 91% for low-risk and 83% for high-risk group (log-rank test, $p = 0.10$).

Conclusions: Our study suggested that microcalcification is not only the earliest detectable radiological sign for mammography screening but the phenomenon itself may reflect the underling events during mammary carcinogenesis. Future studies to evaluate the prognostic significance of microcalcifications are warranted.

CLINICOPATHOLOGICAL CHARACTERISTICS AND PROGNOSIS OF MAMMARY PAGET DISEASE ACCORDING TO UNDERLYING BREAST CARCINOMA

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Background: Paget disease of the breast is a rare breast cancer type, accounting for less than 3 percent of new cases of female breast cancer. Most mammary Paget disease is associated with underlying carcinoma in situ or invasive carcinoma in the breast parenchyma. We aimed to investigate clinicopathological characteristics and survival outcomes of breast cancer patients with Paget disease.

Methods: From database of Seoul National Univ. Hospital and Korea Univ. Anam Hospital, 2000 to 2018, we identified 19,142 female breast cancer patients. Clinicopathological characteristics and survival outcomes of the patients were retrospectively analyzed.

Result: Among the patients of two data sets, 269 female breast cancer patients were identified with Paget disease. These patients included 220 patients with invasive ductal carcinoma (IDC-PD) and 49 patients with ductal carcinoma in situ (DCIS-PD). Compared with invasive ductal carcinoma patients without Paget disease, IDC-PD patients had more HER2 positivity ($p < 0.01$), higher Ki-67 level ($p < 0.01$) and worse prognosis (KaplanMeier analysis, $p < 0.001$ for overall survival). Compared with ductal carcinoma in situ patients without Paget disease, DCIS-PD patients had more HER2 positivity ($p < 0.01$), however, there were no difference in prognosis. In Cox regression analyses, PD was an independent prognostic factor for invasive ductal carcinoma patients. DCIS-PD patients had more HER2 positivity ($p = 0.008$) than IDC-PD patients.

Conclusions: Invasive ductal carcinoma with Paget disease was associated with aggressive characteristics and worse survival outcomes. Further studies of large populations are warranted to elucidate the prognostic factor for Paget disease.

AWARENESS AND ACCEPTABILITY OF RECONSTRUCTIVE BREAST SERVICES IN PATIENTS WITH BREAST CANCER

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Background: Many women still need to undergo a mastectomy for breast cancer (BC) for oncological concerns. Factors impacting the choice to undergo breast reconstruction (BR) are not clear. We conducted a survey, to evaluate the awareness and acceptability of BR at our institution.

Methods: A questionnaire was designed and served to women presenting to the breast clinic. Three groups were interviewed-women planned for surgery, those on follow up post mastectomy and those for BCS.

Result: of the 492 women who participated in the survey, 212 (43.08%) were planned for surgery, and 280 (57%) were on follow up. Majority (48%) were more than 50 years of age, over 70% were home-makers and 15 (0.03%) were unmarried. Aspects evaluating awareness of BR suggested that 202 (41%) women had knowledge about BR, 28% knew about types of BR. Major source of knowledge was surgeon (56%) and media (50%). In mastectomy group on follow up, 67% did not want reconstruction and 59% had coped with the mastectomy. Family or financial reasons was cited by 8% and 6% were worried about impact on treatment. Among women planned for surgery, 69.6% had not considered BR. Cost influenced choice for BR in 25 (13%), 102 (52.3%) felt that they did not need the reconstruction, 20 (10.2%) were worried it would affect treatment.

Conclusions: Our study shows high awareness regarding BR in women being treated for breast cancer. However, only 31.5% women opt for BR, suggesting good coping skills among those who undergo mastectomy and priority on treatment related concerns, independent of socio economic issues.

PREOPERATIVE THERAPY PROGRAM AND SUPPORTIVE CARE IN EARLY & LOCALLY ADVANCED BREAST CANCERS - PRESCELLA

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Background: Increasingly, non-metastatic breast cancers (BC) are treated with neoadjuvant therapy (NAT). Such an approach is resource intense, prolonged and associated with significant morbidity. Early identification and addressing supportive care needs of NAT treated patients is important for provision of effective cancer care whilst maintaining a patient's optimal physical, psychological and social function.

Methods: This is a prospective cohort study of BC patients treated with NAT. A convergent parallel mixed-methods study design will be used to collect, analyze and interpret quantitative and qualitative data from patients under 40 and over 65 years of age. In the young, we focus on disturbances in sexuality and in the older patients, we aim to evaluate for preferences among health outcomes. We aim to: 1) Explore the longitudinal trends of quality of life of BC patients enrolled in a NAT program. 2) Explore the perspective and supportive care needs in young patients </=40 focusing on disturbances in sexuality, body image and relationships. 3) Explore the perspective and supportive care needs in older patients >/=65 focusing on health outcome preferences.

Result: A total of 72 patients were recruited from June 2020. Of the 72, 11 are aged </=40 whilst 15 are aged >/=65.

Conclusions: The findings of this study will be relevant in prioritizing care provision in younger, older and general population of BC patients receiving NAT. It will add to sparse literature of unmet needs of generally under-represented groups of BC patients, filling gaps to provide social-culturally appropriate evidence for the management of Singaporean patients.

THE INFLUENCES OF ANGER TRAIT AND ANGER EXPRESSION ON THE SOMATIZING SYMPTOMS FOR BREAST CANCER PATIENTS

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Background: This study was conducted to investigate factors related to the somatizing symptoms for breast cancer patients and to explore the influence of disease, anger trait and anger expression on the somatizing symptoms.

Methods: A total of 82 breast cancer patients in a Univ. hospital located in J province were included, who agreed to participate in this study completed a self-report Questionnaire. The collected data were analyzed by descriptive analysis, t-test, ANOVA, Pearson's correlation, and multiple regression using SPSS 22.0 statistical program.

Result: The average score of uncertainty, resilience, and perceived stress were 94.27 ± 14.46, 88.74 ± 10.57, and 16.99 ± 4.42. As stress perceived, there were significantly positive correlations stress and uncertainty ($r = .258$, $p = 0.019$). There were significantly negative correlation between stress and resilience ($r = -.265$, $p = 0.016$). In additions there were no differences by breast cancer characteristics except period of cancer treatments. Specially, it was also significantly negative correlation between stress and period of breast cancer treatment ($r = -.238$, $p = 0.032$). In this study factors affecting stress perceived were resilience ($\beta = -.285$, $p = 0.007$), and uncertainty ($\beta = .218$, $p = 0.041$). The factors explained 15% of perceived stress.

Conclusions: It doesn't matter period of treatment for breast cancer, it is more important to enhance cancer resilience by themselves to clarify cancer prognosis by physicians. It is suggested that strategies of clinical intervention for strengthening emotional support and patients-health professionals communication including uncertainty and resilience management for breast cancer patients.

PREDICTORS OF THE QUALITY OF LIFE AT THE END OF PRIMARY TREATMENT OF BREAST CANCER

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Background: The period after completing primary treatment is important as patients learn to transition into normal life during this time. Studies on the factors affecting QOL during this transition period is needed to develop an effective intervention program. The purposes of this study were to evaluate symptom experience, self-efficacy, social support, and quality of life (QOL), and identify the predictors of QOL among breast cancer patients at end of primary treatment.

Methods: A cross-sectional study was conducted on 140 disease-free breast cancer survivors at Univ. hospitals. The Korean version of the Functional Assessment of Cancer Therapy-General, the Memorial Symptom Assessment Scale-Short Form, Self-Management of Breast Cance, and Interpersonal Support Evaluation List-12 scales were used to assess predictors and QOL. The data were analyzed using the Pearson correlation, t-test, ANOVA, and hierarchical multiple regression.

Result: The mean score of QOL for breast cancer survivors was 95.81 (± 18.02). Chemotherapy and economic status were significantly associated with QOL in sociodemographic variables. Physiological and psychological symptoms and social support have a significant association with QOL. The results of the regression analyses showed that physiological and psychological symptoms and belonging support were statically significant in predicting patients' QOL.

Conclusions: Symptom experience, social support, and QOL are essential variables that should be acknowledged when delivering health care to breast cancer survivors. More attention to the reduction and management of symptom distress could improve QOL among breast cancer survivors.

PERSONAL SOCIAL CAPITAL, CANCER-RELATED FATIGUE, AND QUALITY OF LIFE IN KOREAN BREAST CANCER SURVIVORS

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Background: Social capital of breast cancer survivors was associated with treatment compliance, pain relief, and resilience, and was related to health outcomes. Social capital, cancer-related fatigue (CRF), and quality of life (QOL) has been reported to be related to each other, but studies that investigated those variables in Korean breast cancer survivors are insufficient. The purpose of this study is to identify the personal social capital, CRF, and QOL in Korean breast cancer survivors, and to explain the relationships among those variables.

Methods: This study is a secondary analysis of prospective questionnaire data collected in 2016 from the "Better Life after cancer, Energy, Strength, and Support (BLESS) program" for Korean breast cancer survivors experiencing CRF. The data (n = 48) measured before the program were analyzed using descriptive statistical analysis, Independent t-test, Mann Whitney test, analysis of variance, Kruskal Wallis test, and Pearson correlation coefficient.

Result: The mean score of personal social capital (2.85 ± 0.64) and CRF (5.31 ± 1.66) was moderate level. CRF was higher and QOL (mean score 85.42 ± 17.48) was lower than reported in previous studies. Personal social capital showed a significant positive correlation with social/family status ($r = 0.47$, $p < .01$) and functional status ($r = 0.31$, $p < .05$) of QOL. CRF showed a significant moderate negative correlation with QOL ($r = -0.54$, $p < .01$).

Conclusions: In addition to medical treatments for breast cancer survivors, interventions for reducing CRF and multidisciplinary approaches to maintaining and promoting social capital could contribute to improving the QOL of breast cancer survivors.

EXPERIENCES IN SEEKING AND ENDURING MEDICAL TREATMENT : A QUALITATIVE STUDY AMONG LATE-STAGE BREAST CANCER PATIENTS AND FAMILY IN INDONESIA

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Background: Breast cancer in Indonesia is mostly diagnosed at late stages with increasing rates of mortality, while studies investigating patients' experiences from initial symptoms up to treatment course is limited in ASEAN countries. This study aims to explore advanced-stage breast cancer patients' experiences in seeking and undergoing medical treatment.

