

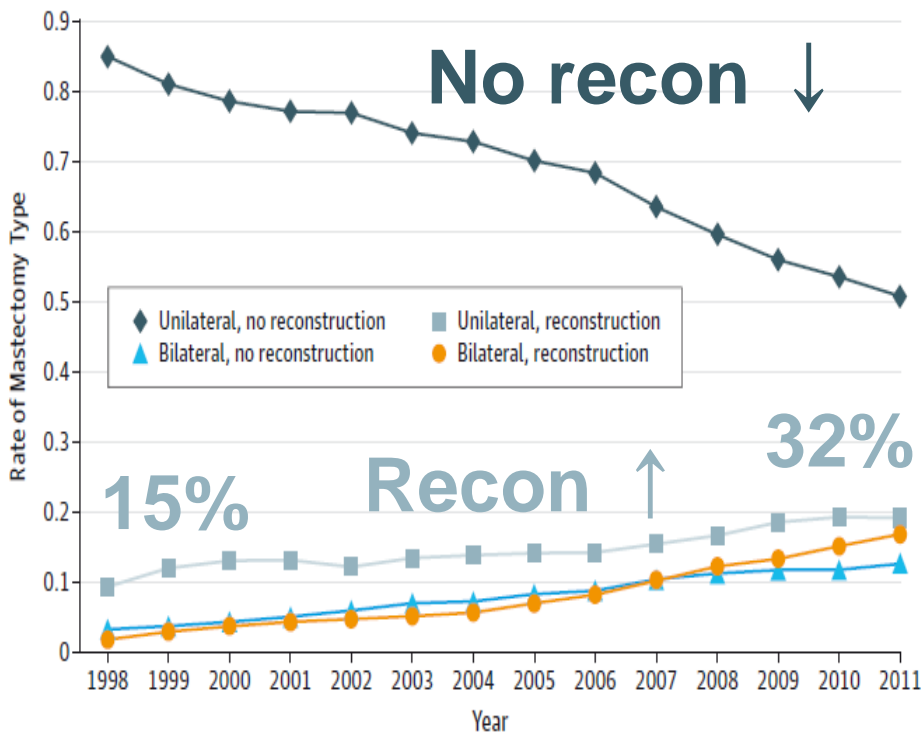
RADIATION PRACTICE PATTERNS AND IMPACT OF RADIOTHERAPY ON COMPLICATIONS AFTER BREAST RECONSTRUCTION

: FINAL REPORT OF KROG 18-04

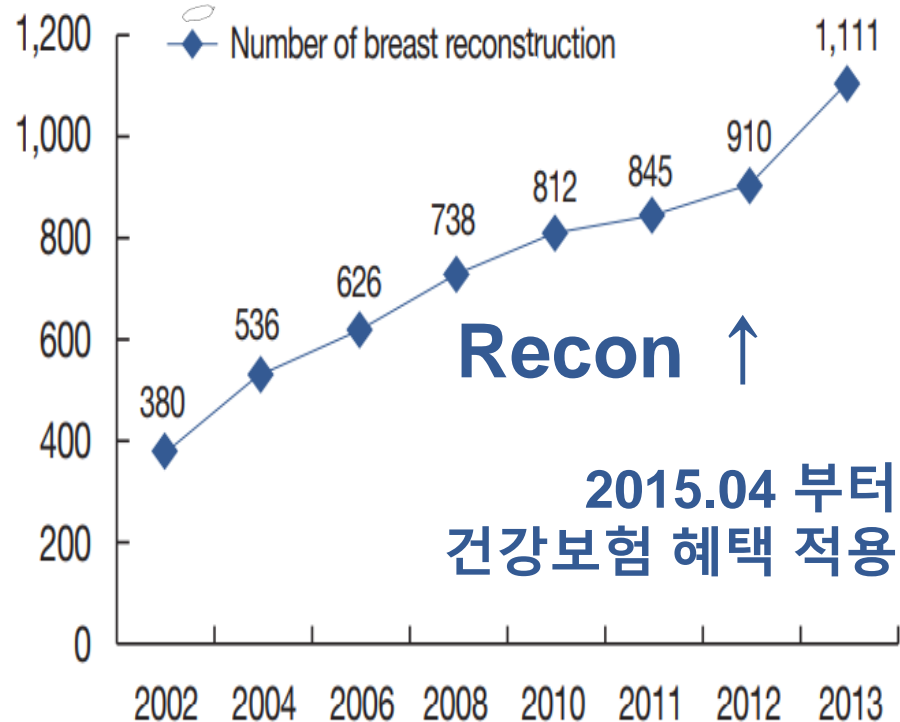
Jee Suk Chang, Kyung Hwan Shin, Won Park, Kyubo Kim,
Won Sup Yoon, Kyu-Chan Lee, Jin Hee Kim, Jin Hwa Choi, Sung Ja Ahn, Boram Ha,
Sun Young Lee, Woo Chul Kim, Sei One Shin, **Yong Bae Kim**

