

# Radiation Therapy for Patients with pCR after Neoadjuvant Chemotherapy

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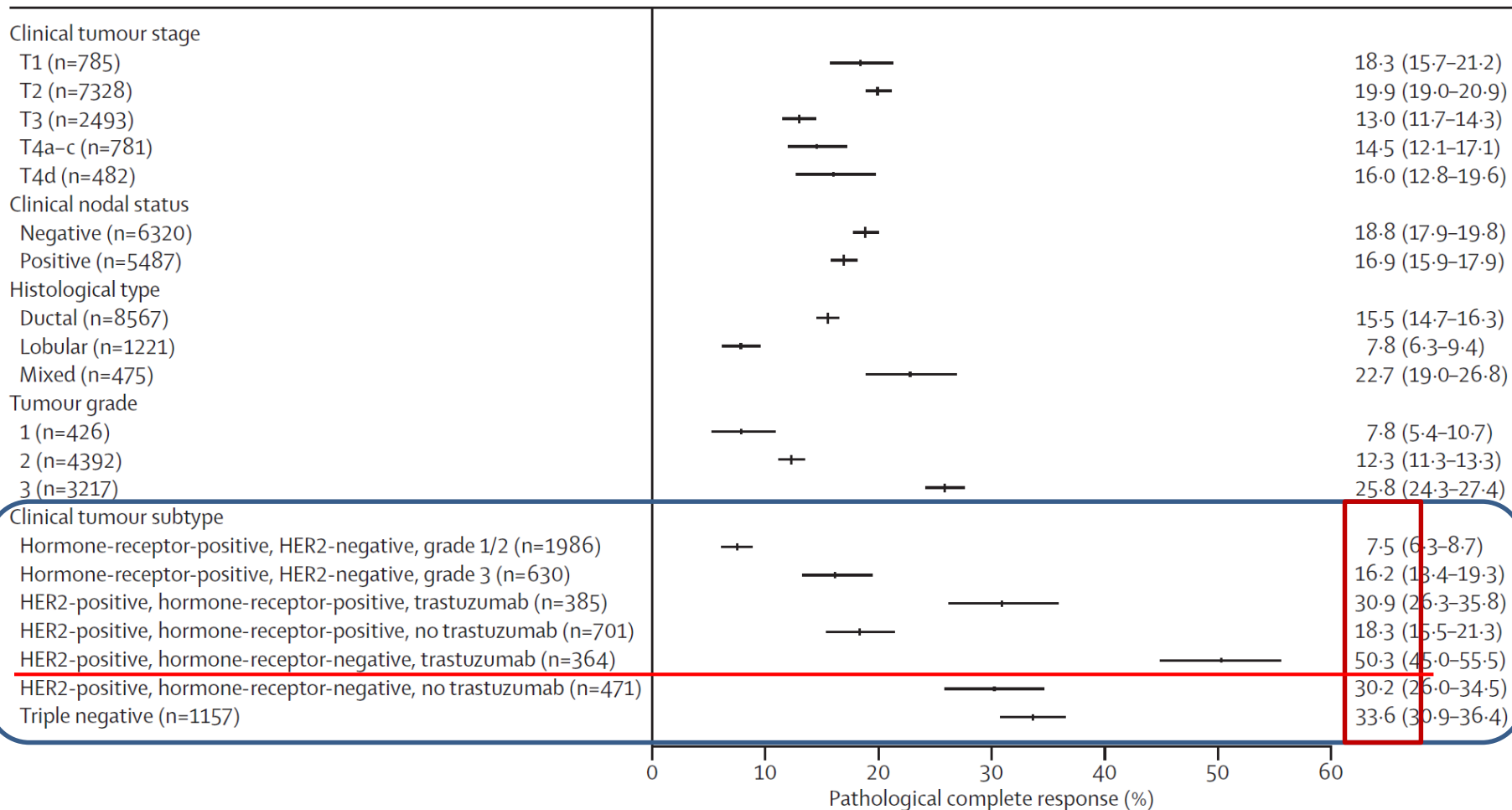
# Theoretical advantages of NeoAC

- **Allowing BCS for patients who would have required a mastectomy**
- **Treatment of micrometastasis without the delay of postop recovery**
- **In vivo assessment of tumor response to chemotherapy**

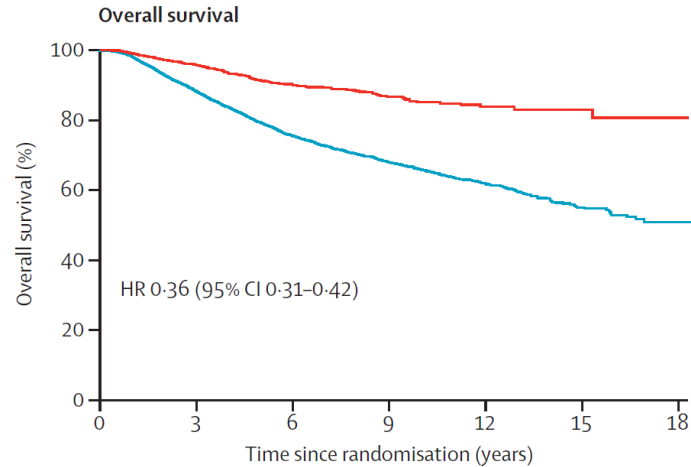
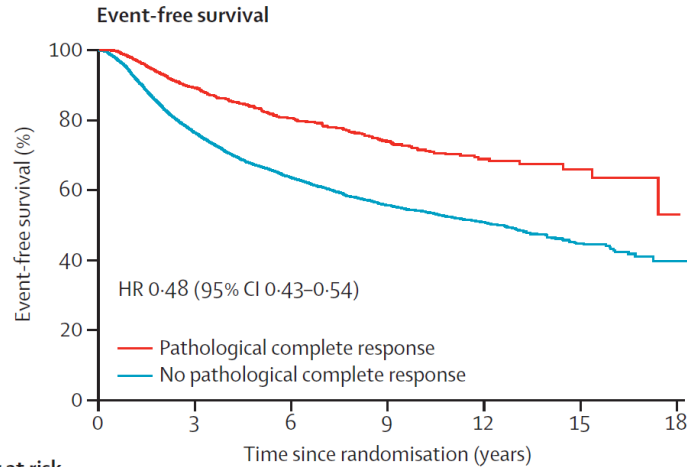
# CTNeoBC pooled analysis of pCR

A

Percentage of patients achieving pathological complete response (95% CI)



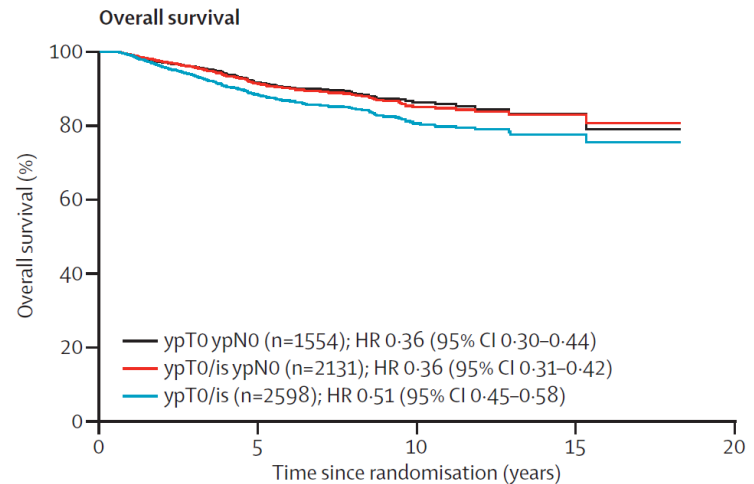
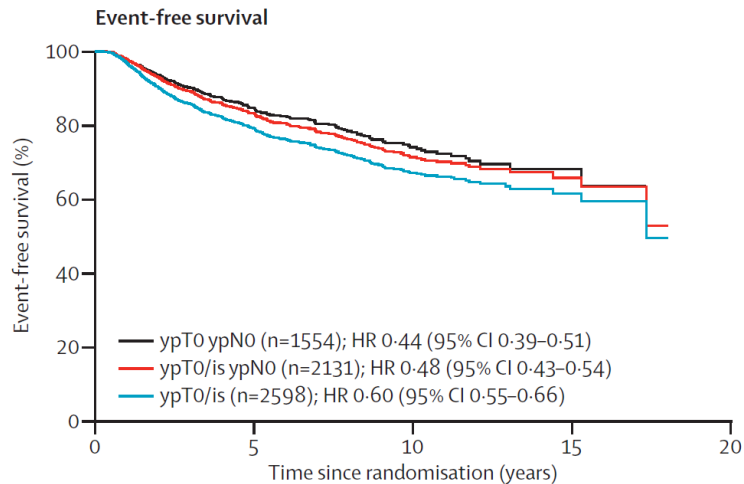
# CTNeoBC pooled analysis of pCR



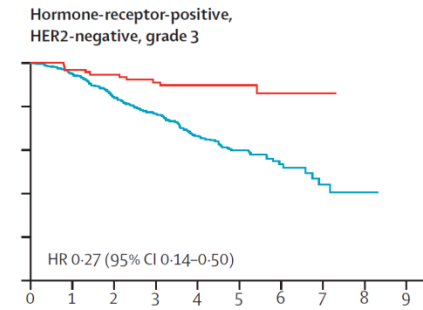
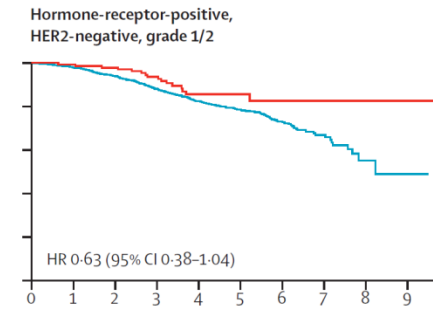
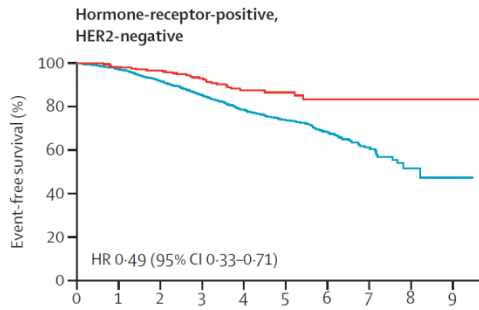
**Number at risk**

	0	3	6	9	12	15	18
Pathological complete response	2131	1513	583	337	124	35	2
No pathological complete response	9824	6169	2674	1523	525	165	1

	0	3	6	9	12	15	18
Pathological complete response	2131	1618	640	383	145	43	3
No pathological complete response	9824	7119	3173	1859	659	209	3

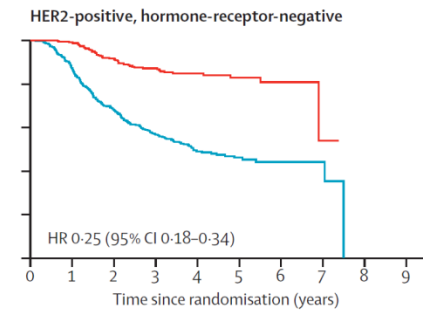
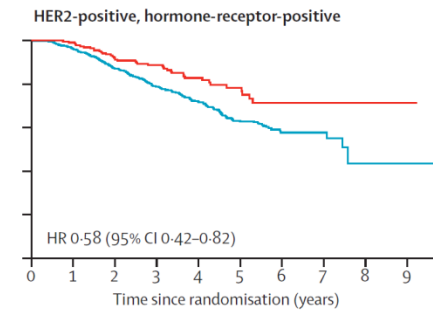
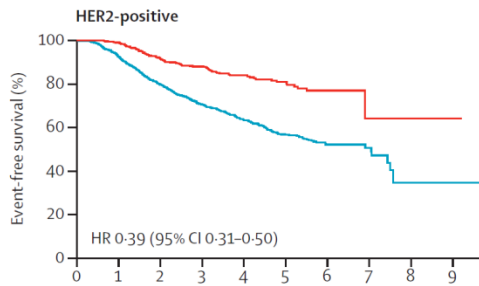