Methods: A qualitative study with semi-structured interviews, 40 to 60 minutes length each, involving 20 advanced-stage breast cancer patients registered in Sardjito Hospital Yogyakarta in 2018 to 2019, and 5 family members. Recorded interviews were transcribed and analyzed by developing core categories, concepts, repeating patterns, and emerging themes. Results were cross-checked and verified among research team members.

Result: Five themes emerged: 1) Patients' struggle in accessing health care were dealing with preconceived fear of surgery, convoluted referral systems, and long-distance travels to health facilities; 2) Financial issues generated from medical treatment were expenses not covered in health insurance (transportation and accommodation costs), and income lost due to leaving jobs for attending treatments; 3) Family plays important factors, as they provided patients with physical, psychological and financial supports; 4) Patients sought to be healed and perceived sense of normalcy through enduring chemotherapy, combining with alternative treatments, and finding joy and spirituality; 5) Trust and positive relationship with health professionals helped patients followed through with disease treatments.

Conclusions: This study highlights the complex struggle and experiences of patients and families in seeking and enduring breast cancer medical treatments, which could inform the health system and services improvement for advanced-stage breast cancer patients.

THE EMOTIONAL STATUS, ATTITUDES IN DECISION MAKING PROCESS, AND THEIR IMPACT ON SURGICAL CHOICES IN KOREAN BREAST CANCER PATIENTS

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Background: We examined the incidence of emotional distress in women with newly diagnosed breast cancer to determine whether the degree of emotional distress affected their choice of breast-conserving surgery (BCS) or mastectomy, and evaluated how the patient's preferred role in decision-making influenced her choice of surgical method.

Methods: This prospective study included 85 patients newly diagnosed with *in situ* or invasive breast cancer eligible for BCS. Their degree of depression/anxiety and attitude toward the decision-making process were measured using the Hospital Anxiety and Depression Scale (HADS) and Control Preference Scale (CPS), respectively. After receiving information on both surgical methods, the patients indicated their preferred surgical method and completed the CPS at their initial and second visits before surgery.

Result: After the diagnosis of breast cancer, 75.3% of patients showed abnormal or borderline HADS scores for depression and 41.2% for anxiety. Patients with borderline or abnormal degrees of depression were more likely to have co-existing abnormal degrees of anxiety ($p < 0.001$). However, the presence of depression or anxiety was not associated with patients' surgical choices ($p = 0.394$ and 0.530, respectively). Patients who preferred a more active role in the decision-making process were more likely to choose mastectomy over BCS, while those who were passive or collaborative chose BCS more frequently ($p = 0.001$).

Conclusions: Although many patients with newly diagnosed breast cancer experience depression and anxiety before surgery, these do not affect the choice of surgical method, while their attitudes toward the decision-making process do.

THE ROLE OF LISINOPRIL AND BISOPROLOL TO PREVENT ANTHRACYCLINE INDUCED CARDIOTOXICITY IN LOCALLY ADVANCED BREAST CANCER PATIENTS

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Background: Anthracyclines are a class of chemotherapeutic agents that are used to treat many different cancers, including breast cancer. Although anthracyclines remain an effective and commonly used therapy, their use is limited by cardiotoxicity. This study aimed to evaluate whether the addition of lisinopril and bisoprolol could prevent anthracycline induced cardiotoxicity.

Methods: In this randomized, controlled trial, 74 subjects with locally advanced breast cancer were randomly assigned to a group receiving lisinopril and bisoprolol ($n = 37$) or to a control group ($n = 37$). Lisinopril and bisoprolol was started simultaneously 24 hours before the first cycle of chemotherapy. The initial dose was 2.5 mg each, once daily, and was increased gradually under close supervision to 10 mg if systolic blood pressure persistently remained > 90 mmHg and HR > 60 bpm. Echocardiographic studies were performed before and after the 6th cycles of neoadjuvant anthracycline-based chemotherapy (FAC).

Result: There was no difference in baseline left ventricular ejection fraction (LVEF) between intervention and control group (65.77 ± 4.56% vs. 65.64 ± 455%, $p = 0.92$). There was also no difference in total anthracycline doses between 2 groups (579.48 ± 65.10 mg vs. 557.50 ± 47.76 mg, $p = 0.18$). However, after 6 cycles of FAC, the rate of decline in LVEF was greater in control group (-5.52 ± 8,90%) than in the intervention group (-0.27 ± 5.73%) with $p = 0.017$.

Conclusions: Combined treatment with lisinopril and bisoprolol may prevent anthracycline-induced cardiotoxicity in patients with locally advanced breast cancer treated with anthracycline-based chemotherapy.

Poster Presentation

THE LONG-TERM EFFECT OF AGE ON CARDIOVASCULAR DISEASE IN PATIENTS WITH BREAST CANCER WHO RECEIVED CHEMOTHERAPY

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Background: As breast cancer survival has significantly improved and patient life expectancy has increased, greater numbers of elderly breast cancer survivors are at risk for cardiovascular disease (CVD). Therefore, the present study investigated the impact of age (age < 50 years and age ≥ 50 years) on the incidence, mortality and predictors of CVD following adjuvant chemotherapy in the late period of survivorship.

Methods: From July 1985 to December 2013, 761 patients who underwent chemotherapy for breast cancer were enrolled and divided into patients aged < 50 years ($n = 413$, 54.3%) and patients aged ≥ 50 years ($n = 348$, 45.7%).

Result: During long-term follow-up (median: 122 months, range: 12-340 months), CVD events developed in 50 (6.57%) patients, including 17 (4.1%) aged < 50 years and 33 (9.5%) aged ≥ 50 years ($p = 0.003$). The median time to the development of CVD was 71 months (16-326 months). Eight (1.1%) of 50 patients with CVD died, including 1 patient aged < 50 years and 7 patients aged ≥ 50 years. CVD-free survival was significantly lower in patients aged ≥ 50 years compared with patients aged < 50 years ($p < 0.001$). In multivariate analyses, age ≥ 50 years is a significant predictor of CVD ($p < 0.001$, hazard ratio $= 3.802$, 95% confidence interval, 1.986-7.278).

Conclusions: Age in patients with breast cancer who underwent chemotherapy has a long-term effect on CVD. Therefore, it is important to consider ethnic and age-specific risks for CVD in breast cancer survivors.

FACTORS INFLUENCING CANCER ADAPTATION AND COPING IN BREAST CANCER SURVIVORS: FOCUSED ON THE MINI-MAC SCALE

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Background: While it is known that breast cancer survivors (BCS) experience physical and socio-psychological changes, anxiety about recurrence, and disease-related distress, the body of knowledge on how patients adapt to and cope with cancer is limited. This study aimed to investigate mental adjustment to cancer in Korean BCS.

Methods: A cross-sectional survey was done with 188 Korean BCS via online or paper survey in July and August 2019. To evaluate patterns of cancer adaptation and coping, we used the mini-Mental Adjustment to Cancer (mini-MAC) scale, which is widely used in psycho-oncology, This study used the Korean version of the mini-MAC for the first time in Korea, to our knowledge, using the four subscales, i.e. fighting spirit, positive redefinition, helplessness-hopelessness, and anxious preoccupation. Data were analyzed using independent t-tests and ANOVA.

Result: The majority of study participants were young (< 50 years) and had been diagnosed within the past 2 years. High scores were reported particularly for anxious preoccupation and helplessness-hopelessness, suggesting that participants used more maladaptive coping strategies compared to adaptive coping strategies. Participants who used painkillers, were older, single, and perceived greater economic burden scored higher in helplessness-hopelessness. BCS with more advanced cancer stage or greater economic burden reported higher anxious preoccupation. Older participants and those with children were more likely to score higher in fatalism.

Conclusions: The findings present empirical data on Korean BCSs adaptation and coping with cancer, which can be used to identify vulnerable BCS as well as guide interventions to improve adaptation and coping.

PSYCHOLOGICAL ISSUES IN VERY LONG-TERM BREAST CANCER SURVIVORS: A CLOSER LOOK AT FEAR OF CANCER RECURRENCE

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Background: This study aimed to assess fear of cancer recurrence (FCR) and depression in long-term breast cancer survivors.

Methods: A survey was conducted in 2020 at two hospitals in Korea. FCR was assessed by Fear of Cancer Recurrence Inventory (FCRI) and depression by PHQ-9 questionnaires. Two cut-offs were applied to severity subscale of FCRI to define 'having FCR': ≥ 13 for sub-clinical FCR and ≥ 16 for clinical FCR. Demographic, clinical characteristics and overall quality of life was also measured. Univariate and multivariate logistic regression analysis was conducted to identify factor associated with FCR. Structural equation model was used to explore the impact of FCR on other outcomes.

Result: The mean age of 333 study participants was 57.2 ± 8.4, 90% were early-stage BC, and 72% had luminal A subtype. Time since diagnosis of BC ranges from 9 to 16 years. More than 40% reported having sub-clinical FCR and 36% had clinical FCR. Age at diagnosis earlier than 45 was a strong predictor for higher level of FCR (aOR 2.27, 95% CI 1.25-4.11). No significant association was found between other factors with FCR. Higher level of FCR negatively impact on the emotional function of BC survivors, increased risk of depression, and deteriorate their over QoL ($\beta = -0.11$, $p = 0.021$).

Conclusions: Years after the diagnosis, BC survivors still express their concern and fear about cancer recurrence. Our findings suggest that psychological intervention to reduce FCR and their impact is helpful for BC survivors diagnosed at early ages.

SURVIVAL IN DIFFERENT AGED PATIENTS WITH MALE BREAST CANCER

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Background: To examine the difference of long-term survivals between the young patients and the old patients in male breast cancer.

Methods: Data from male patients with invasive breast cancer treated from 1991 through 2013 were obtained from the Korean Breast Cancer Registry databases. The cases were categorized according to age at diagnosis into two subgroups: the ≤ 40 years group and the >40 years group. A total of 475 patients were included: 46 (9.7%) patients in the ≤ 40 years group and 429 (90.3%) patients in the >40 years group. Clinicopathological characteristics between two groups were compared. The survival was calculated using the Kaplan-Meier method.

Result: The mean age at diagnosis was 59.8 years (±13.3). Proportions of human epidermal growth factor receptor-2 positive in the ≤ 40 years group were higher than that in the >40 years group ($p = 0.009$). Median follow-up duration was 74 months. In the Kaplan-Meier survival curve, the ≤ 40 years group showed better overall survival (OS) than >40 years group. The 5-year OS rates for the ≤ 40 years group and >40 years group were 97.4% and 85.9%, respectively ($p = 0.003$). Age (HR = 3.42, 95% CI: 1.35 to 8.72, $p = 0.010$) was the prognosis factors of OS.