Yonsei University College of Medicine, Seoul National University College of Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Ewha Womans University School of Medicine, Ansan Hospital, Korea University, Gachon University Gil Medical Center, Dongsan Medical Center, Keimyung University School of Medicine, Chung-Ang University Hospital, Chonnam National University Medical School, Hallym University Dongtan Sacred Heart Hospital, Chonbuk National University Hospital, Inha University Hospital, Inha University of Medicine, Andong Medical Group Hospital, Republic of Korea

Introduction



JAMA Surg. 2015;150(1)



J Breast Cancer 2016; 19(1)

Key goal: minimizing complications and maximizing aesthetic satisfaction without compromising oncological outcomes

Lancet Oncol 2017;18



Flap necrosis



Capsular contracture

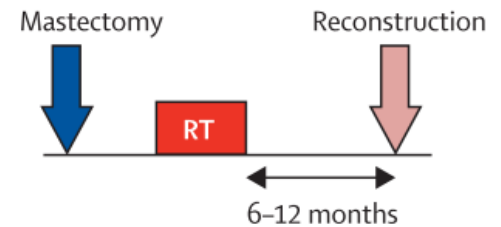


I. Sequencing

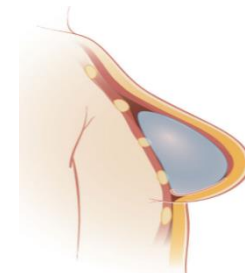
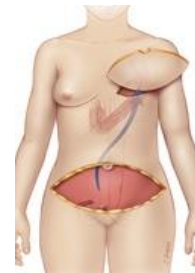
A Immediate reconstruction
Mastectomy and reconstruction