# CTNeoBC pooled analysis of pCR



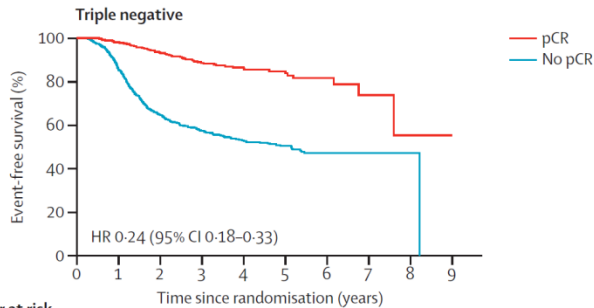
Number at risk

	0	1	2	3	4	5	6	7	8	9		0	1	2	3	4	5	6	7	8	9		0	1	2	3	4	5	6	7	8	9
pCR	270	244	224	184	113	69	21	6	2	2	148	134	123	102	55	33	10	5	2	2	102	92	83	71	49	30	9	1	0			
No pCR	2491	2226	1978	1616	1017	658	247	84	20	1	1838	1653	1493	1236	790	517	198	68	15	1	528	458	376	290	173	111	38	14	5			



Number at risk

	0	1	2	3	4	5	6	7	8	9		0	1	2	3	4	5	6	7	8	9		0	1	2	3	4	5	6	7	8	9
pCR	586	527	454	371	212	120	37	4	2	1	247	224	194	157	91	50	17	2	2	1	325	293	250	205	115	65	19	2				
No pCR	1403	1157	918	713	436	269	106	33	3	1	839	723	617	484	306	198	79	24	3	1	510	392	269	200	111	59	22	6				



Number at risk

	0	1	2	3	4	5	6	7	8	9
pCR	389	349	310	250	166	88	29	11	1	
No pCR	768	604	429	317	198	125	50	13	1	

**PREOPERATIVE SYSTEMIC THERAPY: ADJUVANT THERAPY**

**SURGICAL TREATMENT**

Mastectomy and  
surgical axillary  
staging<sup>m</sup>  
+ reconstruction  
(optional)<sup>q</sup>

Lumpectomy with  
surgical axillary  
staging<sup>m</sup>

**ADJUVANT TREATMENT**

- Complete planned chemotherapy regimen course if not completed preoperatively.
- Consider adjuvant capecitabine in patients with triple-negative breast cancer and residual invasive cancer following standard neoadjuvant treatment with taxane-, alkylator-, and anthracycline-based chemotherapy.

and

Adjuvant radiation therapy<sup>s</sup> is based on maximal disease stage from prechemotherapy tumor characteristics at diagnosis and post-chemotherapy pathology results.

▶ Post mastectomy:<sup>s</sup>

- ◊ Strongly consider radiation to the chest wall + infraclavicular region, supraclavicular area, internal mammary nodes, and any part of the axillary bed at risk for clinical N1, pN0.
- ◊ For ANY positive axillary nodes after chemotherapy, radiation therapy as indicated to the chest wall + infraclavicular region, supraclavicular area, internal mammary nodes, and any part of the axillary bed at risk.

▶ Post lumpectomy:<sup>s</sup>

- ◊ Adjuvant radiation post-lumpectomy is indicated to the whole breast.
- ◊ Strongly consider radiation to the whole breast + infraclavicular region, supraclavicular area, internal mammary nodes, and any part of the axillary bed at risk for clinical N1, ypN0.
- ◊ For ANY positive axillary nodes after chemotherapy, radiation therapy as indicated to the whole breast + infraclavicular region, supraclavicular area, internal mammary nodes, and any part of the axillary bed at risk.

and

- Adjuvant endocrine therapy<sup>bb</sup>, if ER-positive and/or PR-positive (category 1)

and

- If HER2-positive, complete up to one year of HER-2 targeted therapy with trastuzumab (category 1) ± pertuzumab. HER2-targeted therapy may be administered concurrently with radiation therapy and with endocrine therapy if indicated.<sup>ff</sup>

[See  
Surveillance/  
Follow-up  
\(BINV-16\)](#)

# What is the status to determine the RT indication and RT field in patient with good response after NAC?

- **No prospective randomized trials**
- **A few retrospective studies**

# RT issues in patients treated with NAC

- **ypN(+)** patients: no disagreement of adjuvant RT
- **ypCR/N0 mastectomy patients: adjuvant RT benefits ???**
- **ypCR/N0 BCS patients: What is the optimal RT field???**

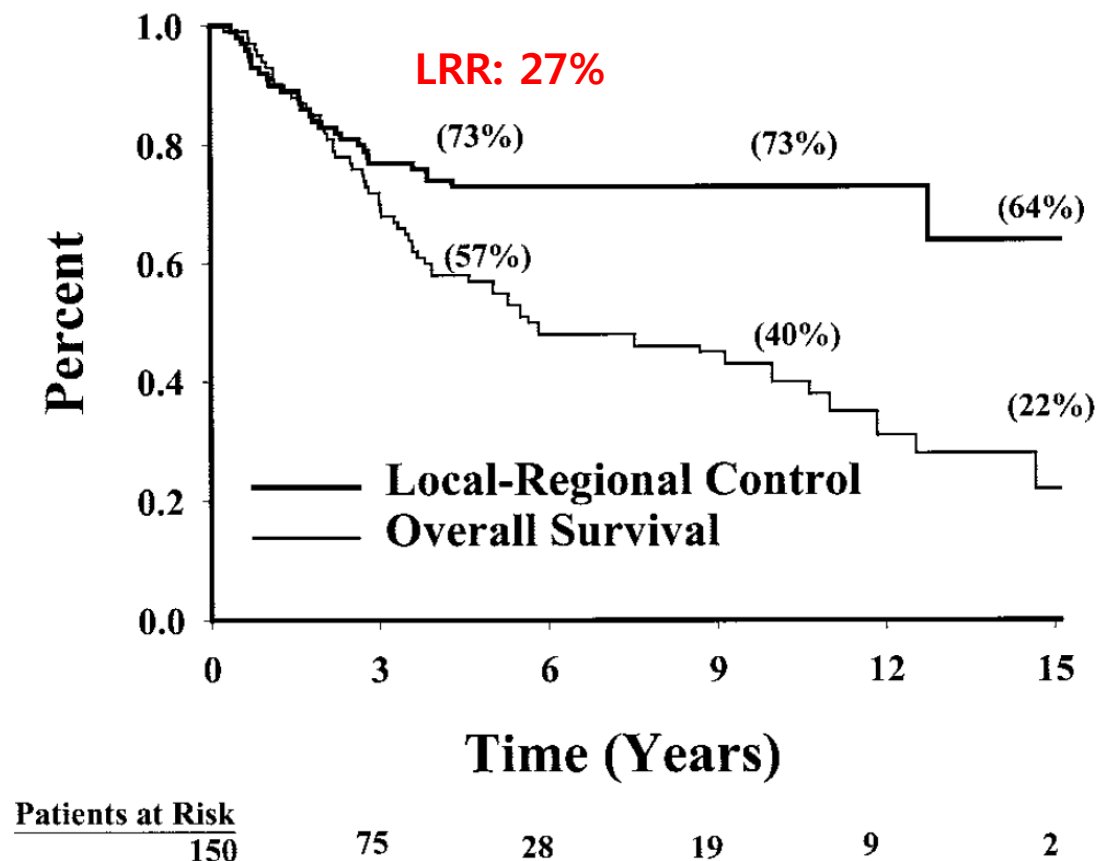


# RT issues in patients treated with NAC

- ypN(+) patients: no disagreement of adjuvant RT
- **ypCR/N0 mastectomy patients: adjuvant RT benefits ???**
- ypCR/N0 BCS patients: What is the optimal RT field???

# Predictors of Local-Regional Recurrence After Neoadjuvant Chemotherapy and Mastectomy Without Radiation

- MDACC, 1974-1998
- 150 pts with **NeoCT + MRM without RT**
- Median f/u 4.1 yrs



## 5-year loco-regional recurrence rate

Factor	5-Year Rate (%)	P	Crude Rate		Sites of Failure
			No.	%	
<b>Clinical T stage</b>					
T1	0	< .0001	0/5	0	
T2	12		5/56	9	CW-3, SCF-3, AX-1, ICF-2, IMC-0
T3	25		9/44	20	CW-6, SCF-4, AX-2, ICF-1, IMC-1
T4	51		20/45	44	CW-18, SCF-4, AX-3, ICF-0, IMC-0
<b>Clinical LN status</b>					
Negative	23	.307	7/42	17	CW-5, SCF-4, AX-1, ICF-0, IMC-0
Positive	27		25/106	24	CW-20, SCF-8, AX-5, ICF-3, IMC-1
<b>Pathologic primary size</b>					
≤ 2.0 cm	18	.005	12/74	16	CW-11, SCF-3, AX-1, ICF-0, IMC-0
2.1-5.0 cm	36		15/56	27	CW-10, SCF-7, AX-4, ICF-3, IMC-1
> 5.0 cm	46		6/14	43	CW-5, SCF-2, AX-1, ICF-0, IMC-0
<b>Pathologic LN status</b>					
0 + LN	12	< .0001	6/62	10	CW-5, SCF-3, AX-0, ICF-0, IMC-0
1-3 + LN	18		7/42	17	CW-5, SCF-2, AX-2, ICF-1, IMC-1
4-9 + LN	57		14/30	47	CW-12, SCF-5, AX-1, ICF-2, IMC-0
> 10 + LN	30*		3/11	27	CW-3, SCF-0, AX-0, ICF-0, IMC-0

Abbreviations: LN, lymph node; CW, chest wall; SCF, supraclavicular fossa; AX, axilla; ICF, infraclavicular fossa; IMC, internal mammary chain.

\*Rate at 3 years; no patients were at risk at 5 years.

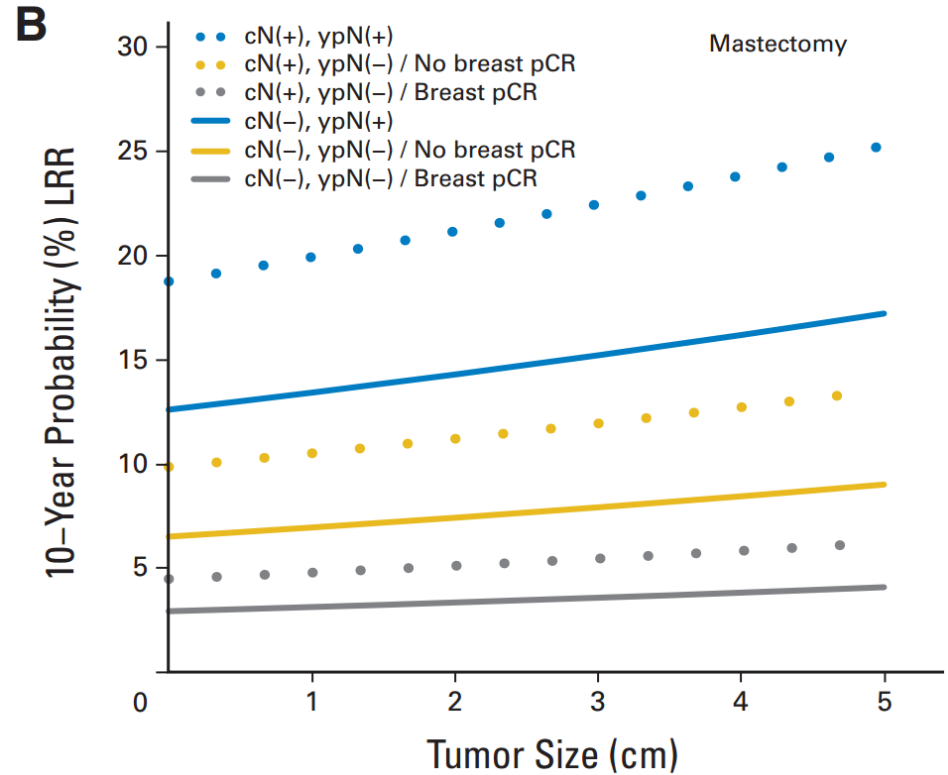
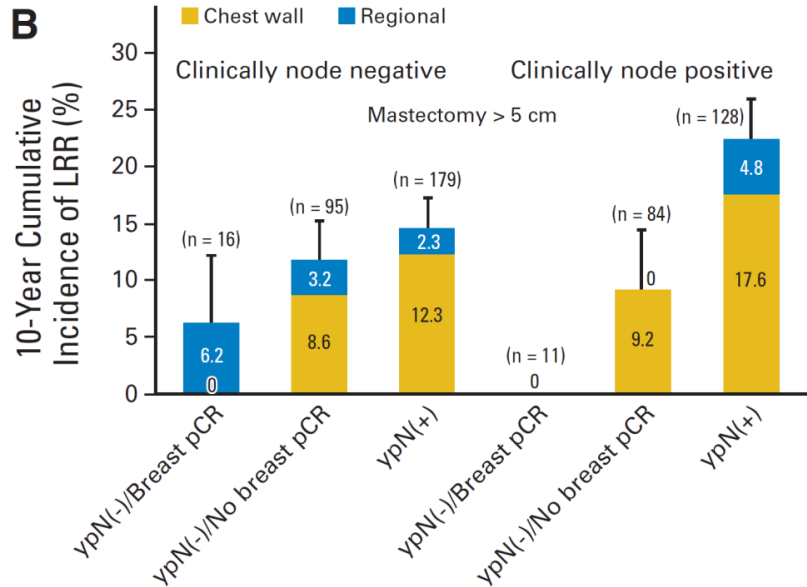
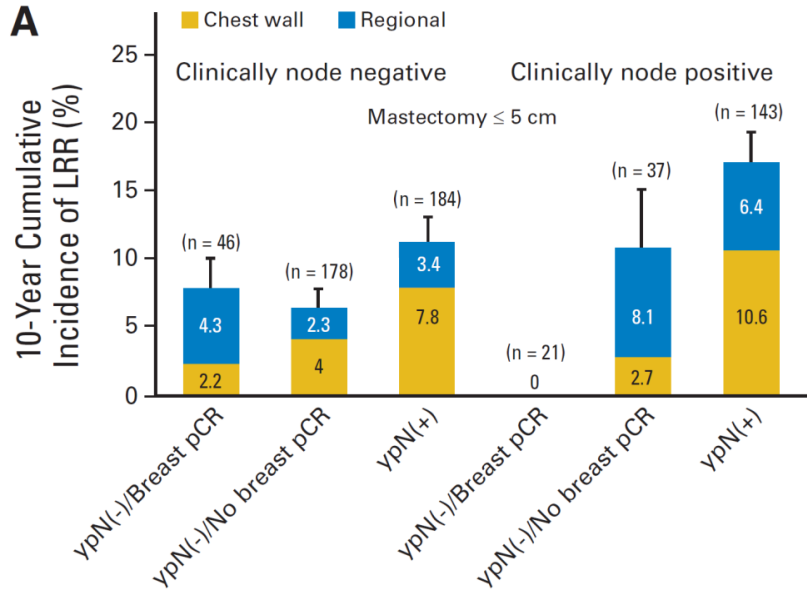
➤ **advanced disease at presentation**