Conclusions: Worse survivals in the >40 years group were found comparing to those in the ≤ 40 years group in male breast cancer patients.

PATIENT-REPORTED OUTCOMES AND OBJECTIVE ASSESSMENTS WITH ARM MEASUREMENT AND BIOIMPEDANCE ANALYSIS FOR LYMPHEDEMA AMONG BREAST CANCER SURVIVORS

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Background: Lymphedema (LE) decreases the quality of life of breast cancer patients. Objective quantification of patient-reported outcome (PRO) may improve the discordance between PROs and objective assessments of LE by establishing a standard follow-up for LE. This study determined the prevalence of subjective and objective LE and evaluated the correlation between objective assessment and PRO of LE in primary breast cancer patients undergoing breast and axillary surgery.

Methods: Breast cancer patients who underwent sentinel lymph node biopsy (SN) or axillary lymph node dissection (ALND) more than 1 year after surgery were enrolled. We prospectively evaluated LE using the Patient-Reported Outcomes version of the Common Terminology Criteria for Adverse Events (PRO-CTCAE) and two objective assessments (arm circumference and bioimpedance) and analyzed their correlations.

Result: Between November 2018 and January 2019, 631 patients (SN; n = 415, ALND; n = 216) were enrolled. The median age, body mass index, and duration from surgery was 56 years, 21.9 kg/m^2, and 3.8 years, respectively. The prevalences of subjective and objective LE were 4.1% and 1.4% in the SN group and 51.8% and 24.1% in the ALND group, respectively. The objective assessments were weakly positively correlated with PRO-CTCAE. Arm circumference measurement correlated better than bioimpedance overall and was most strongly correlated with frequency ($r = 0.485$, $p < 0.01$).

Conclusions: LE occurred in few SN patients. The prevalence of subjective LE was higher than that of objective LE. Arm circumference measurements better reflected PRO than did bioimpedance. These results underscore the limitation of LE detection by subjective or objective methods alone.

ANALYSIS OF QUALITY OF LIFE IN BREAST CANCER GROUP UNDERGOING MASTECTOMY AND BREAST CONSERVING SURGERY

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Background: The surgical modality currently used nowadays in breast cancer patients are mastectomy and breast-conserving surgery (BCS). Each of these techniques has its own side effects, especially in mastectomy, and could affect patients' quality of life. This research is conducted to know whether there is any quality of life difference between breast cancer patients undergoing mastectomy and breast-conserving surgery.

Methods: This observational research was conducted in breast cancer survivor group, Lovely Pink Solo. The quality of life is measured with validated Indonesian version of RAND SF-36. Analysis of the quality of life is using parametric, non-parametric, and also linear and logistic regression to all quality of life domains and independent variables such as type of surgery, age, employment, education, number of children, income, stadium, duration since surgery, therapy, and comorbid illness.

Result: A total of 115 stage I-III breast cancer survivors completed the questionnaire. Among them, 83 (71.3%) underwent mastectomy and 32 (28.7%) underwent BCS. Type of surgery didn't affect any domain of quality of life. In multivariate analysis, it is known that quality of life is affected by employment, undergoing therapy, duration since surgery, comorbid illness, age, and the number of children in some domains. The global score of quality of life was only affected by undergoing therapy.

Conclusions: There is no significant difference regarding the quality of life between survivor undergoing mastectomy and BCS. Other factors like socioeconomic and clinical characteristics might play a role in quality of life.

THE EVALUATION OF PREDICTIVE EQUATION FOR ESTIMATING ENERGY EXPENDITURE IN BREAST CANCER PATIENTS IN DR. SARDJITO GENERAL HOSPITAL, YOGYAKARTA, INDONESIA

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Background: Despite the presence of hyper-, hypometabolism, and energy imbalance in cancer patients, there are conflicting evidences and no consensus on the use of predictive equation in estimating energy expenditure (EE) when indirect calorimetry (IC) is unavailable. This study aims to assess the EE of women with breast cancer (BC) and to evaluate prediction equations for estimating resting and total energy expenditure (pREE and pTEE).

Methods: We included 146 BC patients treated in Dr. Sardjito Hospital in 2019. We assessed pREE and pTEE using four different equations. Mifflin-St.Jeor (MJ) equation was used as the determinant because of its closest adequacy to IC. Harris-Bennedict (HBE) and FAO/WHO are the commonest equations used to assess pREE. Simplified Equation (SE) is a method that is daily used in our center. Equations were compared to using student's paired t-test. Bland-Altman plot was used to analyze the limits of agreement between two methods.

Result: PREE estimation with HBE was similar to that of MJ ($p = 0.68$). When compared with MJ, SE and FAO/WHO equations were significantly overestimated ($p < 0.0001$). Further calculation of pTEE showed that SE, HBE, and FAO/WHO methods were significantly overestimating pTEE when corrected with activity factors and injury factor (149.6, 193.7, and 283.6 kcal/day). All values were consistent with the significant bias from the agreement plots.

Conclusions: Mifflin-St.Jeor and Harris-Bennedict equations are preferable for predicting pREE in our BC patients. pTEE of these patients should be calculated based on Mifflin-St.Jeor only, parallel with the monitoring of other nutritional parameters to avoid low survival outcomes.

OPTIMAL TUMOR REDUCTION RATE AND MODALITIES FOR PREDICTING PATHOLOGICAL COMPLETE RESPONSE AFTER TWO CYCLES OF NEOADJUVANT CHEMOTHERAPY IN WOMEN WITH BREAST CANCER: RESULTS OF A MULTICENTER PROSPECTIVE

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Background: Prognosis can be improved by switching treatment for patients who are not expected to achieve pCR. However, the optimal modality for predicting pCR and the cutoff tumor reduction rate are unclear.

Methods: This was a prospective, multicenter, observational study. This study was approved by our institutional review board. HER2-positive or triple-negative breast cancer subtypes were eligible. The tumor reduction rate was evaluated after two 3-week cycles of docetaxel (plus trastuzumab for patients with HER2-positive cancer) using calipers, MMG, US, and MRI. Patients without disease progression completed two additional cycles of docetaxel (plus trastuzumab for patients with HER2-positive disease) and four cycles of an anthracycline-containing regimen. We investigated the optimal tumor reduction rate for predicting pCR using various measurement modalities via receiver operating characteristic analysis.

Result: In total, 52 patients were analyzed. Twenty-eight patients (54%) achieved pCR. Patients who experienced pCR had a larger tumor reduction rate after two cycles of docetaxel (plus trastuzumab for patients with HER2-positive cancer) as measured using calipers (62% vs. 25%), MMG (40% vs. 19%), US (35% vs. 14%), and MRI (47% vs. 19%). The optimal tumor reduction rates for predicting pCR were 23, 39, 32, and 40% for US, caliper, MMG, and MRI measurements, respectively. The area under the curve was highest for caliper measurements. The optimal modality for predicting pCR differed among subtypes, but there were few cases.

Conclusions: Although tumor reduction rate after two cycles of chemotherapy is highly predictive of pCR, the optimal cutoff value differed among the modalities, and might differ by breast cancer subtype.

TOP-100 HIGHEST-CITED ARTICLES ON BREAST SURGERY (SINCE 2010): A BIBLIOMETRIC ANALYSIS

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Background: The total number of citations of a research article can be used to determine its impact on the scientific arena. We aimed to identify the top-100 articles published on breast surgery and evaluate their characteristics.

Methods: The authors searched the Thomson Reuters Web of Knowledge for citations of all articles which were published from 2010 to 2019 relevant to breast surgery. The number of citations, authorship, year, journal, and country and institution of publication were recorded for each article.

Result: The top-100 articles were published in 20 different journals, with Annals of Surgical Oncology having the highest numbers (n = 32), followed by Annals of Surgery (n = 19). The first authors of the 100 most-cited articles were based in the USA (58%), Netherlands (11%), and England (10%). The leading institutions were MD Anderson Cancer Center (17%), Memorial Sloan Kettering Cancer Center (10%) and Mayo Clinic (8%). Among the top 100 articles, there were 87 original articles, 13 reviews and 4 proceeding papers.

Conclusions: The present study has produced a detailed list of the most-cited articles on breast surgery. This list makes it possible to recognize the classic articles on breast surgery as well as research trends and academic achievements in this field.

A PROPENSITY SCORE-MATCHED COMPARISON OF RECURRENCE OUTCOMES AFTER IMMEDIATE IMPLANT VS. AUTOLOGOUS FLAP RECONSTRUCTION IN PATIENTS RECEIVING NEOADJUVANT CHEMOTHERAPY FOR BREAST CANCER

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Background: Breast implant associated anaplastic large cell lymphoma have raised concerns about the unexpected influence of implants on carcinogenicity; however, few studies have compared different reconstruction methods from oncologic perspectives. We compared oncologic outcomes between breast cancer patients who underwent immediate implant-based breast reconstruction (IBBR) and those who underwent autologous flap reconstruction (AFR) after neoadjuvant chemotherapy (NACT).

Methods: The study group comprised 536 patients with primary breast cancer who underwent NACT followed by either immediate IBBR or AFR between January 2010 and December 2016. After propensity score-matching, 111 patients in IBBR group and 222 patients in AFR group were selected for comparisons of the 5-year locoregional recurrence-free survival (LRRFS), disease-free survival (DFS), distant metastasis-free survival (DMFS), and overall survival (OS) rates.

Result: We observed no significant differences between the IBBR and AFR groups in 5-year LRRFS (83.3% vs. 86.3%; $p=0.595$), DFS (76.9% vs. 75.6%; $p=0.732$), DMFS (86.2% vs. 82.6%; $p=0.347$), or OS (97.3% vs. 91.0%; $p=0.112$) rates. In IBBR group, no significant differences were observed in locoregional recurrence (14.4% vs. 21.4%; $p=0.447$), distant metastasis (14.4% vs. 7.1%; $p=0.688$), and overall recurrence (21.6% vs. 28.6%; $p=0.514$) rates between the textured and smooth implant subgroups.

Conclusions: In this propensity score-matched analysis of oncologic outcomes in patients with primary breast cancer who underwent immediate breast reconstruction after NACT, no significant differences were observed between the IBBR and AFR groups. Further prospective studies are needed to validate our results.