B Delayed reconstruction

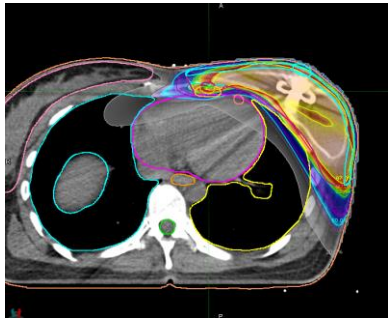


II. Autologous vs. prosthetic



Previous study

1st plan

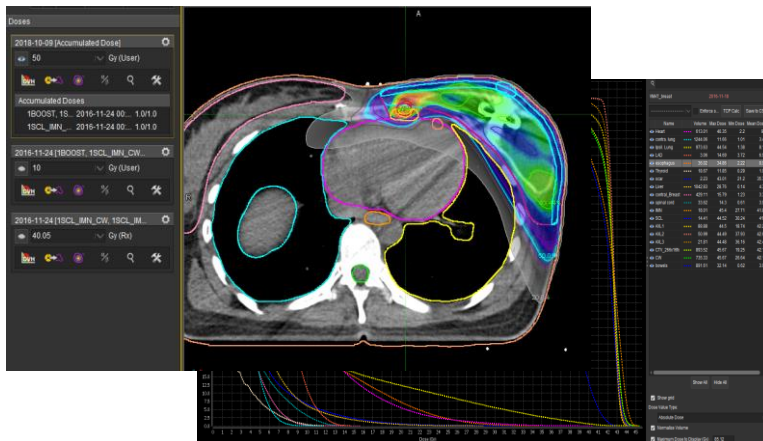


2nd plan

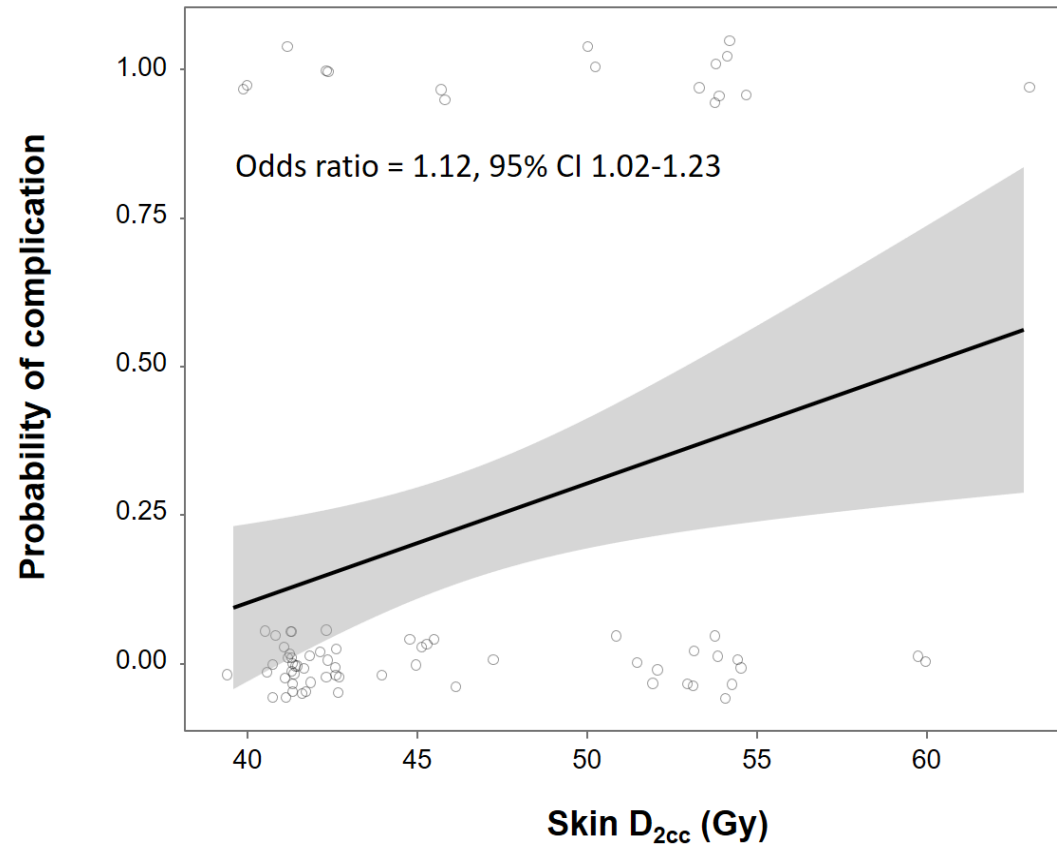


Cumulative recalculated dose

Transferred



Radiation dose-response relationship



Purpose

- The purpose of **KROG 1804** was to **compile retrospective data of radiation treatment with breast reconstruction** until mature prospective data became available
- To **validate** the **previous findings** in multi-institutional based cohort regardless of reconstruction surgical techniques.