➤ **positive LNs after NAC**

-> **predict for clinical significant rates of LRR**

# Neoadjuvant Trials: NSABP B-18 B-27

No RT for mastectomy patients  
 10yr LRR 12.3% (local 8.9%; regional 3.4%)



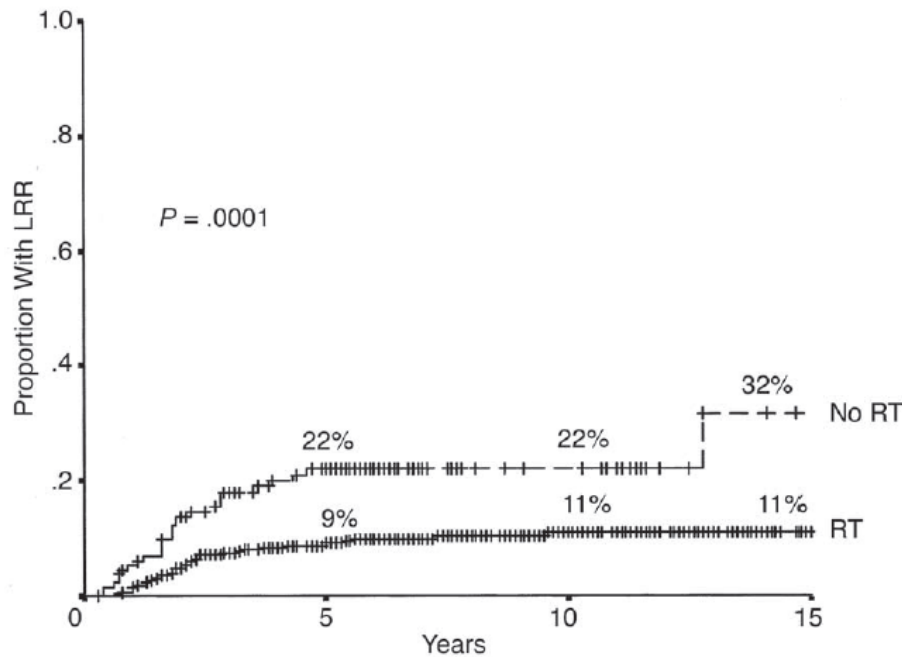
- Predictor of LRR: clinical tumor size, clinical nodal status, pathological nodal status, breast tumor response

# Postmastectomy Radiation Improves Local-Regional Control and Survival for Selected Patients With Locally Advanced Breast Cancer Treated With Neoadjuvant Chemotherapy and Mastectomy

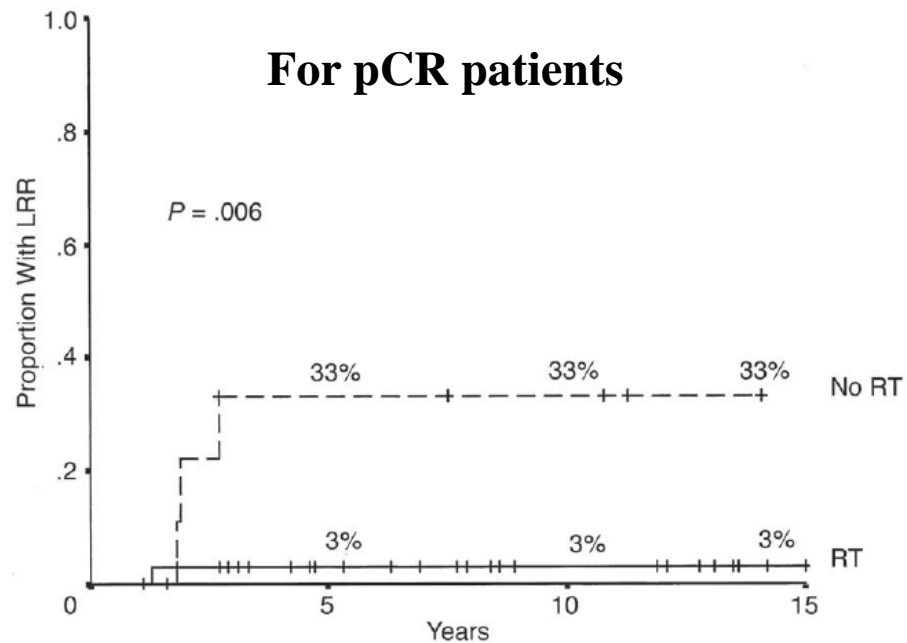
- MDACC, 1974-2000
- NeoAC+mastectomy with or without RT

**Table 2.** Patient, Tumor, and Treatment Characteristics

Characteristic	No Radiation (n = 134)		Radiation (n = 542)		P*
	No.	%	No.	%	
Clinical T-stage†					< .001
T1	5	4	13	2	
T2	54	40	73	13	
T3	41	31	195	36	
T4	34	25	261	48	
Clinical N-stage†					< .001
N0	42	31	97	18	
N1	65	49	213	39	
N2	26	19	217	40	
N3	1	1	15	3	
Clinical stage†					< .001
I	1	1	0	0	
IIA	21	16	8	1	
IIB	45	34	83	15	
IIIA	29	22	164	30	
IIIB	32	24	233	43	
IV	6	4	54	10	
Response to neoadjuvant chemotherapy					.001
CR	8	6	78	14	
PR	111	83	354	65	
MR	9	7	88	16	
NC	3	2	16	3	
PD	3	2	6	1	
No. positive nodes					< .001
Median		1		2	
Interquartile range		0-3		0-6	
0	60	45	141	26	
1-3	40	30	185	34	
4-9	22	16	138	25	
≥ 10	8	6	73	13	
Unknown	4	3	5	1	
Positive nodes, %					< .001
< 20	91	68	279	51	
≥ 20	37	28	257	47	
Unknown	6	4	6	1	
Margin status					.010
Free/negative	127	95	477	88	
Involved/positive	1	1	19	4	
Close	3	2	41	8	
Unknown	3	2	5	1	



	No. Patients	No. Events
No RT	134	28
RT	542	50



	No. Patients	No. Events
No RT	11	3
RT	35	1

**Table 3.** Ten-Year Actuarial Rates of LRR According to Clinical and Pathological Disease Status

Factor	10-year LRR Rate		P
	No Radiation (%)	Radiation (%)	
<b>Clinical T-stage</b>			
T1	0	8	.535
T2	10	7	.408
T3	22	8	.002
T4	46	15	< .0001
<b>Clinical N-stage</b>			
N0	23	10	.014
N1	14	9	.062
N2-3	40	12	< .0001
<b>Pathological tumor size, cm</b>			
0-2	13	8	.051
2.1-5.0	31	14	.002
≥ 5.1	52	13	.001
<b>No. of positive nodes</b>			
0	11	4	.010
1-3	13	11	.636
≥ 4	59	16	< .0001

**Table 5.** Ten-Year Actuarial Rates of CSS According to Clinical and Pathological Disease Status

Factor	10-Year CSS Rate		P
	No Radiation (%)	Radiation (%)	
<b>Combined clinical stage</b>			
I-II	73	71	.482
IIIA	64	70	.742
≥ IIIB	22	44	.002
<b>Clinical I-stage</b>			
T1	80	92	.550
T2	56	66	.977
T3	71	69	.878
T4	24	45	.007
<b>Clinical N-stage</b>			
N0	65	62	.749
N1	66	64	.818
N2-3	27	49	.024
<b>Pathological tumor size, cm</b>			
0-2	64	69	.168
2.1-5.0	49	53	.887
≥ 5.1	25	37	.577
<b>No. of positive nodes</b>			
0	67	81	.271
1-3	70	56	.179
≥ 4	18	44	.005

➤ **clinical T3 or stage III-IV**

➤ **4 or more positive nodes**

-> **RT should be considered regardless of tumor response with NAC**

# POSTMASTECTOMY RADIATION IMPROVES THE OUTCOME OF PATIENTS WITH LOCALLY ADVANCED BREAST CANCER WHO ACHIEVE A PATHOLOGIC COMPLETE RESPONSE TO NEOADJUVANT CHEMOTHERAPY

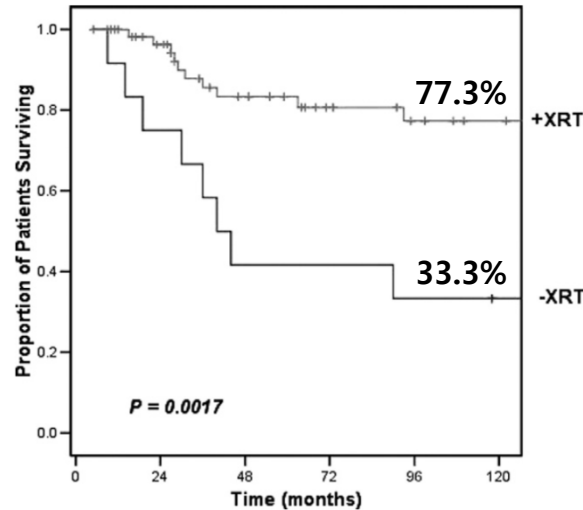
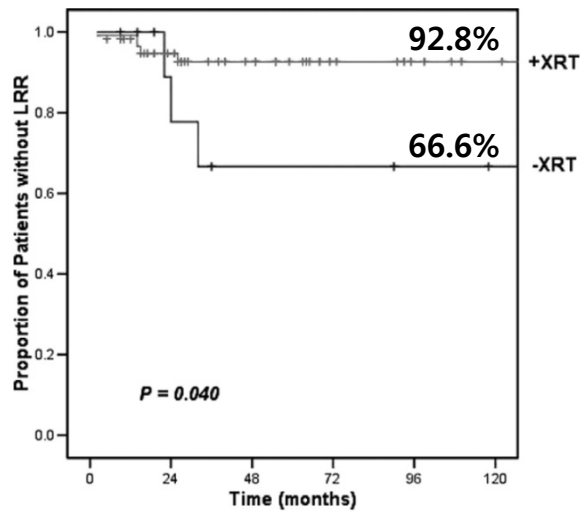
•MDACC, **ypCR** 106pts, 1982-2002