BREAST CANCER RECURRENCE AFTER SMOOTH VS. TEXTURED IMPLANT-BASED BREAST RECONSTRUCTION: A MATCHED COHORT STUDY

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Background: An increasing number of recent reports on breast implant associated anaplastic large cell lymphoma have raised concerns about the potential adverse influence of implants on cancer progression, particularly the implants with textured surface. We aimed to compare the recurrence outcomes between the smooth versus textured implant reconstructions in breast cancer patients.

Methods: All patients who underwent immediate direct-to-implant (DTI)-based breast reconstruction for primary breast cancer between January 2010 and December 2016 were reviewed and a total of 590 patients were included. After propensity score 1:2 matching, 138 patients were included in the smooth implant group and 276 patients in the textured implant group. The 5-year locoregional recurrence-free survival (LRRFS), disease-free survival (DFS), and distant metastasis-free survival (DMFS) rates were compared between the groups.

Result: After matching, the median follow-up periods were 62 months and 66 months for the smooth and textured groups, respectively. We observed no significant differences between the smooth and textured implant groups in terms of locoregional recurrence (10.9% vs. 11.6%; $p=0.827$), distant metastasis (3.6% vs. 4.0%; $p=0.547$), or any recurrence (12.3% vs. 13.4%; $p=0.757$) rates. No significant differences were observed between the groups in 5-year LRRFS (89.5% vs. 89.4%; $p=0.840$), DFS (87.7% vs. 88.1%; $p=0.794$), or DMFS (98.8% vs. 96.8%; $p=0.741$) rates.

Conclusions: In this matched cohort analysis of recurrence outcomes in patients with primary breast cancer who underwent immediate DTI reconstruction, no significant differences were observed between the smooth and textured implant groups.

A SINGLE ARM, PROSPECTIVE, OPEN-LABEL PHASE II STUDY OF PYROTINIB PLUS NAB-PACLITAXEL FOR ADVANCED HER2-POSITIVE BREAST CANCER

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Background: HER2-targeted drugs in combination with chemotherapy is currently the standard treatment for patients (pts) with HER2-positive breast cancer. We conducted this phase II trial to confirm the efficacy and safety of Pyrotinib plus nab-paclitaxel in pts with advanced or metastatic HER2-positive breast cancer.

Methods: This multicenter, single arm, prospective, open-label phase II study will evaluate the efficacy and safety of Pyrotinib plus nab-paclitaxel in pts with advanced or metastatic HER2-positive breast cancer whether have been treated with anthracycline, taxane or anti-HER2 therapy. 49 female pts, aged ＞18 years, Eastern Cooperative Oncology Group (ECOG) performance score of 0-1, advanced or metastatic HER-2 positive breast cancer will be enrolled. Pts with primary resistant to trastuzumab will be excluded. All the pts will receive Pyrotinib (400 mg qd) and nab-paclitaxel (125 mg/m^2 on day 1, day 8 and day 15) for 28-day cycles. The primary endpoint is objective response rate (ORR).Secondary endpoints are progression-free survival (PFS), overall survival (OS), safety and Quality of Life score (QoL).

Result: From December 2019 to November 2020, 17 pts were enrolled and mean age was 53 years, ECOG 0-1,most (59%) pts had received one lines of prior therapy. The ORR was 64.7%. Median PFS was 3.6 months [95% CI, 2.8-5.6], the first patient's PFS was 10.9 months. Adverse events (AEs) of any garde were Diarrhea17 (100.0%), Alopecia 10 (58.8%) and Neutrophil count decreased 8 (47.1%). Garde 3/4 AEs were Neutrophil count decreased 4 (23.5%) , Diarrhea 3 (17.6%) and White blood cell count decreased 2 (11.8%).

Conclusions: Pyrotinib plus nab-paclitaxel for advanced HER2-positive breast cancer showed acceptable toxicity and promising efficacy.

ABEMACICLIB PLUS FULVESTRANT IN EAST-ASIAN WOMEN WITH HR+, HER2- ADVANCED BREAST CANCER (ABC): OVERALL SURVIVAL (OS) FROM MONARCH 2

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Background: MONARCH 2 (phase3, global, double-blind, 2:1 randomized trial of abemaciclib+fulvestrant or placebo+fulvestrant in patients [N = 669] with HR+, HER2- ABC who progressed on endocrine therapy) demonstrated that abemaciclib+fulvestrant significantly improved PFS vs. placebo (median = 16.4 vs. 9.3 months; HR = 0.553; $p < 0.001$) and resulted in an OS benefit of 9.4 months vs. placebo+fulvestrant (median = 46.7 vs. 37.3 months; HR = 0.757; $p = 0.01$). Consistent with ITT population and patients from other regions, PFS benefit was previously reported in East-Asian patients (Japan, Korea; Taiwan) (median = 21.2 months: abemaciclib+fulvestrant and 11.6 months: placebo+fulvestrant [HR = 0.520; $p < 0.001$]). Safety profile was manageable. We report OS and other updated efficacy and safety data in East-Asian patients.

Methods: Pre/perimenopausal (with ovarian suppression) and postmenopausal women received abemaciclib or placebo (150 mg Q12H) and fulvestrant (500 mg per label). Exploratory subgroup analyses were conducted among East-Asian patients. HR was estimated using Cox model, with log-rank test performed.

Result: In ITT population, 212 East-Asian patients were randomized to abemaciclib+fulvestrant (n = 147) or placebo+fulvestrant (n = 65). At data cutoff (20 June 2019), 89 OS events were observed (median OS not reached: abemaciclib+fulvestrant and 48.9 months: placebo+fulvestrant [HR = 0.798; 95% CI = 0.515, 1.235; $p = 0.38$]). OS rates at 42 months: 64% (95% CI-55.5, 71.8) for abemaciclib+fulvestrant; 53% (95% CI = 39.9, 64.6) for placebo+fulvestrant. PFS2 (HR = 0.588; 95% = CI 0.420, 0.823; $p = 0.001$), time to chemotherapy (HR = 0.601; 95% CI = 0.411, 0.877; $p = 0.008$) and chemotherapy-free survival (HR = 0.573; 95% CI = 0.402, 0.815; $p = 0.002$) significantly improved in patients treated with abemaciclib+fulvestrant. No new safety signals were reported; safety profile was consistent with previously reported safety data in East-Asian patients.

Conclusions: Consistent with previous reports in ITT population, abemaciclib+fulvestrant was an effective and tolerable treatment in East-Asian patients. Previously presented at ESMO Asia Congress 2020.

OPEN-LABEL, PHASE 1 STUDY TO EVALUATE DURATION OF SEVERE NEUTROPENIA AFTER SAME-DAY DOSING OF EFLAPEGRASTIM IN PATIENTS WITH BREAST CANCER RECEIVING DOCETAXEL AND CYCLOPHOSPHAMIDE (NCT04187898)

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Background: Eflapegrastim (Rolontis, Efla) is a long-acting granulocyte-colony stimulating factor (G-CSF), consisting of a recombinant human G-CSF analog conjugated to a human IgG4 Fc fragment via a polyethylene glycol linker. In two Phase 3 studies that a total of 643 patients with early-stage breast cancer (ESBC) to either Efla or Pegfilgrastim (Peg) given ~24-hour after TC administration (docetaxel/cyclophosphamide), the duration of severe neutropenia (DSN) was statistically noninferior with Efla compared to Peg. In preclinical studies, the duration of neutropenia (DN) was significantly shorter with Efla vs. Pegfilgrastim (Peg) when administered on the same day and 24 hour post-chemotherapy. Here we demonstrate clinical trial design to assess feasibility of Efla same-day dosing with TC administration.

Methods: This is a randomized, schedule finding, multicenter, Phase 1, open-label study evaluating the same-day administration of 13.2 mg/0.6 mL Efla (3.6 mg G-CSF) following IV infusion of docetaxel (75 mg/m^2) and cyclophosphamide (600 mg/m^2) in patients with ESBC. Patients will be randomized 1:1:1 to Efla dose schedules of 0.5, 3, and 5 hours after TC. The primary endpoint is DSN (ANC $< 0.5 \times 10^9$/L) in Cycle1. The secondary endpoints are the incidence of SN, time to recovery from SN, incidence of Grade 3 febrile neutropenia and neutropenic complications, with pharmacokinetics of Efla.

Result: This trial is in progress.

Conclusions: The purpose of this study is to assess the feasibility of Efla same-day (3 different dosing timepoints) in patients receiving TC for treatment of ESBC.

PLEOMORPHIC LOBULAR CARCINOMA IN SITU ARISING IN SCLEROSING ADENOSIS: A CASE REPORT

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Background: Sclerosing adenosis (SA) is a common type of breast adenosis. Ductal or lobular carcinoma *in situ* (DCIS/LCIS) can rarely arise in SA.

Methods: We report a case of pleomorphic LCIS arising in SA of the breast.

Result: A lumpectomy was performed on a 54-year-old female because of a mass in the right breast. Ultrasonography revealed a lobulated, circumscribed hypoechoic mass measuring 1.5 × 0.8 cm in the right mid outer breast. Macroscopically, the cut surface of the mass revealed a pinkish gray multinodular mass. Microscopically, a multinodular mass had relatively well delineated pushing margin and showed lobular nature of SA at low power. Central portion of the mass showed extensive fibrosis with microcalcifications. In part of the mass, the lesion was composed of tightly packed ductules separated by thin fibrous septa within the SA background. The ductules were completely replaced by a population of large, rounded cells showing incoherent growth. The neoplastic cells were characterized by abundant cytoplasm and large nuclei with prominent nucleoli. Scattered mitotic cells were present. Necrosis was absent. Myoepithelial cells were demonstrable with immunohistochemical staining for smooth muscle myosin heavy chain and p63. The neoplastic cells were negative for E-cadherin, ER, and PR, but positive for HER2/neu. Ki-67 labelling index was 20%. Putting these findings together, our diagnosis with pleomorphic LCIS arising in preexisting SA. After 6 months of medical follow-up, no evidence of recurrence has been found.

Conclusions: We report the morphologic features of a rare case of pleomorphic LCIS arising in SA.

PLEURAL SCHWANNOMA THAT MAY BE SUSPECTED AS LUNG METASTASIS OF BREAST CANCER

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Background: Differentiating a distant mass in breast cancer patients can be challenging. Although pleural schwannoma in breast cancer patient is unusual, clinicians may experience many similar benign lesions mimicking metastatic breast cancer.