Eligibility

- **Inclusion criteria**

- Diagnosis of breast cancer
- Mastectomy
- Radiation treatment with breast reconstruction
- RT between 01/01/2015 and 12/30/2016

- **Exclusion criteria**

- Male breast cancer
- Bilateral reconstruction

Analysis

- **Study endpoints**

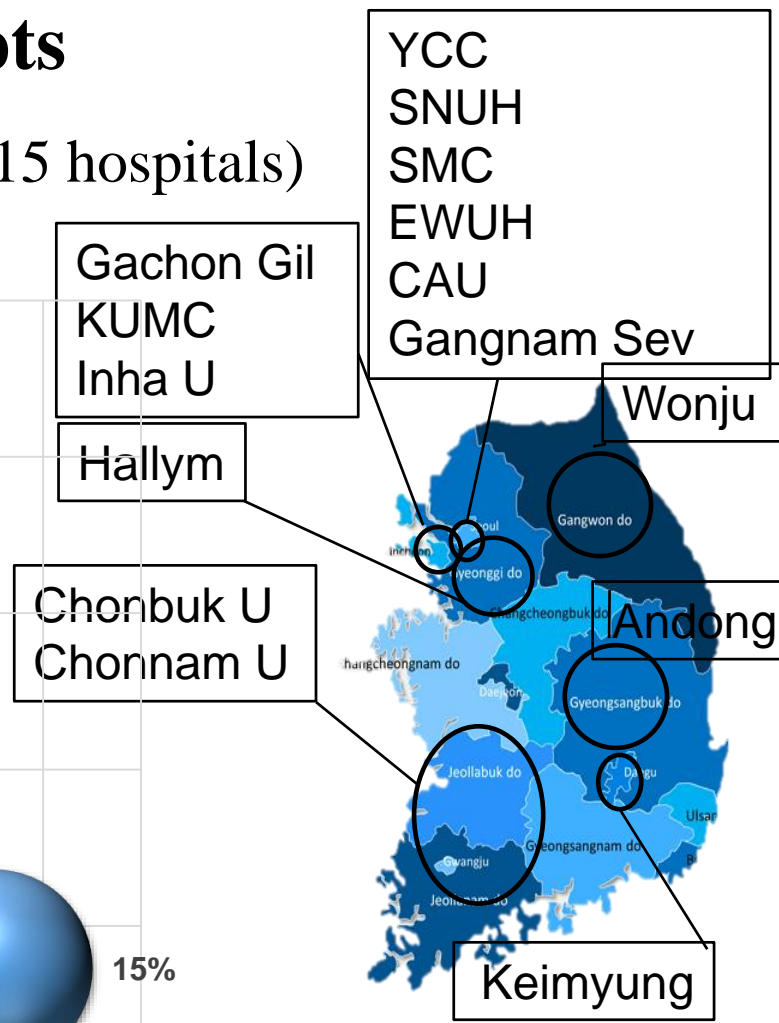
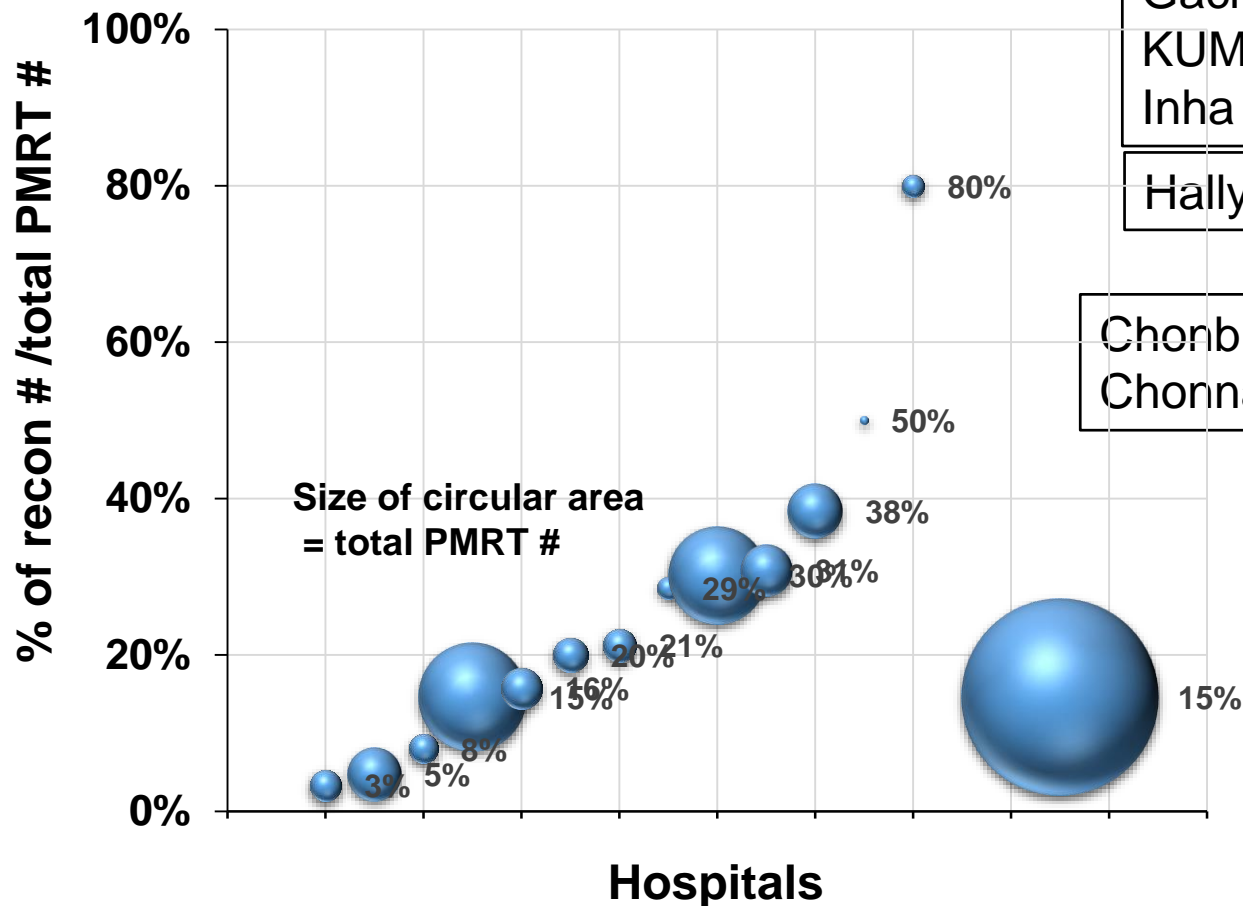
- Incidence of complication
- Factors associated with complication