Table 1. Patient and tumor characteristics

Characteristic	Nonirradiated (n = 34)		Irradiated (n = 72)		p Value
	No. of patients	%	No. of patients	%	
Age					
≤50 years	21	(62)	44	(61)	0.949
>50 years	13	(38)	28	(39)	
Menopause					
Pre	22	(65)	39	(54)	0.155
Post	12	(35)	32	(45)	
Male sex	0	(0)	1	(1)	
Clinical T stage					
T1	5	(15)	3	(4)	<0.001
T2	18	(53)	9	(13)	
T3	4	(12)	36	(50)	
T4	7	(20)	24	(33)	
Clinical N stage					
N0	15	(44)	14	(19)	0.057
N1	12	(35)	30	(42)	
N2	6	(18)	16	(22)	
N3	1	(3)	11	(15)	
NX	0	(0)	1	(2)	
Clinical stage					
IB	2	(6)	0	(0)	<0.001
IIA	13	(38)	1	(1)	
IIB	7	(21)	9	(17)	
IIIA	5	(15)	29	(37)	
IIIB	6	(17)	21	(29)	
IIIC	1	(3)	12	(15)	



## In clinical stage III



- In patients with clinical stage III disease and pCR after NAC  
-> PMRT: significant benefit

Table 2. Univariate analysis of factors associated with local-regional recurrence (LRR) after a pathologic complete response (pCR) in patients with Stage III disease treated with mastectomy

Characteristic	No. of patients	10-Year actuarial LRR rate	p Value
Age			0.27
≤50 years	50	14.3	
>50 years	24	5.3	
Clinical T stage			0.43
T1	3	0	
T2	8	27	
T3	30	7	
T4	31	12	
Clinical N stage			0.46
N0	5	20	
N1	31	4.2	
N2	22	11.5	
N3	13	15.4	
Menopausal status			0.55
Premenopausal	44	13.9	
Postmenopausal	28	8.0	
Histology			0.67
Ductal	61	11.5	
Lobular	2	0	
Estrogen receptor status			0.24
Positive	12	0	
Negative	42	14.3	
Progesterone receptor status			0.36
Positive	9	0	
Negative	37	12.5	
Lymphovascular invasion status			0.063
Yes	6	45	
No	68	8.5	
Nuclear grade			0.23
2	13	0	
3	54	13.0	
No. of lymph nodes examined			0.68
≤10	18	6	
>10	55	11.1	
Radiation therapy given			0.04
Yes	62	7.2	
No	12	33.4	

# RADIOTHERAPY FOR STAGE II AND STAGE III BREAST CANCER PATIENTS WITH NEGATIVE LYMPH NODES AFTER PREOPERATIVE CHEMOTHERAPY AND MASTECTOMY

Departments of \*Radiation Oncology, †Biostatistics, and ‡Medical Oncology, Institut Curie-Hôpital René Huguenin, Saint-Cloud, France

- **France**, NeoAC, 1054 patient, 1990-2004
- **ypN0 after NeoAC and mastectomy**, 134pts

Table 1. Patient characteristics and treatment

Variable	No PMRT group (n = 56)	PMRT group (n = 78)	p
Clinical Stage (AJCC)			.001
I	0	1 (1)	
II	44 (79)	39 (50)	
III	12 (21)	38 (49)	
Clinical T stage			.021
T1-T2	35 (62)	33 (42)	
T3-T4	21 (38)	45 (58)	
Clinical N stage			.007
N0	37 (66)	33 (42)	
N1-N2	19 (34)	45 (58)	
Primary tumor response to NAC (pCR)			.066
Yes	6 (11)	18 (23)	
No	50 (89)	60 (77)	

### Kaplan Meier estimates of 10-year LRR-FS

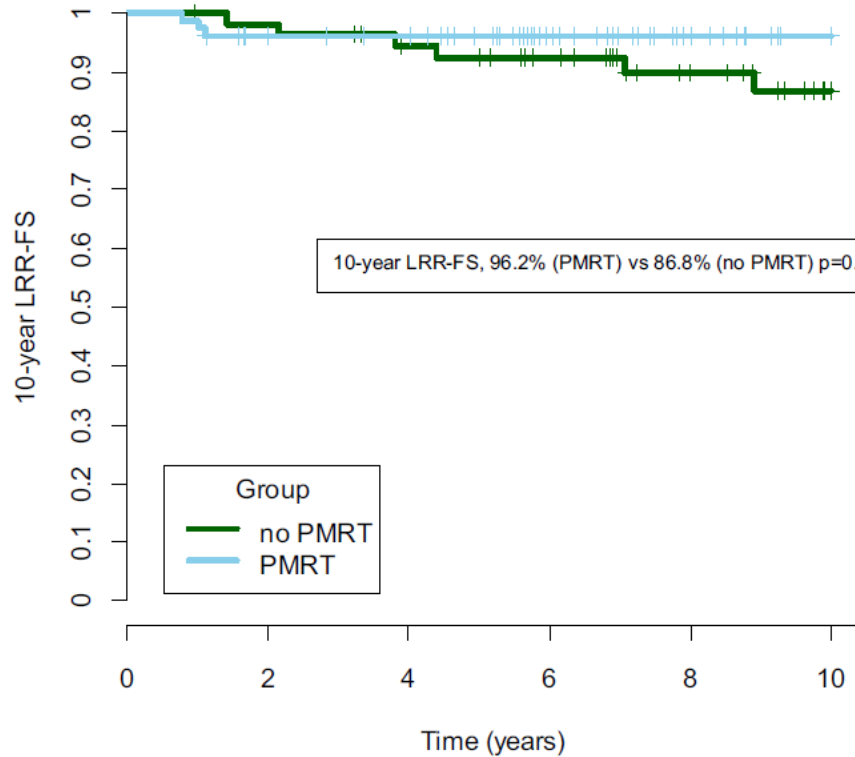


Table 3. Multivariate analysis of disease-free survival, Cox model ( $n = 116$ )

Variable	HR	95% CI	<i>p</i>
PMRT		0.67–3.38	.318
No	1		
Yes	1.51		
Age at diagnosis (y)		0.35–1.68	.505
<50	1		
$\geq 50$	0.77		
Clinical T stage		0.69–3.25	.301
T1-T2	1		
T3-T4	1.50		
Clinical N stage		0.35–1.70	.519
N0	1		
N1-N2	0.77		
Histologic grade (SBR)		0.35–21.05	.335
SBR1	1		
SBR2-SBR3	2.73		
ER status		0.27–2.86	.834
Negative	1		
Positive	0.88		
PR status		0.28–1.91	.516
Negative	1		
Positive	0.73		
NAC regimen		0.35–4.19	.766
Anthracycline	1		
Taxane	1.21		
Response to NAC		1.14–70.47	.037
pCR	1		
No pCR	8.95		
Inflammatory signs		0.42–2.26	.951
No	1		
Yes	0.97		
Hormonal treatment		0.29–2.25	.677
No	1		
Yes	0.80		

➤ In patients with pN0 status after NAC  
 -> no PMRT: no increase in the risk of DM, LRR or death

# The Role of Postmastectomy Radiation Therapy After Neoadjuvant Chemotherapy in Clinical Stage II-III Breast Cancer Patients With pN0: A Multicenter, Retrospective Study (KROG 12-05)

- **Korea**, 1998-2009
- clinically tumor size  $\geq 5\text{cm}$  or axillary LN(+)
- **ypN0 after NeoAC and mastectomy**, 151pts

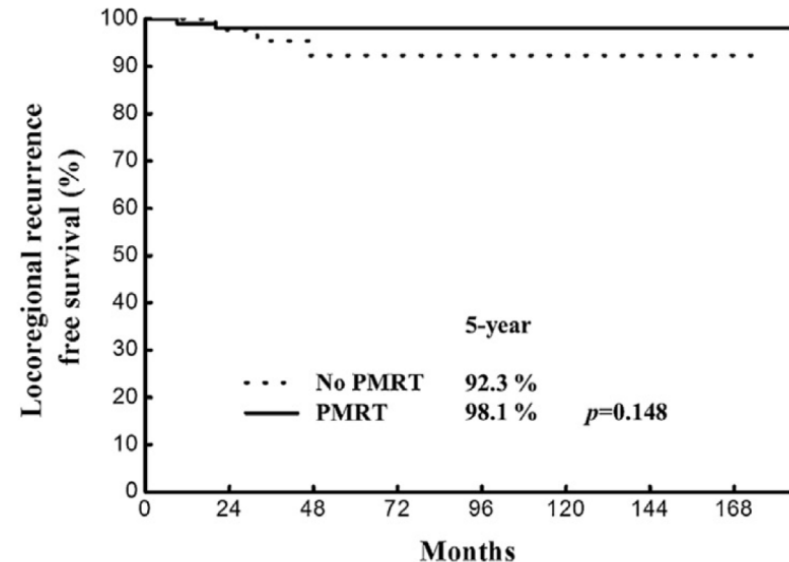
**Table 2** Patterns of failure

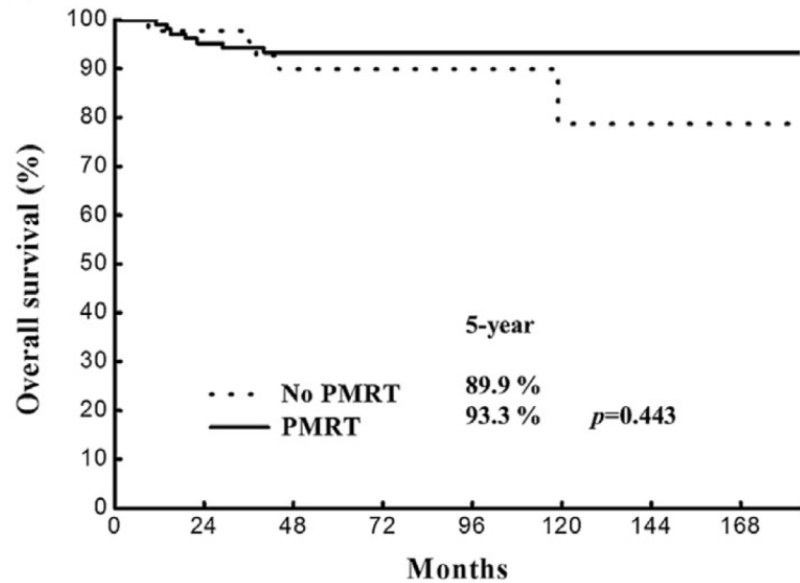
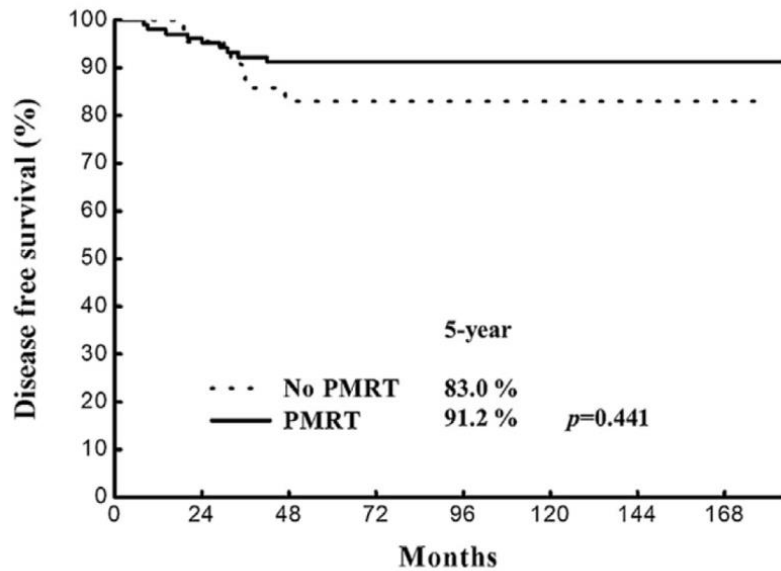
Recurrences	No PMRT (n=46)	PMRT (n=105)
Locoregional	3* (6.5%) <sup>(%)</sup>	2 <sup>†</sup> (1.9%) <sup>(%)</sup>
Chest wall	1	1
Supraclavicular LN	2	1
Axillary LN	1	1
Internal mammary LN		1
Distant metastasis	4 (8.6%)	10 (9.5%)

Abbreviations: LN = lymph node; PMRT = postmastectomy radiation therapy.

\* One patient had axillary and supraclavicular LN recurrence in locoregional recurrence.

<sup>†</sup> One patient had chest wall, axillary LN, supraclavicular, internal mammary LN recurrences, and distant metastasis.