Methods: Herein, we present the case of a 62-year-old woman who developed schwannoma on her pleura, which was suspected as lung metastasis of breast cancer.

Result: Intraoperative frozen biopsy result of the pleural lesion revealed it as a benign lesion. Nipple sparing mastectomy with sentinel lymph node biopsy and immediate reconstruction with implant was performed for her left breast cancer treatment.

Conclusions: Our case highlights the need to keep in mind the non-malignant diagnosis of distant lesion mass in those with malignancies, such as breast cancer.

TATTOO PIGMENT IN AXILLARY LYMPH NODES MIMICS OCCULT BREAST MALIGNANCY: A CASE REPORT

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Background: Isolated calcified axillary lymphadenopathy is an uncommon radiological finding. Its presence raises the suspicion of worrisome etiologies such as occult breast malignancy or metastasis from mucin producing non-breast primary. A rare benign differential which poses diagnostic challenge to clinicians is tattoo pigment. Though tattooing is a common social adornment practice across Asia, tattoo pigment mimicking calcification has yet to be reported in this region. We report the first case in Asia in a lady who had presented with severe weight loss.

Methods: A 45-year-old Indian lady had presented with significant weight loss. She exhibited an extensive tattoo over her right upper back, right shoulder and upper arm. Her medical history was unremarkable. Mammography and ultrasound showed isolated calcified enlarged right axillary lymph nodes. Computed tomography did not show any other abnormality. Needle biopsy of the lymph nodes showed few focal areas of fibrosis. Excision of three enlarged lymph nodes was performed.

Result: Tattoo pigment was seen within the macrophages of the excised lymph nodes which were non-birefringent. Special stain for acid fast bacilli and fungal were all negative. No evidence of malignancy was seen in the nodes.

Conclusions: Tattoo pigment resulting in calcified reactive lymphadenopathy is extremely uncommon. Mammography may not be able to distinguish from occult breast malignancy due to similar radiological findings. Though needle biopsy has been widely accepted as a minimally invasive diagnostic tool for evaluation of indeterminate lesions, excision may still be offered as a last resort option to achieve accurate histological diagnosis.

AN UNUSUAL PRESENTATION OF PRIMARY BREAST LYMPHOMA MIMICKING INFLAMMATORY BREAST CARCINOMA: A CASE REPORT AND LITERATURE REVIEW

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Background: Primary breast lymphoma (PBL) is a rare condition that represents less than 0.5% of all breast malignancies and about 2% of extra-nodal lymphomas. Both PBL and breast carcinoma usually present with a painless breast mass. However, clinical signs of locally advanced breast cancer, such as inflammatory changes and skin involvement have never been reported.

Methods: We report a rare case of PBL that presented with an unusual clinical feature, an inflammatory skin change. The clinical manifestation, imaging investigation and pathological results were reported. We also demonstrated the outcome after receiving systemic treatment.

Result: A fifty-two-year old female presented with a lump at left breast for 3 months with yellowish discharge from the nipple. The skin showed redness and inflammation. Both axillary lymph nodes could be palpated. The differential diagnosis included inflammatory breast cancer, breast abscess and mastitis. Ultrasound of both breasts showed several ill-defined infiltrative hypoechoic mass-like lesions. There were several enlarged lymph nodes in left axilla, size about 1.2 cm. Core needle biopsy was done. The pathological result showed diffuse large B-cell lymphoma (DLBCL). After further investigation, there was no bone marrow involvement. After complete course of R-CHOP, there was a complete metabolic response (CMR) from Positron Emission Tomography. Consequently, radiotherapy was initiated at her left breast. The patient could return to work and her daily life activities.

Conclusions: PBL generally presents with painless palpable mass. However, inflammatory changes could be occurred. Physicians should be concerned PBL as one of the differential diagnosis. Biopsy is essential for diagnosis to avoid unnecessary surgery.

EOSINOPHILIC MASTITIS: CASE REPORT

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Background: Eosinophilic mastitis is a rare disease in which eosinophil infiltrates the ducts and lobules of the breast, causing mammary inflammation. Although eosinophilic mastitis is nonspecific, it is similar to breast cancer and is often mistaken for breast cancer. We report the eosinophilic mastitis as the first case in Korea.

Methods: In June, 2019, a 43-year-old female patient, who had redness and swelling in her right breast for 2 months. In breast ultrasound, ill-defined isoechoic & hyperechoic area in upper half & lower inner quadrant of right breast, edematous change of subcutaneous fat and dilatated lymphatics combined with axillary level I lymphadenopathy were observed. In breast MRI, extreme fibroglandular tissue was observed and mild non-mass enhancement was found with increased vascularity with diffuse edematous changes of right breast parenchyma. Core needle biopsy was performed on right breast and right axilla.

Result: Lymphoplasma cell infiltration with eosinophils was observed in Histopathology. In the peripheral blood test, total leukocyte count of 12,000/mm^3, Eosinophils 33%, and eosinophils count 5,000/mm^3 were observed. The treatment with oral steroid, other antibiotics and Leukotriene receptor antagonist were started. After that, the size of the breasts decreased and the redness improved. In October, eosinophil was observed to return to normal and the breast ultrasound showed a marked improvement.

Conclusions: Eosinophilic mastitis is a very rare disease in the world, but it is necessary to recognize the difference from breast cancer and make accurate diagnosis and treatment when similar patients visit.

A 13-YEARS OLD FEMALE WITH BREAST CANCER : A CASE REPORT

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Background: Breast cancer incidence in young women is rare and has a higher mortality risk. It is caused by the aggressiveness in size, stage, lymph node invasion, or high expression of HER2 and triple-negative tumor than the adult.

Methods: We herein report a case of breast cancer in young women.

Result: A 13-year-old female presented with a 1-year history of a mass in her left breast associated with pain due menstrual period. The patient does not have a family history of breast cancer unless brain cancer, lung cancer, and leukemia. The menstrual cycle is regular within two periods each cycle. Biopsy revealed intraductal papillary carcinoma *in situ* breast. A review of the past biopsy showed adnexal carcinoma well-differentiated and squamous cell carcinoma well-differentiated. The patient went through wide excise surgery with a normal result biopsy with breast ultrasonography (USG) showed a 0.5 cm non-palpable mass with benign BIRADS. Immunohistochemistry revealed positive expression of ER (1-2%) and PR (1-2%) while negative expression of HER2 that the patient suggested having breast MRI and the result was no lesion found. The patient does not get hormone therapy but suggested with regular breast USG per 3 months. The patient was well after 1-year surgery without mass recurrence.

Conclusions: Diagnosing breast cancer in young women needs accuracy. Despite hormone therapy for breast cancer in the young patient as described in the literature, the side effects still have a dilemma.

GRANULOMATOUS LOBULAR MASTITIS, A PRODROME FOR UPCOMING SYSTEMIC LUPUS ERYTHEMATOSUS?

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Background: Systemic lupus erythematosus (SLE) is an autoimmune disease mostly affecting women. Although involvement of breast by SLE is rare, granulomatous lobular mastitis (GLM) could be a clue for its development. We report a case of a GLM which was the only manifestation of an upcoming SLE.

Methods: A 36 year-old female admitted with complaints of fever, a palpable mass with pain in the right breast. There was an indurated 4 cm sized swelling, consistent with matted lymph nodes. All laboratory tests were normal except for CRP 7.2 mg/L and there were no typical signs of SLE such as malar rash, arthritis and ulcers except mastitis.

Result: Core needle biopsy revealed a GLM and thus oral steroids were prescribed. Soon after biopsy (1 week), symptoms aggravated and the patient was hospitalized for fever over 40°C, LFT (> 700 U/L) and cervical lymphadenopathy. After competitive research, the patient was re-diagnosed as SLE by a rheumatologist as ANA ratio of 1:320, leukopenia, arthritis was additionally noted, Because the patient was responsive to steroids, it was continued for 2 months which led to the resolution of the lesions. Six months after steroid cessation, the patient was recurrence free.

Conclusions: Although rare, GLM may be an early sign to indicate a development of SLE. We advise physicians to be aware of this possibility, carefully search for other signs of SLE, and avoid routine steroid prescription which may challenge the diagnosis. As suggested, avoid unnecessary biopsy when the diagnosis could be established clinically, as it may worsen SLE. Also, a multidisciplinary approach should be organized for accurate diagnosis and treatment.

MALIGNANT NEOPLASM INCIDENTALLY DISCOVERED IN AN AXILLARY ACCESSORY BREAST: TWO CASE REPORTS

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Background: An accessory breast generally refers to the presence of breast tissue outside the normal breast. Accessory breast tissue can be found in up to 6% of the population and is usually found in the axilla. Affected patients visit the hospital for cyclic pain in the axilla and cosmetic abnormalities. The incidence of malignant neoplasms in an axillary accessory breast (AAB) is < 1% and has been rarely reported. The main histopathologic type of AAB cancer is invasive ductal carcinoma; in contrast, lobular, mucinous, and papillary carcinoma are uncommon. Few reports have described incidental cases of carcinoma *in situ* of an AAB.

Methods: We herein report a case of ductal carcinoma in situ (DCIS) and a case of lobular carcinoma in situ (LCIS) incidentally found in an AAB.

Result: A 49-year-old woman visited the hospital with cyclic pain in the axilla. No specific abnormalities were found on ultrasonographic examination; however, histopathologic examination after excision of a right-sided AAB revealed multifocal LCIS. A 35-year-old woman visited the hospital with cyclic pain and cosmetic changes in the axilla. No specific abnormalities were found on ultrasonographic examination; however, histopathologic examination after excision of a right-sided AAB revealed DCIS.

Conclusions: Malignancy in an AAB is very rare. Even if no abnormality is found on imaging examination, *in situ* cancer can occur incidentally. Close histopathologic examination is essential in patients undergoing surgical excision of an AAB.

THE CONSIDERATION OF 73 GNECOMASTIA PATIENTS WHO HAD A MEDICAL EXAMINATION TO OUR DEPARTMENT

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Background: Although the patients of breast surgery department are mainly female, we sometimes experience male patients. They often visit with a complaint of lumpiness or pain of their breast.

Methods: We considered the background and the approach from diagnosis to treatment of the male patients who visited our department. The coverage of this survey is 73 male patients who visited our department between April 2016 and March 2018.