- **Reconstruction complication**

- Seroma, hematoma, wound dehiscence, necrosis, bleeding, contracture, infection, cellulitis, rupture, exposure, rippling, malposition, hernia
- **Major:** re-op for explantation, flap failure, bleeding control
- **Minor:** re-op for other reasons, and IV antibiotics

% of Recon pts/total PMRT pts

Total, 304 recon pts / 1140 PMRT pts (15 hospitals)



Baseline characteristics (N = 304)

Variables		N	%
Age, y	Mean (SD)	43.8	8.4
	< 40	114	38%
	≥ 40	190	62%
BMI	Mean (SD)	23.1	±3.3
Smoking Hx	No	293	97%
	Current	4	1%
	Ever	7	2%
Diabetes	Yes	14	5%
	Unknown	5	2%
Residential area	Metropolitan	210	69%
	Non-metropolitan	94	31%
Clinical T stage	T1	69	23%
	T2	146	48%
	T3-4	85	28%
	Tx	4	1%

Variables		N	%
Clinical N stage	N0	46	15%
	N+	255	84%
	Unknown	3	1%
Multicentricity	Yes	121	40%
Systemic Tx		295	97%
	Neoadjuvant CTx	147	48%
	Adjuvant CTx	177	58%
	Endocrine Tx	225	74%
	Anti-HER2 Tx	125	41%
Mastectomy	Standard	159	52%
	Skin sparing	74	24%
	Nipple sparing	71	23%
Resection margin	Close	22	7%
	Positive	11	4%
	Unknown	3	1%

Surgical treatment characteristics

	N	%
Reconstruction stage		
1-stage	156	51.3%
2-stage	148	48.7%
Reconstruction timing		
Immediate	302	99.3%
Delayed	2	0.7%
Reconstruction type		
Prosthetic-based	180	59.2%
ADM use	166	54.6%
Autologous-based	122	40.1%
Both	2	0.7%
Reconstruction status at the time of RT		
Tissue expander	140	46.1%
TRAM	75	24.7%
Implant	38	12.5%
DIEP	29	9.5%
LD	13	4.3%
Others	9	3%
Bilateral reconstruction	34	11%
Operation time, hour	6.1	3.2