**Table 5** Multivariate analysis of LRRFS, DFS, and OS (Cox model)

Variables	LRRFS			DFS			OS		
	HR	95% CI	P value	HR	95% CI	P value	HR	95% CI	P value
Age group $\leq 40$ vs $>40$	0.149	0.230-0.959	.045	0.353	0.135-0.928	.035	0.935	0.246-3.550	.992
Clinical T Stage 1-2 vs 3-4	1.754	0.269-11.418	.557	1.059	0.371-3.019	.915	0.527	0.157-1.768	.299
Clinical N Stage N0 vs N1-N2				1.148	0.291-4.526	.844			
ypT stage 0-is vs 1 vs 2-4	2.294	0.594-8.858	.228	2.223	1.074-4.604	.031	1.775	0.770-4.092	.178
RT No PMRT vs PMRT	0.198	0.290-1.340	.097	0.647	0.236-1.772	.397	0.789	0.231-2.697	.705

Abbreviations: CI = confidence interval; DFS = disease-free survival; HR = hazard ratio; LRRFS = locoregional recurrence-free survival; OS = overall survival; PMRT = postmastectomy radiation therapy; RT = radiation therapy.

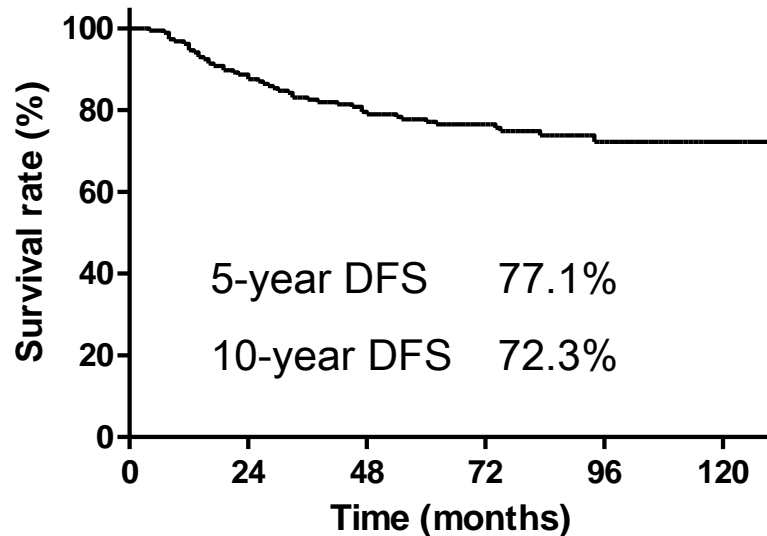
➤ In patients with ypN0 status after NAC

-> PMRT might not be necessary regardless of clinical stage

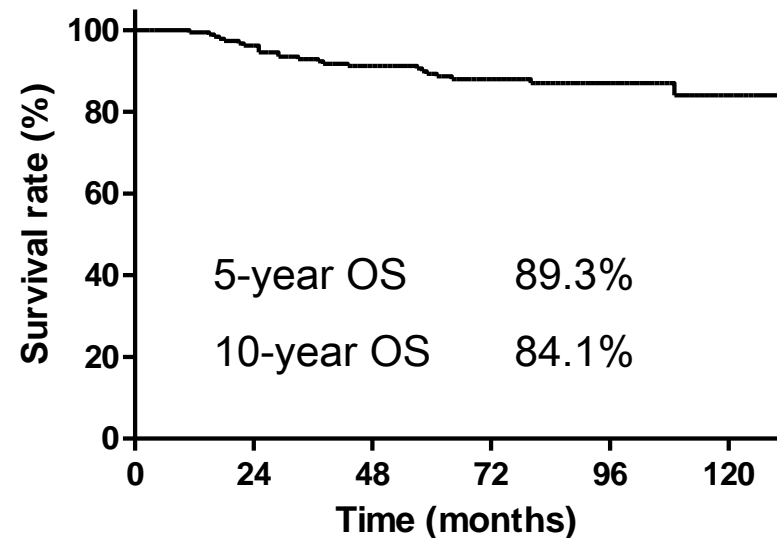
# Recent multicenter, retrospective study in Korea (KROG 16-16)

- 2005-2011
- positive axillary LN via FNA or imaging studies at diagnosis
- ypN0 after NeoAC and mastectomy, 189pts

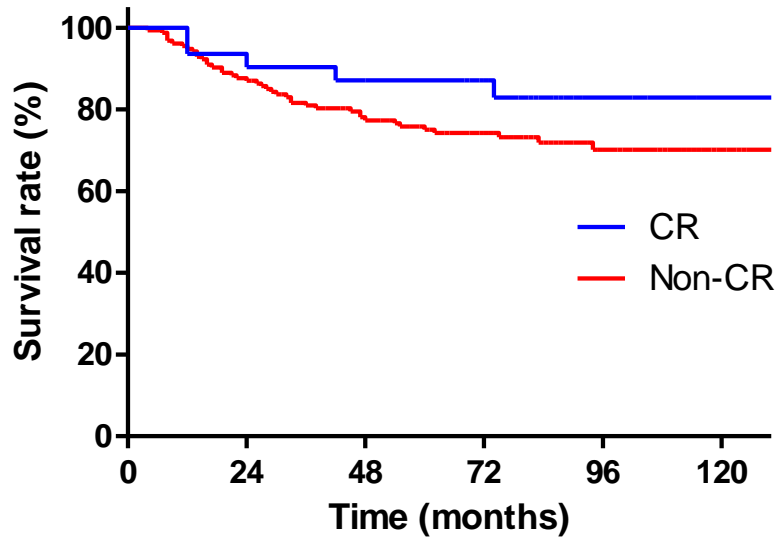
Disease free survival



Overall survival

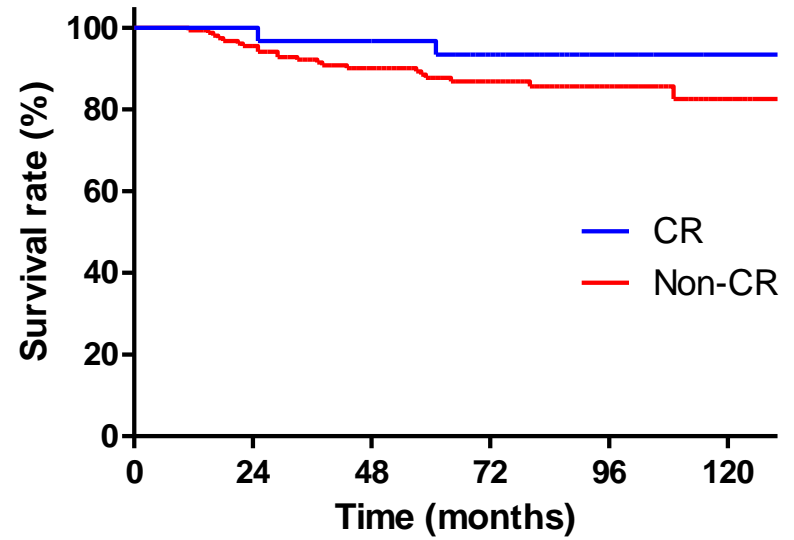


### Disease free survival



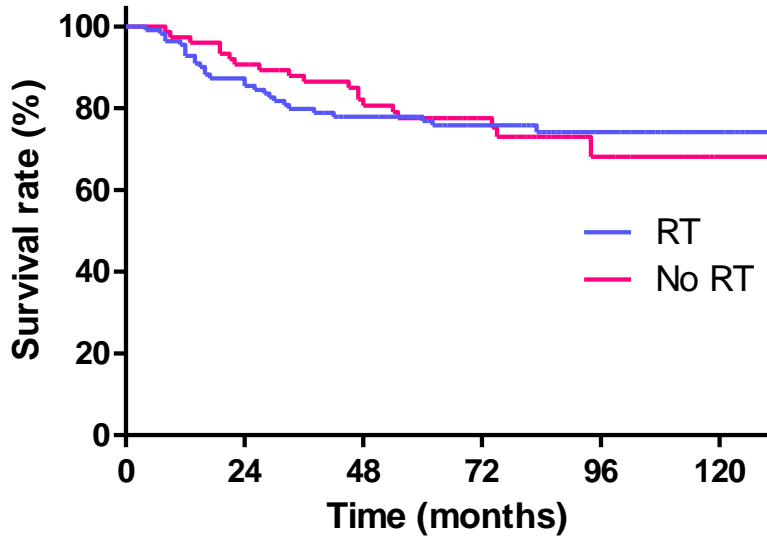
	N	5-yr	10-yr	<i>P</i>
CR	31	87.1%	82.9%	<i>0.194</i>
Non-CR	158	75.0%	70.2%	

### Overall survival



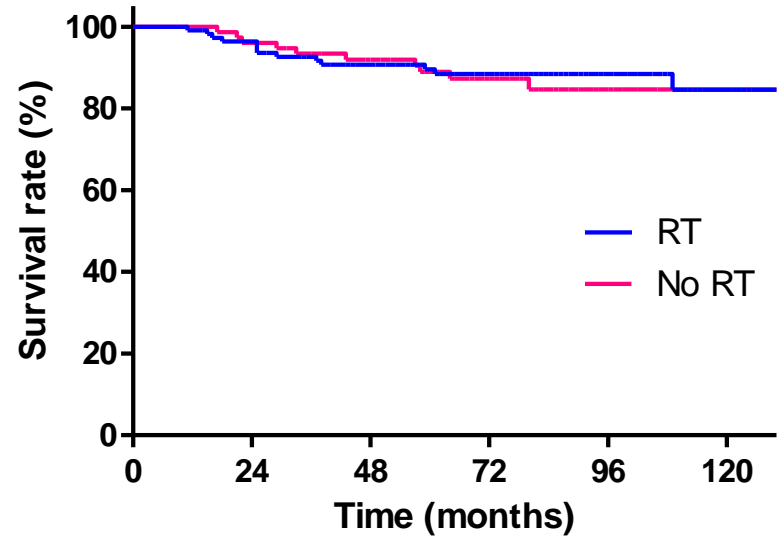
	N	5-yr	10-yr	<i>P</i>
CR	31	96.8%	93.4%	<i>0.249</i>
Non-CR	158	87.7%	82.6%	