Result: The median age was 66 years old (13-91). 12 patients were under 30s (16%). Five patients were 30s to 40s (7%). 22 patients were 50s to 60s (29%). 31 patients were over 70s (41%). 32 patients complained about both of lumpiness and pain of their breast. 26 patients complained about lumpiness of their breast. 13 patients complained about the pain of breast. 62 patients (83%) complained about one side.13 patients (17%) complained about bilateral. About their medical history, 21 patients had Hypertention,15 patients had Hyperlipidemia, 9 patients had disease related prostate. 53 patients who use medicines with the side effects of gynecomastia (suspect drug). 67 gynecomastia patients were given no treatment follow-up. 1 patient discontinued suspect drug, 4 of 67 followed patient were supervised reduction of suspect drug. Five patients were prescribed Danazol.

Conclusions: We considered 73 gynecomastia patients who had medical examination to our department.

VARIED PRESENTATIONS OF ROSAI-DORFMAN DISEASE MIMICKING BREAST CANCER

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Background: Rosai-Dorfman disease is a rare benign proliferative disorder of histiocytes that usually involves lymph nodes but can rarely involve extra nodal sites like skin, nasal sinuses and, soft tissue. Confinement of the disease to the breast is rare, and when present in the breast it mimics a malignancy.

Methods: We present a case series of varied presentations of Rosai-Dorfman disease mimicking breast cancer.

Result: Case 1 (Rosai-Dorfman Mimicking Early Breast cancer)-36 year old woman presented to the outpatient department (OPD) with a 2.5 cm lump in the breast. Her mammography was suggestive of a malignancy and fine needle aspiration cytology showed inflammatory cells. Excision biopsy suggested extranodal Rosai-Dorfman disease. Case 2 (concomitant Rosai-Dorfman disease and breast cancer)- 40 year old woman came to our hospital in 2018 after treatment for a right breast carcinoma. Post treatment she developed lymphadenopathy which on pathology was Rosai-Dorfman histiocytosis which when treated with steroids responded well. Case 3 (Rosai-Dorfman Mimicking Metastatic carcinoma Breast)- 58 year old woman, presented to the OPD with a breast lesion on mammography, bilateral lymphadenopathy and a PET scan showing sclerotic lesions in multiple bones and bilateral lung nodules, mimicking metastatic breast cancer. Breast biopsy as well as axillary node biopsy showed sinus histiocytosis in favor of Rosai-Dorfman disease.

Conclusions: Rosai-Dorfman disease in the breast typically can present with a painless breast mass, or can mimic metastatic breast cancer. We have presented a case series with varied presentation of Rosai-Dorfman.

RESISTANT METAPLASTIC SQUAMOUS CELL CARCINOMA OF THE BREAST, AGAINST CHEMOTHERAPY COMBINED WITH HER2-TARGETED THERAPY: CASE REPORT

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Background: Metaplastic squamous cell carcinoma of the breast is a very rare subtype of breast cancer that consist dominant areas of non-glandular squamous differentiation and other components.

Methods: A 54-year-old female patient, who had palpable mass in her left breast for 2 weeks. Irregular heterogeneous mass about 3.3 × 2.7 cm is noted in left breast. It was demonstrated Invasive carcinoma with focal squamous differentiation by core-needle biopsy. ER positive, PR negative and HER2 was overexpressed.

Result: The patient has started neoadjuvant chemotherapy (3 cycles of fluorouracil, epirubicin, and cyclophosphamide followed by 3 cycles of docetaxel, trastuzumab and pertuzumab). During chemotherapy, the carcinoma of the patient grew bigger and worsened. After the fifth chemotherapy, the patient was forced to undergo modified radical mastectomy due to high fever and severe inflammatory change of the left breast. There was no distant metastasis in CT performed two days before surgery. Final histopathology revealed a metaplastic squamous cell carcinoma (7.0 × 6.5 cm size) and lymph node metastasis (3 of 21 axillary lymph nodes). Both of hormone receptor and HER2 expression were converted to negative. Radiotherapy was planned 4 weeks after surgery. However, new multiple metastatic nodules of both lungs were seen on chest CT for radiotherapy simulation.

Conclusions: Metaplastic squamous cell carcinoma had a resistance to chemotherapy combined with HER2-targeted therapy. It might be caused by heterogeneity of breast tumor. Therefore, the treatment to breast cancer that is mixed with metaplastic squamous cell should be required a different approach than a standard therapy.

LYMPHOMA IN THE BREAST: DIAGNOSTIC AND TREATMENT DILEMMA

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Background: Lymphoma involving the breast is rare, accounting for less than 0.5% of malignant breast neoplasms. Primary breast lymphoma (PBL), defined by Wiseman and Liao, affects breast and ipsilateral axillary nodes, while secondary breast lymphoma (SBL) is systemic lymphoma with secondary involvement of breast. Synchronous is where there is breast cancer concurrent with lymphoma.

Methods: Records of patients diagnosed with breast lymphoma in our breast clinic were reviewed. All underwent breast imaging, then core biopsy to confirm diagnosis.

Result: Three women between 60 and 72 years old were identified, and none had B symptoms. One patient presented with bloody nipple discharge from a 12 mm mass with dilated duct. Core biopsy of the breast and ipsilateral axillary node showed invasive breast carcinoma with marginal zone B-cell lymphoma (MALT-type). She was recommended breast surgery followed by chemotherapy. The second patient was diagnosed with diffuse large B cell lymphoma following cervical node excision. She also reported a 20 mm breast mass, which was associated with enlarged ipsilateral axillary nodes, and biopsied showing triple negative invasive ductal carcinoma, while the nodes had follicular cells. She was recommended neoadjuvant chemotherapy followed by breast surgery. The last patient had breast pain; imaging showed a 15 mm nodule and bilateral suspicious axillary nodes. Biopsy revealed small B lymphocytic lymphoma and PET scan showed disseminated lymphadenopathy, she was treated with chemotherapy.

Conclusions: Breast lymphoma is rare and can pose a diagnostic and treatment dilemma where multi-disciplinary board recommendation is important as treatment will need to be individualized.

FIRST REPORT OF INTRACRANIAL HEMORRHAGE SECONDARY TO CDK4/6 INHIBITOR INDUCED SEVERE THROMBOCYTOPENIA

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Background: CDK4/6 inhibitors (CDK4/6i) transformed the treatment landscape for hormone- receptor positive, HER-2 negative metastatic breast cancer without visceral crisis. Marrow suppression, particularly neutropenia, is commonly associated with CDK4/6i treatment, while severe thrombocytopenia is very rare. Here we report a case of Ribociclib induced thrombocytopenia complicated by intracranial hemorrhage.

Methods: A 61-year-old lady presented with de novo ER-positive, HER-2 negative metastatic breast cancer. She received in sequence palliative letrozole, exemestane/everolimus, 3 lines of chemotherapy, as well as radiotherapy for cord compression and brain metastasis. Upon further disease progression, she was started on ribociclib and Fulvestrant. Her baseline complete blood counts were normal.

Result: Shortly into cycle 2 of ribociclib she developed grade 4 thrombocytopenia, with platelet count nadired at 3×10^9/L, together with Grade 2 anemia and neutropenia. Brain CT for drowsiness revealed bleeding from her frontal lobe metastasis. Ribociclib was discontinued. Her platelet count only recovered 4 weeks later with repeated transfusion.

Conclusions: To the best of our knowledge, this is the first reported case of intracranial hemorrhage secondary to a CDK4/6i. In major CDK4/6i trials, G3/4 thrombocytopenia are considered rare events (PALOMA3G3 0.9%, G4 0%; Monaleesa 70%). However, clinical factors such as extensive bone metastasis, heavy chemotherapy exposure and marrow irradiation may render individuals ultra-susceptible to CDK4/6i induced marrow toxicities. Vigilance in blood counts monitoring is mandatory in such cases, with low threshold of treatment suspension to avoid potentially fatal complications.

CONSECUTIVE 300 ACCESSORY BREAST SURGERIES BY A SINGLE SURGEON

Seongbae Hwang, Byungseo Choi

Spring Day Clinic, Korea

Background: Accessory breast is common occurring in 2-6% women and has the same natural changes as the normally located breast tissue such as development, shrinkage and fatty change according to their hormone level. We conducted an analysis of clinical factors according to marriage status in accessory breast patients.

Methods: Three hundred patients who have been treated with an excision of accessory breast tissue from September 2017 to August 2019 at the Spring Day Clinic were analyzed retrospectively to clinical factors according to Spring day clinics classification. Accessory breast excision and liposuction were performed on all cases by single surgeon (Dr. Hwang).

Result: The mean age was 35.5 years and the most frequent age group was thirties (35.6%). The married group was observed in 47.0% (141 patients) and the unmarried group in 53.0% (159 patients) of all accessory breast patients. According to SDCs classification (Spring Day Clinic), type II was most frequent (51.3%). The mean amount of mammary tissue was 52.6 g and the mean amount of liposuction was 393.2 ml. Postoperative bleeding was seen in four patients (1.3%), hypertrophic scar change in two patients (0.6%), contour irregularity in three patients (1.0%). In our study, 97.1% of patients enjoyed cosmetically satisfying outcomes.

Conclusions: Patients with accessory breast after puberty or postpartum are suffering from unintended axillar contour deformities and pain, and it is more developed after delivery. Accessory breast excision may help patients with accessory breast to relieve their aesthetic and clinical anxiety with great reliable results.

CONSECUTIVE 800 GYNECOMASTIA SURGERIES BY A SINGLE SURGEON

Seongbae Hwang, Byungseo Choi

Spring Day Clinic, Korea

Background: Gynecomastia is occurring in 5-10% men. When fibrotic tissue develops in gynecomastia, medical therapy is less helpful and surgical treatment may be the only way to overcome gynecomastia.

Methods: Eight hundred patients who have been treated with gynecomastia from September 2017 to August 2019 at the Spring Day Clinic were analyzed for clinical factors retrospectively. Subcutaneous mastectomy and liposuction were performed on all cases by single surgeon (Dr. Hwang).

Result: The mean age was 26.3 years and the most frequent age group in gynecomastia patients was twenties (53.5%). According to type of gynecomastia, fibro-glandular type was 285 patients (35.6%), mixed type was 339 patients (42.4%), pseudo type 176 patients (22.0%). Symmetric gynecomastia was found in 754 patients (94.2%) and asymmetric gynecomastia in 46 patients (5.8%). According to Simons classification, type I was 108 patients (13.5%), type IIA 580 patients (72.5%), type IIB 108 patients (13.5%), Type III 4 patients (0.5%). The mean amount of mammary tissue was 82.6g and the mean amount of liposuction was 481 mL. Postoperative bleeding was seen in ten patients (1.2%), nipple retract in two patients (0.2%), contour irregularity in three patients (0.4%). In our study, 98.2% of patients enjoyed cosmetically satisfying outcomes.