Radiotherapy details

		N	%
RT technique	Forward IMRT (Field-in-field)	114	38%
	VMAT	90	30%
	3D conformal	58	19.1
	Step-and-shoot IMRT	26	8.6%
	Others	16	5.3%
Fractionation	1.8- or 2.0-Gy fractionation	199	65.5%
	50 or 50.4 Gy	186	
	Others	13	
	Hypofractionation	105	34.5%
	40.05 Gy in 15 fractions	55	
	42.56 Gy in 16 fractions	11	
	45.9 Gy in 17 fractions	19	
	48 Gy in 20 fractions	14	
EQD2, Gy (α/β ratio, 3.5)	Median (range)	48.6	(43.4-71.0)
Maximum doses in PTV, %	Mean (SD)	107.6%	5.8%
Use of boost RT		43	14.1%
Use of bolus		161	53%
Use of regional RT		287	94.4%
Inclusion of IMN		163	53.6%

Postoperative breast complication

Variables	Total	
	Any	Major*
Total	100 (32.9)	25 (8.2)
Group		
Neoadjuvant chemotherapy		
No	49 (31.2)	9 (5.7)
Yes	51 (34.7)	16 (10.9)
Reconstruction type		
Prosthetic	67 (36.8)	21 (11.5)**
Autologous	33 (27)	4 (3.3)**
EQD2, Gy (alpha/beta ratio, 3.5)		
< Median	27 (37)	1 (1.4)**
≥ Median	73 (31.6)	24 (10.4)**

* Major complications were defined as those requiring re-operation for explantation, flap failure, and bleeding control.