### Disease free survival



	N	5-yr	10-yr	<i>P</i>
RT	111	78.0%	74.1%	0.972
No RT	78	77.5%	68.1%	

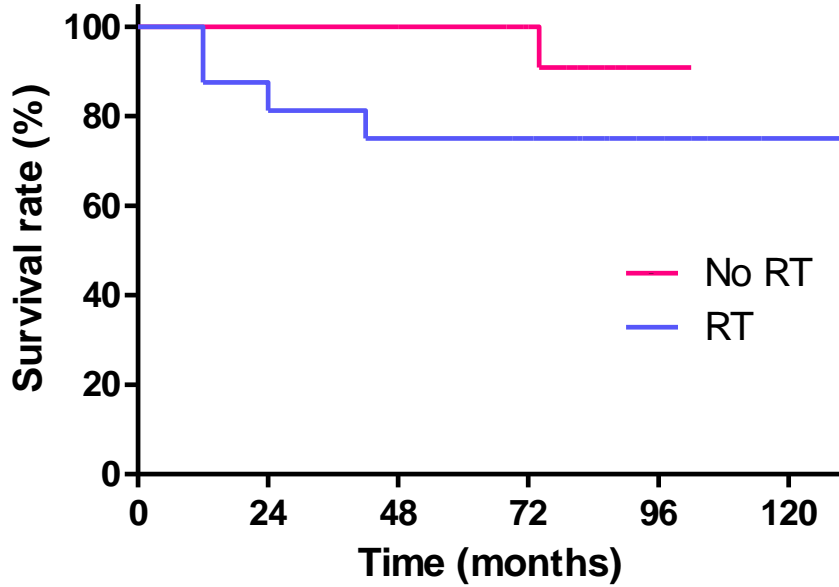
### Overall survival



	N	5-yr	10-yr	<i>P</i>
RT	111	89.6%	84.6%	0.773
No RT	78	88.9%	84.6%	

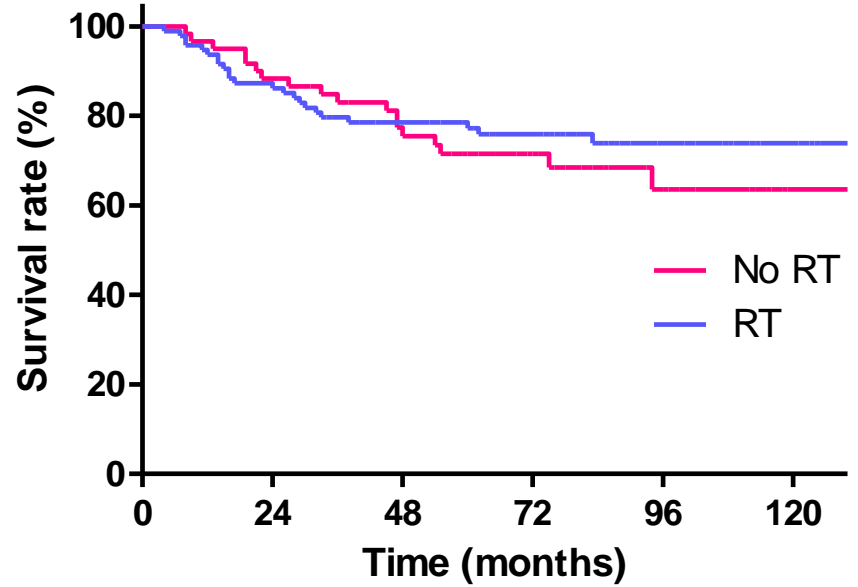


< CR group >



	N	5-yr	<i>P</i>
RT	16	75.0%	0.164
No RT	15	100%	

< Non-CR group >

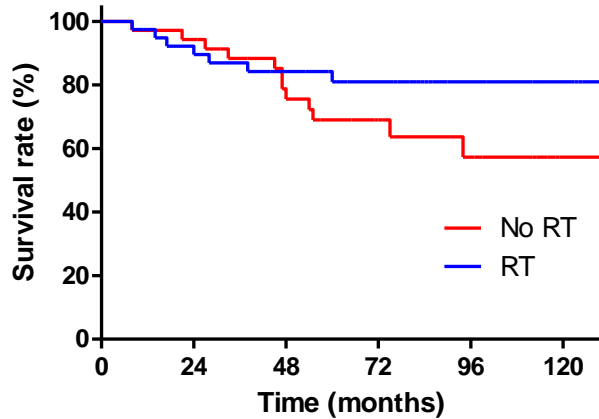


	N	5-yr	<i>P</i>
RT	95	77.2%	0.507
No RT	63	71.6%	

# In non-CR group (N=158)

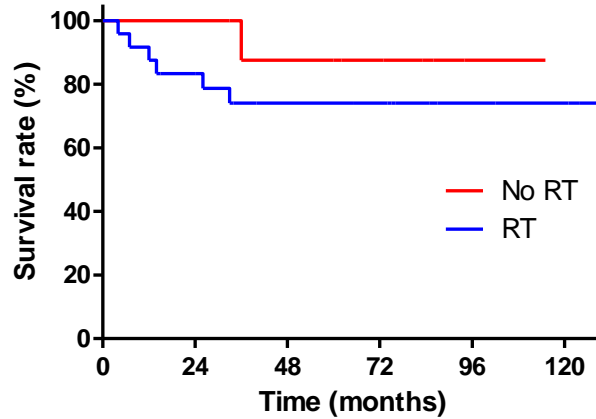
< Luminal type >

Disease free survival



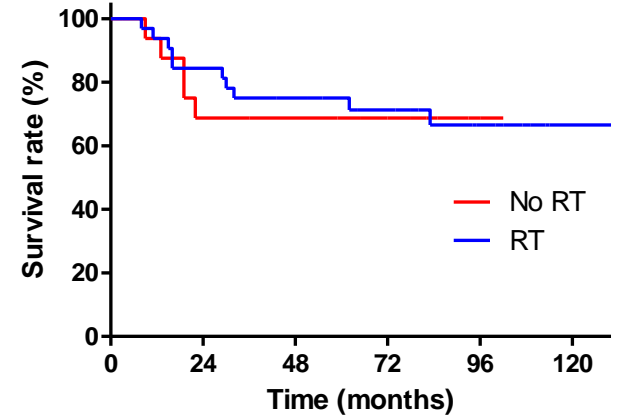
< HER2 type >

Disease free survival



< TN type >

Disease free survival



	N	5-yr	<i>P</i>
RT	39	80.9%	0.156
No RT	36	69.0%	

	N	5-yr	<i>P</i>
RT	24	74.1%	0.337
No RT	9	87.5%	

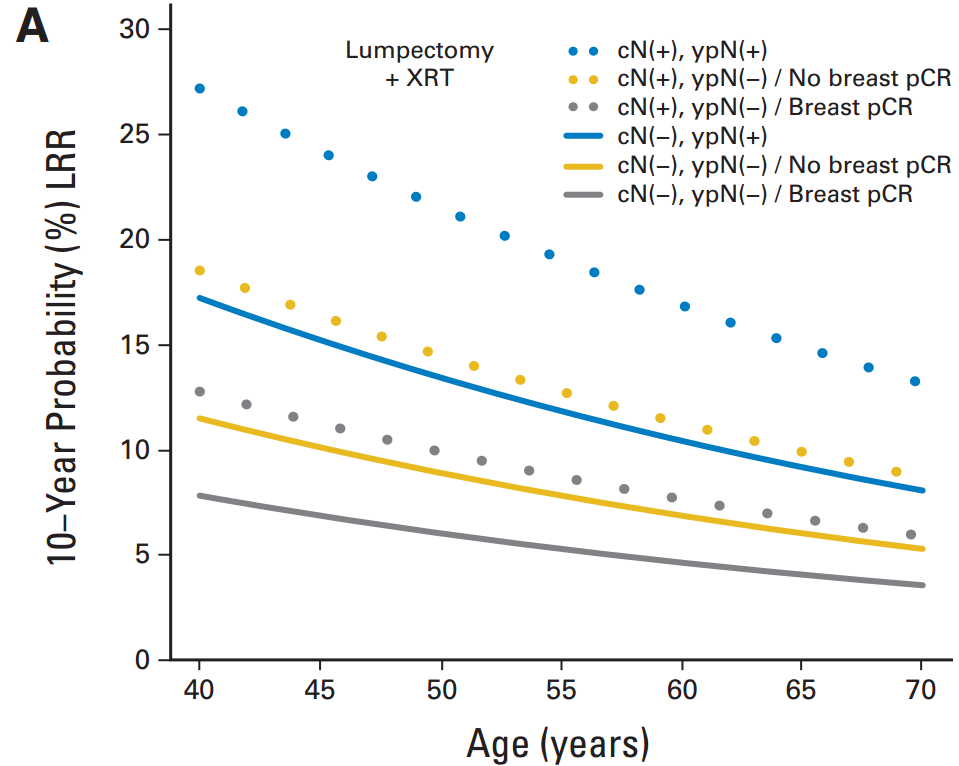
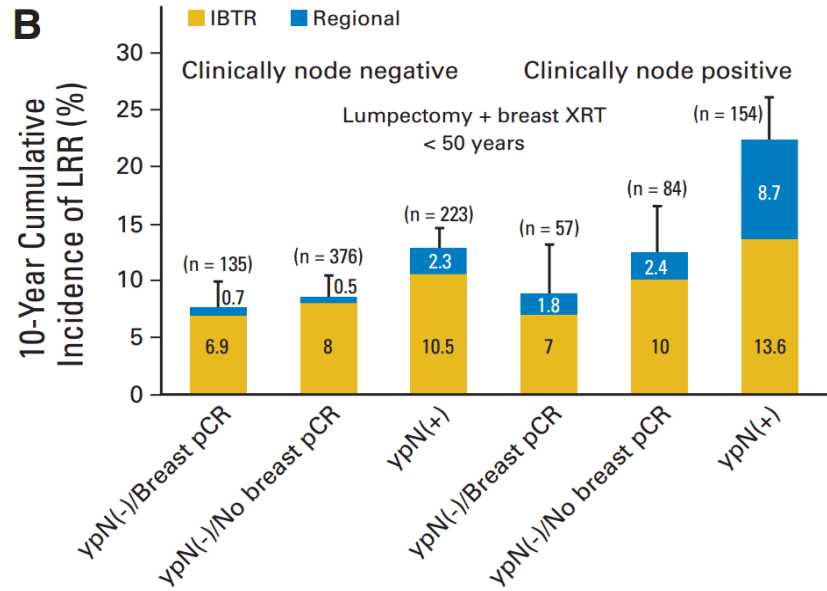
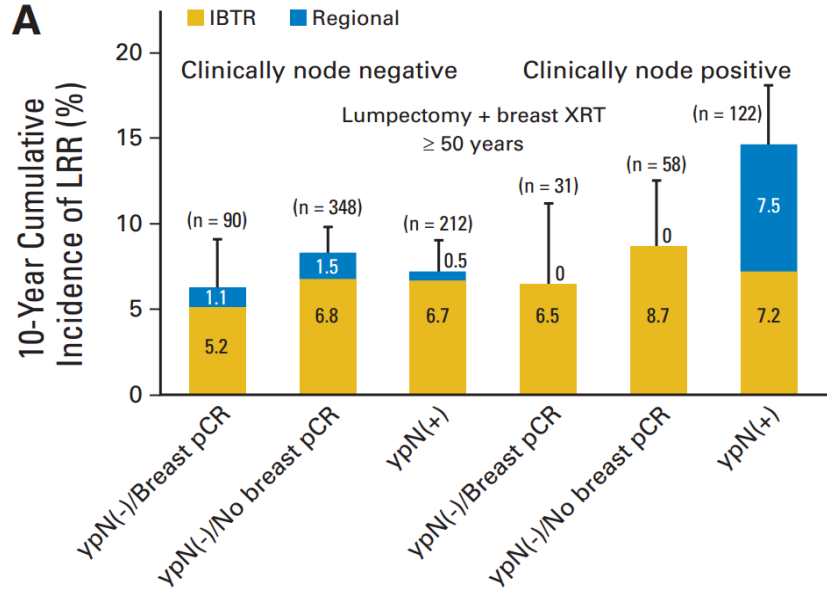
	N	5-yr	<i>P</i>
RT	32	75.0%	0.832
No RT	18	68.8%	

# RT issues in patients treated with NAC

- ypN(+) patients: no disagreement of adjuvant RT
- ypCR/N0 mastectomy patients: adjuvant RT benefits ???
- **ypCR/N0 BCS patients: What is the optimal RT field???**

# Neoadjuvant Trials: NSABP B-18 B-27

Breast RT only for lumpectomy patients  
10yr LRR 10.3% (local 8.1%; regional 2.2%)



- Predictor of LRR: age, clinical nodal status, pathological nodal status, breast tumor response

# IS REGIONAL LYMPH NODE IRRADIATION NECESSARY IN STAGE II TO III BREAST CANCER PATIENTS WITH NEGATIVE PATHOLOGIC NODE STATUS AFTER NEOADJUVANT CHEMOTHERAPY?