Conclusions: Patients with gynecomastia who are not responding to medical treatment and suffering psychosocially will have stable and reliable results with surgical treatment.

ANTI-YO ANTIBODY-MEDIATED PARANEOPLASTIC CEREBELLAR DEGENERATION IN BREAST CANCER: A CASE REPORT

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Background: Paraneoplastic neurological syndrome (PNS) is a rare disease complicating cancer. Paraneoplastic cerebellar degeneration (PCD) is one of the most frequent neurological PNS, usually associated with pelvic and breast malignancies. PCD have several symptoms which present with rapidly progressive. Difficulties in walking, dysarthria, nystagmus, diplopia, and dysphagia, blurred vision are often noted.

Methods: A 52-year-old woman with hypertension developed dysarthria and ataxia of left leg and visited the emergency department. Magnetic resonance imaging of head and C-spine, and positron emission tomography of brain showed no abnormalities. The patient then returned to the emergency department 3 weeks later for dysphagia, worsening dysarthria, and severe ataxia with loss of ambulation, and diagnosed right breast cancer. She was diagnosed with anti-Yo antibody-positive and PCD.

Result: Pulse therapy of steroid and intravenous immunoglobulins were attempted preoperatively. She underwent right mastectomy with axillary lymph node dissection. Histologically, cancer has been an invasive ductal carcinoma (T2N1M0) with Estrogen and progesterone receptor statuses positive and the human epidermal growth factor receptor-2 statues positive. Four cycles of systemic chemotherapy with adriamycin 60 mg/m^2 and cyclophosphamide 600 mg/m^2 followed by 4 cycles of docetaxel 75 mg/m^2 and 18 cycles of trastuzumab were planned. Her neurologic symptoms improved 4 months after operation. She could walk with the support of 2 hands. Dysphagia and pronunciation have improved.

Conclusions: We present a case of anti-Yo antibody-mediated paraneoplastic cerebellar degeneration in breast cancer. Early diagnosis, treatment and rehabilitation of PCD are expected to improve neurologic performance and quality of life of the patient.

CONTRALATERAL AXILLARY NODE METASTASIS IN BREAST CANCER

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Background: There has been debate about whether contralateral axillary metastasis (CAM) should be considered distant disease and treated as a stage IV breast cancer rather than locoregional extension of contralateral breast cancer. We present a case report of a woman with an ipsilateral breast tumor recurrence and synchronous CAM.

Methods: A 36-year-old woman came to the outpatient breast clinic for a palpable mass in upper inner quadrant of the right breast in 2011.

Result: The patient underwent breast conserving surgery with axillary lymph node dissection. Pathologic stage was pT2N1M0. The tumor was ER positive, HER2 positive. She refused adjuvant therapy except radiotherapy. Radiotherapy was performed at the right breast and regional lymph nodes. She no longer came to the hospital. In 2015, she returned to the clinic for a palpable mass in the right breast. Biopsy showed invasive ductal carcinoma. The tumor was ER negative, HER2 positive. Recurrence was found in the right breast, right internal mammary lymph nodes and left axillary lymph nodes without distant metastasis. She underwent chemotherapy with 4 cycles of AC and 12 weeks of paclitaxel. The follow up images showed partial response of the tumor to the chemotherapy. She underwent right salvage mastectomy and left axillary lymph node dissection. The final pathology revealed pathologic complete remission. She underwent adjuvant herceptin therapy. The follow up surveillance showed no recurrence until August 2019.

Conclusions: CAM should be treated with curative intent rather than as a stage IV disease. Individual and multidisciplinary management is for optimal treatment of the patients with CAM.

BILATERAL METACHRONOUS ACCESSORY BREAST CARCINOMA WITH PAGET DISEASE IN AXILLA OF A MALE: A CASE REPORT

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Background: Male accessory breast cancer arising in axilla is rarely reported disease. Diagnosis axillary accessory breast cancer is often delayed due to similarities with diseases such as dermatitis.

Methods: The purpose of this study is to report metachronous accessory breast cancer of a male with contralateral accessory breast Paget disease and its clinical course and treatment

Result: A 55-year-old Korean male presented with a palpable mass and eczematous skin lesion on the left axilla. Incisional biopsy was performed, and histopathologic examination yielded a diagnosis of invasive ductal carcinoma with Paget disease arising in accessory breast. MRI and PET showed no malignancy of normal breast and other organs. He received wide excision and left axillary lymph node dissection. The patient underwent adjuvant chemotherapy and radiation therapy to affected axilla. After 17 months of disease-free survival, the patient diagnosed contralateral accessory breast Paget disease. He had right axilla wide excision and radiation therapy.

Conclusions: The lack of long-term survival data in male accessory breast cancer due to its rarity, the estimated outcome for this patient is unclear. Multi-center and worldwide case acquisition is required to further understand the natural course of this unique type of male breast cancer.

PROLONGED MYELOSUPPRESSION AS A SIDE EFFECT OF NEO ADJUVANT CHEMOTHERAPY AMONG HER2-POSITIVE BREAST CANCER PATIENT

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Background: Myelosuppression can sometimes cause complications like Febrile neutropenia (FN). We need proper management of myelosuppression.

Methods: We present a prolonged case of myelosuppression on a patient receiving Taxane-plus-anthracycline sequential TH regimen every 3 weeks for Neo Adjuvant chemotherapy (NACT) of primary breast cancer.

Result: A 70-year-old woman was diagnosed Hormone receptor positive and HER2-positive breast cancer cT3N0M0. She does not have past medical history. Treatment started with NACT. On the 9th day of first cycle of Docetaxel, Pertuzumab, Trastuzumab, FN occurred. After that she continued to have diarrhea, we changed from Docetaxel to weekly Paclitaxel. Among NACT, myelosuppression was continued. After Taxane-based regimen, We performed Anthracycline-based regimen concomitantly administered Granulocyte colony-stimulating factors (G-CSFs) for the management of neutropenia. One month after NACT, white-cell blood count (WBC) was 2,800/μL, Hemoglobin was 8.6 g/dL. We underwent breast-total-mastectomy and axillary sentinel lymph node biopsy. Postoperative pathological shows breast invasive carcinoma ypT1 (1.8 cm) N0. Two months after surgery, WBC was about 2,000/μL, Hemoglobin was 10g/dL. We started Pertuzumab plus Trastuzumab as adjuvant therapy every 3 weeks. But during this treatment, WBC and Hemoglobin remained almost unchanged. We performed Bone marrow puncture (BMP), but hematological malignancy was negative. Six months after resuming targeted trastuzumab therapy, WBC and Hemoglobin are gradually improving without treatment.

Conclusions: We experienced a rare case of prolonged myelosuppression. Neutropenia is a major risk factor for the development of infections in patients undergoing chemotherapy. Clinicians should always consider the possibility of myelosuppression.

DELAYED UNILATERAL HEMATOMA AFTER RECONSTRUCTIVE AND AESTHETIC BREAST SURGERY WITH IMPLANTS IN ASIAN PATIENTS: TWO CASE REPORTS

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Background: Hematomas represent one of the postoperative complications in undergoing breast surgery with silicone implant. Although there are scattered reports of intracapsular hematoma, there are no reports presenting late hematoma after reconstructive and aesthetic augmentation surgeries. We report two Asian patients with late hematoma after reconstruction and aesthetic breast surgery, respectively.

Methods: A 54-year-old female patient underwent bilateral nipple-sparing mastectomy with immediate breast reconstruction using anatomically shaped textured implant for intraductal carcinoma on the rigth in August 2019. Contralateral mastectomy was performed for the BRCA gene mutation. In a 1-year postoperative MRI, an extracapsular hematoma was found on the right side. Another case is a 63-year-old female patient who underwent augmentations on both breasts and experienced right unilateral swelling and painless firmness about 30 years postoperative. A preoperative MRI has shown both intracapsular and extracapsular ruptures on the right and bulging implant herniation on the left. In both cases during the operation, hematoma, implants, and capsule were all removed.

Result: In both cases, excised capsule were sent for histological evaluation. Dark-colored blood was evacuated before removing semisolid-state intra- and extra capsular hematoma. the patients responded well and were discharged with neither postsurgical complications, including seroma, nor additional hematomas.

Conclusions: Up to date, in Asia, late hematomas in breast augmentation with implants are fairly rare. Furthermore, the complications in post-reconstructive state with implants are even rarer. As the etiology of late hematoma following breast augmentation or reconstruction has been poorly characterized, further reports are needed to clearly establish the reasons.

A CASE REPORT OF AXILLARY ACCESSORY BREAST CANCER

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Background: During embryogenesis, pectoral mammary ridges were developed to breast tissue, others were regressed. However incomplete regression caused accessory breast. Accessory breast has same pathologic characteristics as normal breast tissue, however, malignancy of accessory breast are rarely reported.

Methods: We report a rare case of accessory breast cancer diagnosed in a patient after mass excision of suspected epidermal inclusion cyst.

Result: A 44-year-old woman presented with right axillary mass detected in ultrasonography. 2years ago, she had excisional biopsy of right axillary mass then pathologic report was benign skin adnexal tumor. After that, she annual followed up with ultrasonography. In 2020, 5mm sized right axillary palpable mass suspected ruptured epidermal inclusion cyst and benign cysts of breasts was detected on ultrasonography. Excisional biopsy of axillary mass was done. Pathologist confirmed invasive ductal carcinoma with associated accessory breast tissue. So wide local excision of axillary with sentinel lymph node biopsy was performed. We found two sentinel lymph node, frozen pathologic result was absence of malignant cell. There was no residual carcinoma and clear resection margin in final pathology report. Pathologic stage was IA (pT1N0). We prescribed tamoxifen and radiotherapy. Positron emission tomography (PET) was planned cause of demand of patient and checking undetected originated cancer. There was no specific findings in PET. We planned routine post operation follow-up examination.

Conclusions: Cause of rarity of accessory breast cancer, many physicians have a general lack of awareness of possibility of malignancy of axillary mass. So, awareness of possibility of malignancy is important in clinical field.

CASE SERIES OF RADIATION-INDUCED ORGANIZING PNEUMONIA IN OUR INSTITUTION

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Background: Whole-breast radiotherapy (WBRT) is commonly given after lumpectomy in patients with DCIS and breast cancer (BC). Rarely, WBRT patients developed radiation-induced organizing pneumonia (RIOP). Here, we reported case series of RIOP in our institution.