** $P < .05$.

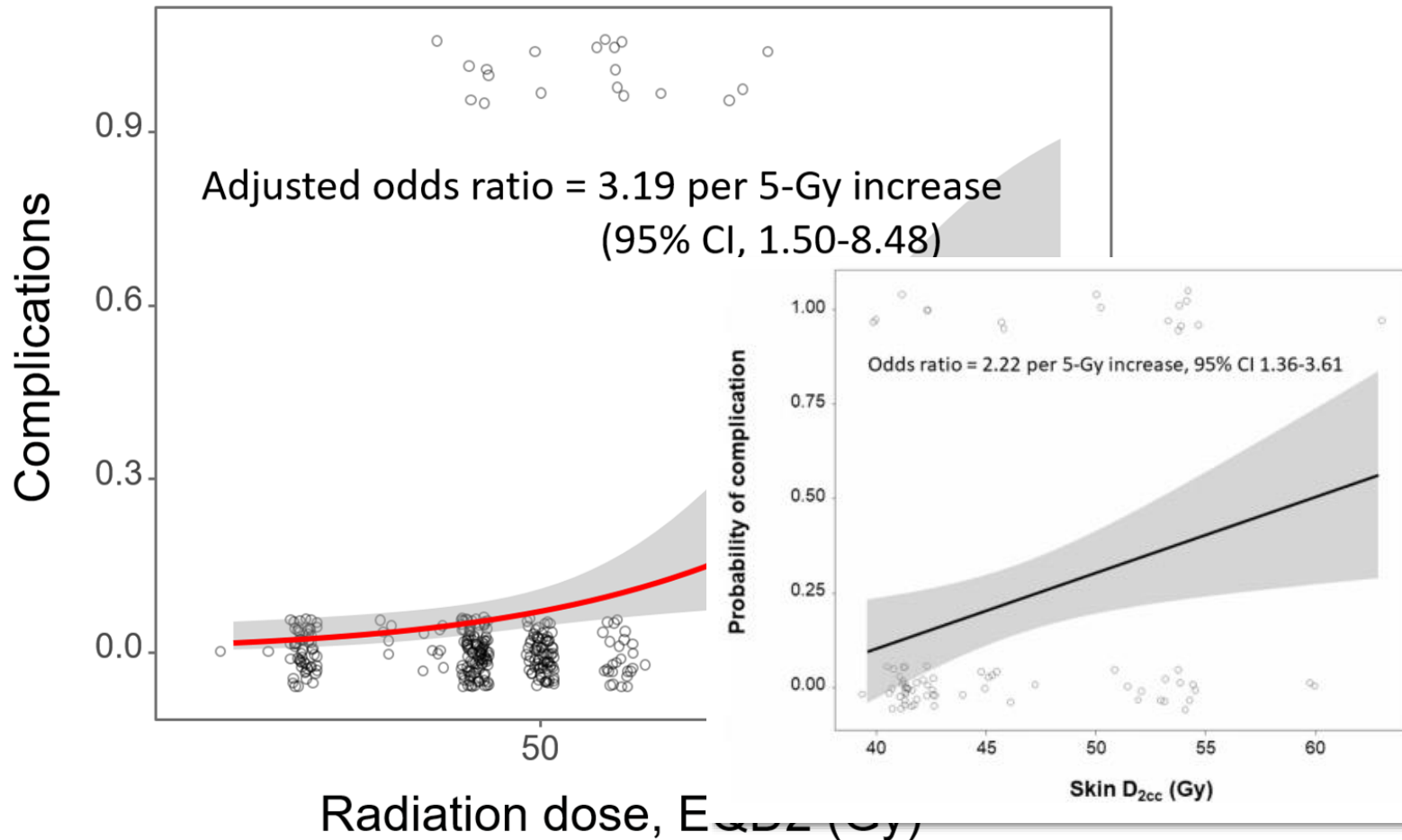
Postoperative breast complication

	Before RT		After RT	
	Any	Major	Any	Major
Total	41 (13.5)	7 (2.3)	73 (24)	19 (6.3)
Group				
Neoadjuvant chemotherapy				
No	22 (14)	5 (3.2)	34 (21.7)	4 (2.5)*
Yes	19 (12.9)	2 (1.4)	39 (26.5)	15 (10.2)*
Reconstruction type				
Prosthetic	25 (13.7)	5 (2.7)	52 (28.6)*	17 (9.3)*
Autologous	16 (13.1)	2 (1.6)	21 (17.2)*	2 (1.6)*
EQD2, Gy (alpha/beta ratio, 3.5)				
< Median, 48.6 Gy	10 (13.7)	0 (0)	19 (26)	1 (1.4)*
≥ Median, 48.6 Gy	31 (13.4)	7 (3)	54 (23.4)	18 (7.8)*

* $P < .05$.