Departments of \*Radiation Oncology, †Biostatistics, ‡Medical Oncology, and §Surgery, Centre René Huguenin, Saint-Cloud, France

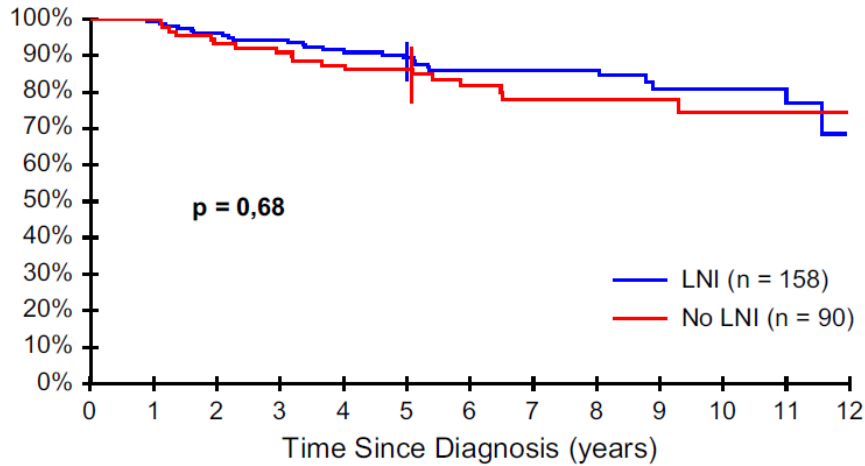
•France, NeoAC 1054 patient, 1990-2004

•ypN0 after NeoAC and BCS, 248pts

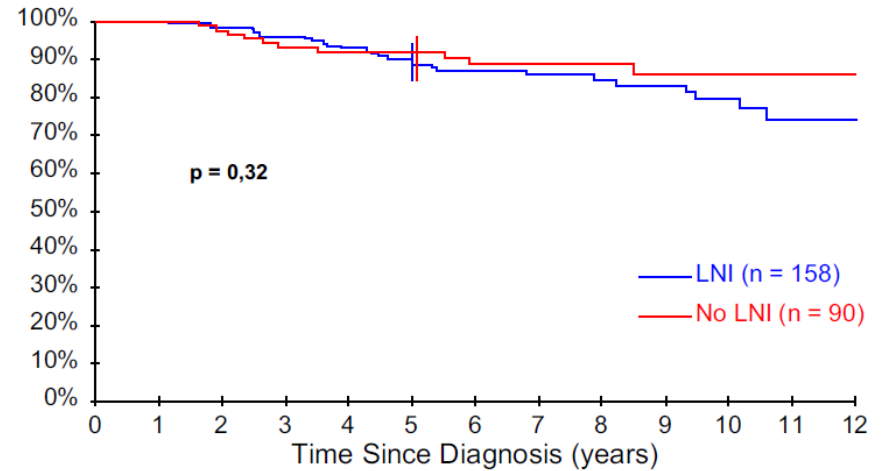
Table 1. Patient characteristics and treatment

	LNI group N = 158		No LNI Group N = 90		<i>p</i>	Total N = 248	
	No. of patients	%	No. of patients	%		No. of patients	%
<b>Median age (range)</b>	47 (20–71)		51 (28–72)		0.005	49 (20–72)	
<b>Age groups, years</b>							
< 50	94	59.5	37	41.1	0.04	131	52.8
50-59	39	24.7	35	38.9		74	29.8
60-69	23	14.6	17	18.9		40	16.2
70+	2	1.2	1	1.1		3	1.2
<b>Clinical N</b>							
N0	89	56.3	75	83.3	0.0001	164	66.1
N1	65	41.1	15	15.7		80	32.3
N2	4	2.6	0	0		4	1.6
<b>Tumor localization</b>							
Internal and/or central	102	64.6	15	16.7	<.00001	117	47.2
external	56	35.4	75	83.3		131	52.8

5-yr LRR-FS, 89.4% (LNI) vs. 86.2% (no LNI), P = 0.68



5-yr OS, 88.7% (LNI) vs. 92% (no LNI), P = 0.32



**5yr DFS**

**P-value**

**5yr OS**

**P-value**

	LNI	No-LNI		LNI	No-LNI	
cNo	83%	85%	NS	89%	95%	NS
cN1-2	72%	88%	NS	79%	80%	NS
Non-pCR	77%	88%	NS	84%	91%	NS

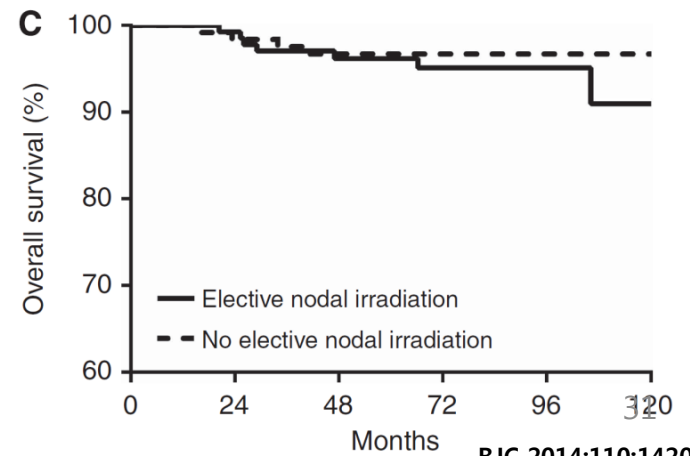
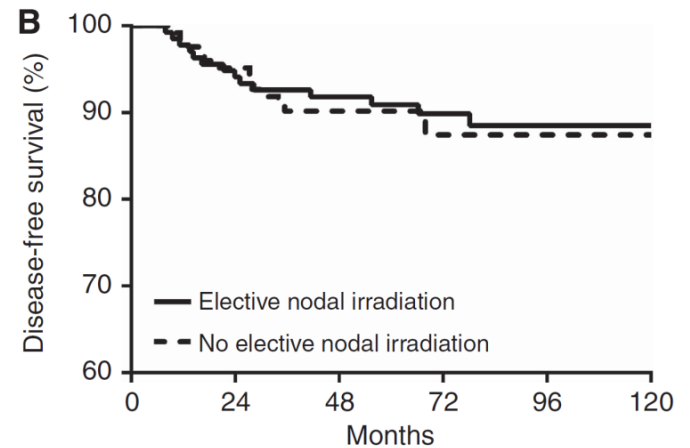
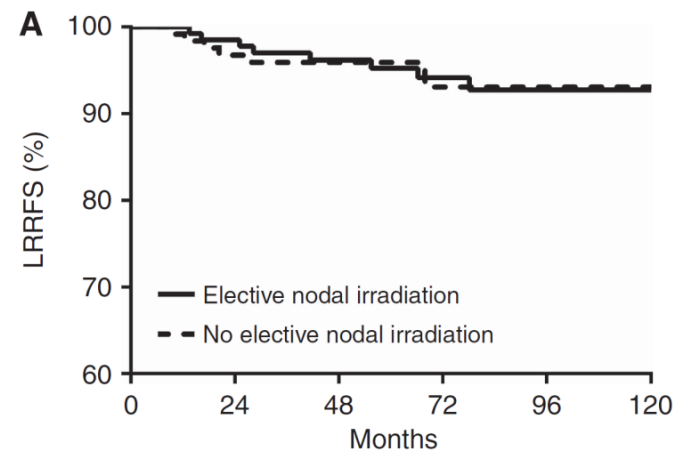
➤ **No increase in the risk of DM, LRR or death when LNI was omitted cN0-N2 patients with ypN0 after NAC**

# Is elective nodal irradiation beneficial in patients with pathologically negative lymph nodes after neoadjuvant chemotherapy and breast-conserving surgery for clinical stage II–III breast cancer? A multicentre retrospective study (KROG 12-05)

- **Korea**, 1998-2009
- clinically tumor size  $\geq 5\text{cm}$  or axillary LN(+)
- **ypN0 after NeoAC and BCS**, 260pts

Table 2. Patterns of disease recurrence according to elective nodal irradiation and pathologic T classification

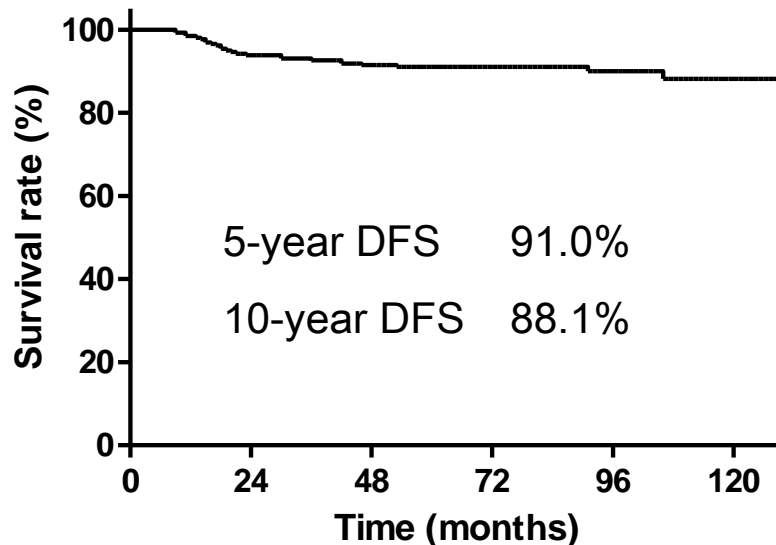
Variables	n	Locoregional	Distant	Overall
<b>ENI</b>				
No	124	6 (4.8%)	10 (8.1%)	13 (10.5%)
Yes	136	7 (5.1%)	8 (5.9%)	13 (9.6%)
<b>Pathologic T classification</b>				
ypT0-is	102	2 (2.0%)	1 (1.0%)	3 (2.9%)
ypT1	116	9 (7.8%)	12 (10.3%)	17 (14.7%)
ypT2-4	42	2 (4.8%)	5 (11.9%)	6 (14.3%)
Total recurrences	260	13 (5.0%)	18 (6.9%)	26 (10.0%)



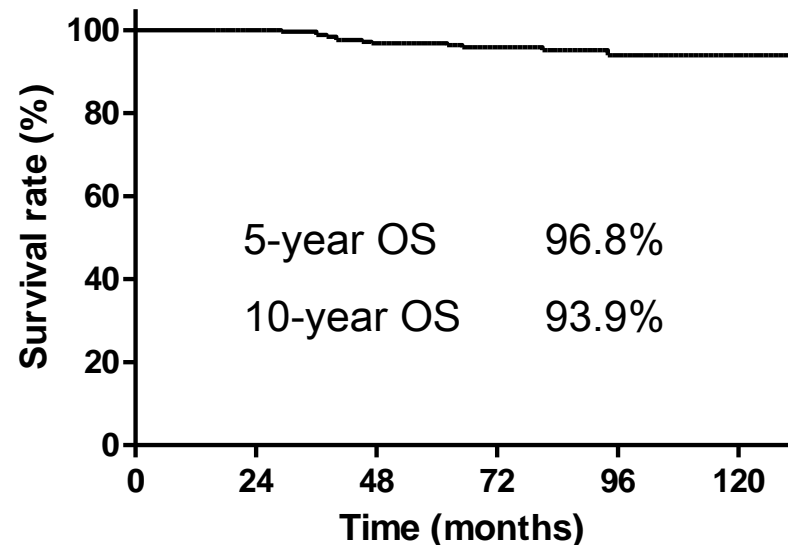
# Recent multicenter, retrospective study in Korea (KROG 16-16)

- 2005-2011
- positive axillary LN via FNA or imaging studies at diagnosis
- ypN0 after NeoAC and BCS, 261pts

Disease free survival

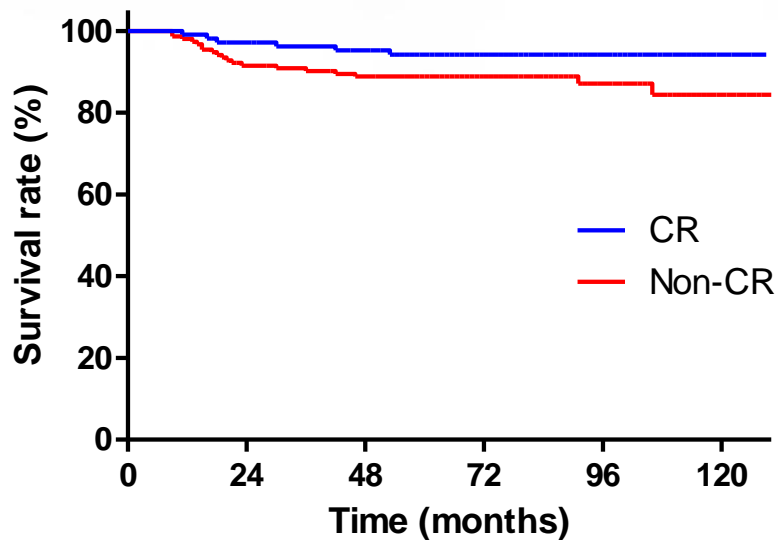


Overall survival



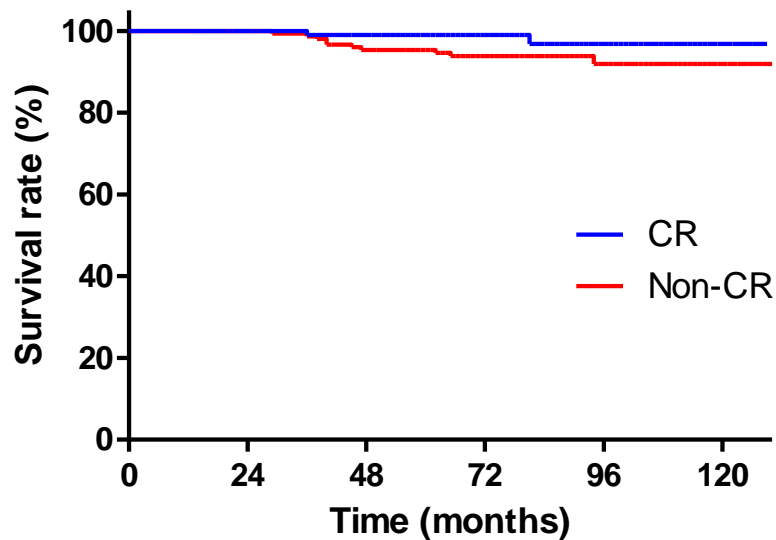


### Disease free survival



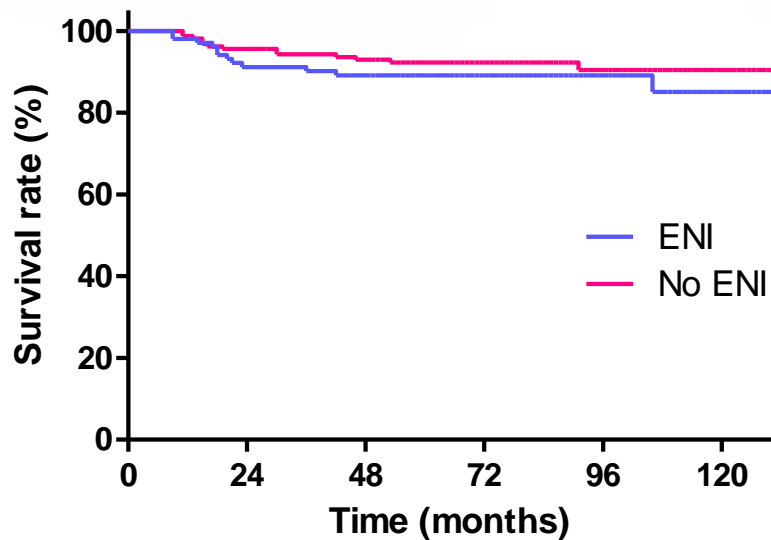
	N	5-yr	10-yr	<i>P</i>
CR	108	94.2%	94.2%	<i>0.077</i>
Non-CR	153	88.8%	84.4%	