Methods: Between 2016-2019 DCIS/BC patients undergoing lumpectomy were analyzed retrospectively. Post-WBRT patients with cough, dyspnea, and lung infiltration outside RT field on CXR were thoroughly worked-up with cultures and transbronchial biopsy with bronchoalveolar lavage to exclude other causes. Clinical course was monitored. Dosimetric parameters for lungs were collected.

Result: 1,253 out of 1,591 patients underwent WBRT (medAge 53; range, 20-93). Between 2-5 months from RT completion, 3 patients with DCIS and 1 with BC (age range, 44-57) presented with cough, dyspnea and fever, which did not improve with antibiotics. Their tumors expressed estrogen receptor, but only 1 DCIS and 1 BC patients received tamoxifen during RT. Both needed systemic corticosteroids with azathioprine (AZT), whereas corticosteroid alone was sufficient in the other 2 patients. 1 DCIS patient with AZT developed contralateral RIOP recurrence 4 months later. CLD ranged from 1.5-2.25 cm, ipsilateral lung V20 Gy were 8.56-13.95%, ipsilateral lung V5 Gy were 21.5-26.5%. No contralateral lung received higher than 5Gy. To date, all patients remain disease-free and alive.

Conclusions: Associated risk factors for RIOP remain unclear and controversial. Therefore, despite its rarity, RIOP remains a serious RT adverse event, of which radiation oncologists should always be mindful of. CXR should be performed in any post-WBRT patients with new onset of respiratory symptoms not responding to antibiotics.

WATSON FOR ONCOLOGY AND CLINICIANS' TREATMENT RECOMMENDATIONS FOR PATIENTS WITH BREAST CANCER

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Background: Various clinical applications have been attempted using artificial intelligence (AI) clinical decision support system (CDSS), and it has become a starting point for personalized cancer treatment. We aimed to identify the degree of agreement between the AI-CDSS, Watson for oncology (WFO), and the clinician in treatment recommendations for Korean breast cancer patients and to provide guidelines for future improvement.

Methods: One hundred and eighty-three breast cancer patients who underwent treatment at the Pusan National Univ. Hospital between January 1, 2016 and May 31, 2017 were enrolled in this study. The concordance between WFO's and clinicians' treatment recommendations were examined according to various factors.

Result: Treatment recommendations between WFO and clinicians are the same as 40.4% of breast cancer patients. There were no significant differences in the concordance between any of the factors with the exception of stages I and III.

Conclusions: The concordance of treatment recommendations was low overall. However, this is largely attributable to the differences of health insurance system and healthcare environment between the United States and Korea.

IMPACT OF COVID-19 PANDEMIC IN 2020 ON THE DIAGNOSIS AND MANAGEMENT OF BREAST CANCER IN KOREA: A MULTI-INSTITUTIONAL STUDY

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Background: There have been many reports that the COVID-19 pandemic has a significant impact on screening, case identification, and referral in cancer diagnosis since it began in early 2020. We investigated the diagnostic and therapeutic status of breast malignancy before and after at the multicenter level.

Methods: We have reviewed the patients with breast cancer in six Univ. hospitals in Korea. The patients were divided according to the date of malignancy diagnosis: Period A, from February to April and Period B, from May to July 2020. The two groups were compared with the same periods in 2019. We examined the number of screening, diagnosis, stage, and surgery for breast cancer.

Result: Overall, there was a 10.9% reduction in the number of diagnoses compared to the same period in 2019, and the decrease was more significant in Period A. According to the age, there was no difference until the 30s but decreased from those in their 40s and above. The decline was more pronounced in the elderly. The COVID-19 pandemic affected breast screening (decreased by 27.4%) and more diminished in Period A (41.0% vs. 19.0%). However, the distribution of stage was similar. There was also decreasing in surgery (Period A: 5.1%, Period B:4.1%).

Conclusions: Diagnoses and surgery decreased in the pandemic period and more during the rapid increase in COVID-19 patients. Increasing infection was leading to fears of hospital visits, noticeable in the elderly. The COVID-19 incidence is continued to increase exponentially as winter approaches. We need to discuss the potential long-lasting impact on cancer.

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Jang, Min Kyeong	PO193	492
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Jang, Si-Hyong	PO046	345
Jeon, Chang Wan	PO014	313
Jeon, Seung Hyuck	OP009	252
Jeon, Sook Young	OP043	286
Jeon, Sookyoung	PO195	494
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Jeon, Ye Won	PO197	496
Jeon, Ye Won	PO234	533
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Jeong, Hyehyun	OP041	284
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Jeong, Joon	PO132	431
Jeong, Joon	PO169	468
Jeong, Joon	PO176	475
Jeong, Joon	PO183	482
Jeong, Yisun	PO039	338
Jeong, Young-Hoon	PO104	403
Jeong, Young-Ju	PO166	465
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Ji, Junghwan	PO062	361
Ji, Junghwan	PO132	431
Ji, Junghwan	PO169	468
Ji, Junghwan	PO176	475
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Jung, Jae Ho	OP035	278
Jung, Jae Ho	PO126	425
Jung, Ji Gwang	PO106	405
Jung, Jigwang	OP048	291
Jung, Jigwang	PO136	435
Jung, Jin Hong	PO087	386
Jung, Jin Hyang	OP050	293
Jung, Jin Hyang	PO008	307
Jung, Jin Hyang	PO173	472
Jung, Jinhong	PO093	392
Jung, Jinhong	PO126	425
Jung, Kyung Hae	OP035	278
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Jung, Kyung Hae	OP052	295
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Jung, Mi Sook	PO149	448
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Jung, Seung Pil	PO053	352
Jung, Seung Pil	PO081	380
Jung, Seung Pil	PO110	409
Jung, Seung Pil	PO182	481
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Jung, So-Youn	OPBS01-3	132
Jung, So-Youn	PO199	498
Jung, Sung Hoo	PO042	341
Jung, Sung Hoo	PO175	474
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Jung, Sung Mi	PO159	458
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Kang, Hansung	PO077	376
Kang, Ji Sook	PO191	490
Kang, Jieun	PO173	472
Kang, Jin Gu	PO118	417
Kang, Jun	OP049	292
Kang, Jun Gu	PO226	525
Kang, Ki Mun	PO115	414
Kang, Kyung-Ah	NR02-2	182
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Kang, Min Ju	PO026	325
Kang, Min Ju	PO209	508
Kang, Minsoo	OP006	249
Kang, Minsoo	PO028	327
Kang, Sang Yull	PO042	341
Kang, Sang Yull	PO175	474
Kang, Shin-Ae	OP030	273
Kang, Su Hwan	PO084	383
Kang, Su Hwan	PO118	417
Kang, Suhwan	PO226	525
Kang, Sun Hee	PO089	388
Kang, Sungmin	PO166	465
Kang, Sunhee	PO227	526
Kang, Taewoo	PO233	532
Kang, Unbeom	PO129	428
Kang, Un-Beom	OP043	286
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Kangleon-Tan, Hannah Lois	PO081	380
Kangleon-Tan, Hannah Lois	PO110	409
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Kartika, Astari Yufi	PO111	410
Katagiri, Yusuke	PO133	432
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Kawada, Kengo	PO086	385
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Kim, Bong Kyun	PO177	476
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Kim, Byung Chul	PO041	340
Kim, Dae Yong	PO115	414
Kim, Dong-Min	PO036	335
Kim, Dong-Yun	PO090	389
Kim, Dooreh	PO057	356
Kim, Dooreh	PO062	361
Kim, Dooreh	PO132	431
Kim, Dooreh	PO169	468
Kim, Dooreh	PO176	475
Kim, Dooreh	PO183	482
Kim, Dowook	PO088	387
Kim, Eun Ae	PO173	472
Kim, Eun Kyu	PO090	389
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Kim, Hee Jeong	PO056	355
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Kim, Hee Jeong	PO165	464
Kim, Hee Jeong	PO174	473
Kim, Hee Jeong	PO186	485
Kim, Hee Jeong	PO206	505
Kim, Hee Yeon	PO034	333
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Kim, Hyun-Ah	PO117	416
Kim, Hyung-Don	OP035	278
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Kim, Jae Sik	PO088	387
Kim, Jae Sik	PO115	414
Kim, Jae Sung	PO117	416
Kim, Jee Hung	OP053	296
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Kim, Jee Ye	OP053	296
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Kim, Jisun	PO165	464
Kim, Jisun	PO186	485
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Kim, Joori	PO116	415
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Kim, Se Young	PO067	366
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Kim, Seok Won	PO015	314
Kim, Seok Won	PO039	338
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Kim, Seung Il	PO130	429
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Kim, Seung Il	PO176	475
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Kim, Seung-Il	PO184	483
Kim, Shin Young	PO141	440
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Kim, Soo Yeon	PO153	452
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Kim, Yong Bae	PO092	391
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Lee, Angela Soeun	PO142	441
Lee, Awon	OP049	292
Lee, Chang Hyung	PO162	461
Lee, Changhyung	PO231	530
Lee, Dae-Won	PO109	408
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Lee, Deuk Young	PO141	440
Lee, Dong Won	ERBS02	154
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Lee, Eun Kyung	PO083	382
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Lee, Eun-Shin	PO110	409
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Lee, Eunsook	PO077	376
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Lee, Han-Byoel	PO109	408
Lee, Han-Byoel	PO124	423
Lee, Han-Byoel	PO136	435
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Lee, Hang-Mei	OP008	251
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Lee, Hey Yoon	PO070	369
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Lee, Hyebin	PO094	393
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Lee, Hyein	PO095	394
Lee, Hyojin	OP051	294
Lee, Hyojin	PO198	497
Lee, Hyojung	PO130	429
Lee, Hyun Jeong	PO145	444
Lee, Hyun Ju	PO046	345
Lee, Hyunji	PO089	388
Lee, Hyunji	PO227	526
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Lee, Janghee	PO057	356
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Lee, Jeong Eon	PO159	458
Lee, Jeong Woo	PO082	381
Lee, Jeongshim	OP028	271
Lee, Ji Shin	PO211	510
Lee, Ji Sung	PO003	302
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Lee, Jihoon	PO151	450
Lee, Ji-Hye	PO046	345
Lee, Jihyoun	PO003	302
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Lee, Jina	PO177	476
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