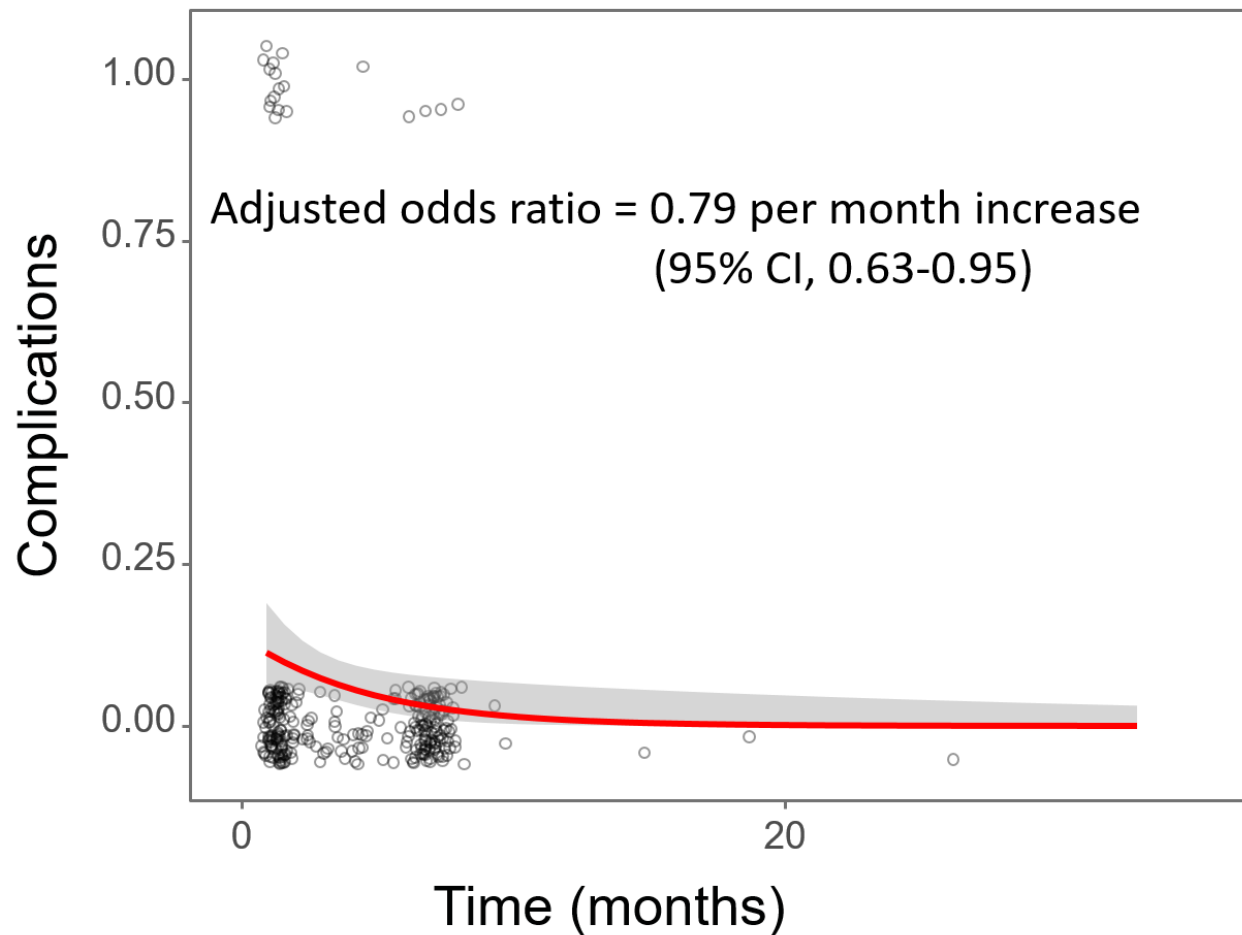
Dose-response curve in logistic regression

: Radiation dose & post-RT major complication risk



Dose-response curve in logistic regression

: Time interval from surgery & post-RT major complication risk



Predictors for post-RT major complications

Multivariate	OR	95% CI	P
Age, y (continuous)	NI		
BMI, kg/m ² (continuous)	NI		
Smoking (yes v no)	37.0	2.26-606	.011
Mastectomy (nipple/skin sparing vs. simple)	NI		
Recon type (autologous vs. prosthetic)	0.14	0.03-0.71	.018
Time interval between recon and RT (month)	0.80	0.64-0.99	.037
Use of bolus material	NI		
Use of boost RT	NI		
RT dose, EQD2Gy (continuous)	1.54	1.22-1.95	<.001



Conclusions

- The **first** report of risk of complications in women underwent **reconstruction and RT** from a nationally representative subjects in Korea
- There might be room for improvement to reduce complications even at the time of RT: **smoking cessation, delaying RT** until complete skin wound-healing, and adoption of **hypofractionation** (40Gy/15fx)
- Ongoing multi-center prospective study (NCT 03523078) can help guide breast cancer team to optimize the outcomes in this setting.

대한방사선종양학회 연구위원회



가천의대길병원
Gachon University Gil Hospital



고려대학교안산병원



계명대학교 동산의료원
Keimyung University Dongsan Medical Center



연세암병원
YONSEI CANCER CENTER



SAMSUNG MEDICAL CENTER

SNUH 서울대학교병원



전북대학교병원
CHONBUK NATIONAL UNIVERSITY HOSPITAL



중앙대학교병원