### Overall survival



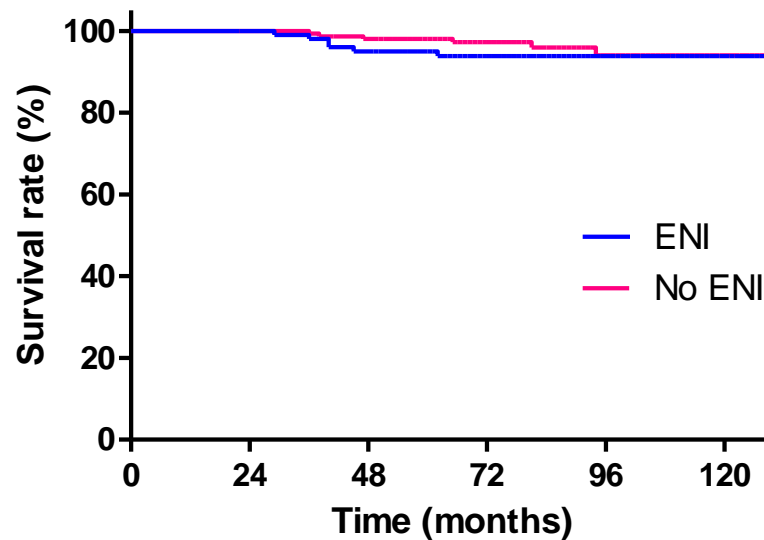
	N	5-yr	10-yr	<i>P</i>
CR	108	99.0%	96.9%	<i>0.103</i>
Non-CR	153	95.3%	91.9%	

### Disease free survival



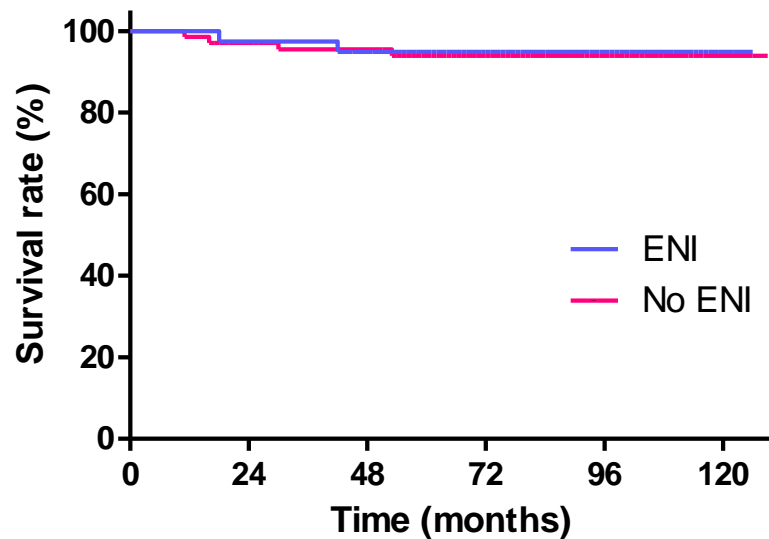
	N	5-yr	10-yr	<i>P</i>
ENI	102	89.2%	85.1%	0.365
No ENI	159	92.3%	90.5%	

### Overall survival



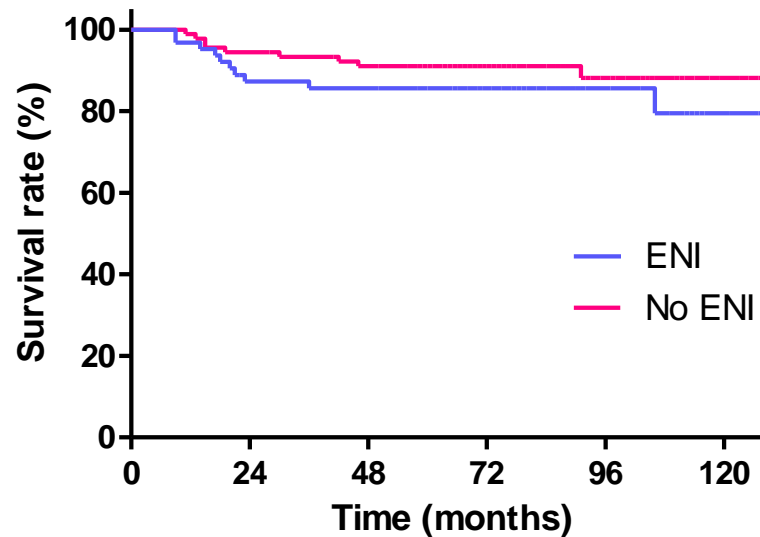
	N	5-yr	10-yr	<i>P</i>
ENI	102	95.0%	93.9%	0.448
No ENI	159	98.0%	93.9%	

### < CR group >



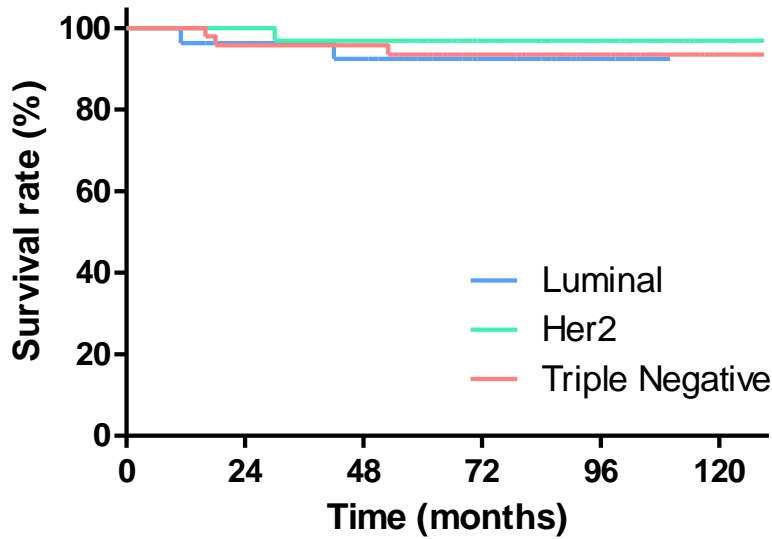
	N	5-yr	<i>P</i>
ENI	39	94.9%	0.837
No ENI	69	93.9%	

### < Non-CR group >



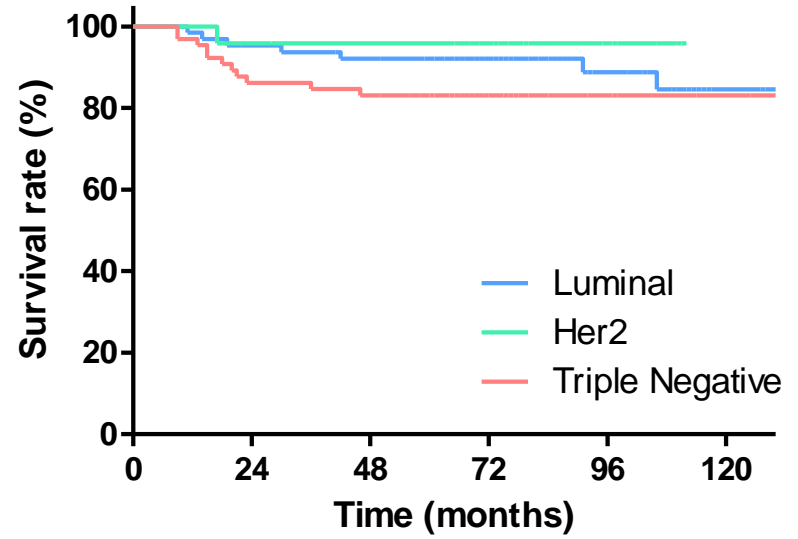
	N	5-yr	<i>P</i>
ENI	63	85.6%	0.265
No ENI	90	91.0%	

### < CR group >



	N	5-yr	<i>P</i>
Luminal	27	92.4%	0.716
Her2	33	96.9%	
TN	48	93.5%	

### < Non-CR group >



	N	5-yr	<i>P</i>
Luminal	64	92.1%	0.209
Her2	24	95.8%	
TN	65	83.1%	

# In non-CR group (N=153)

< Luminal type >

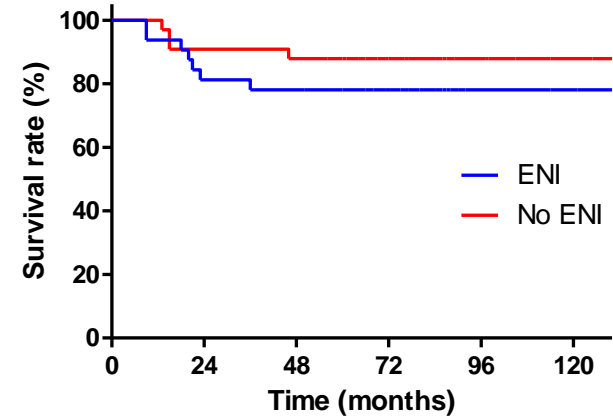
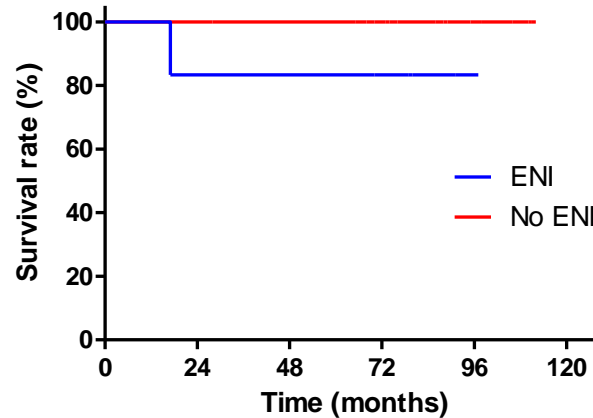
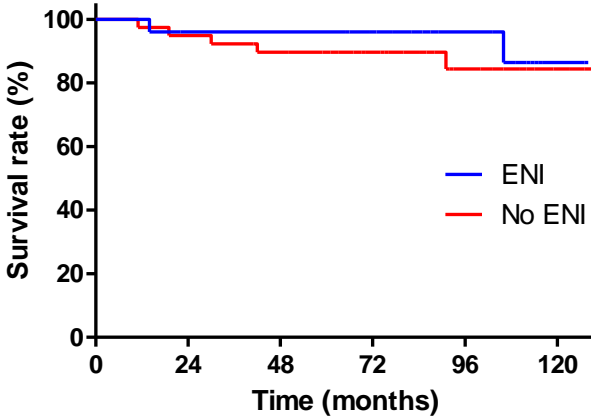
< HER2 type >

< TN type >

Disease free survival

Disease free survival

Disease free survival



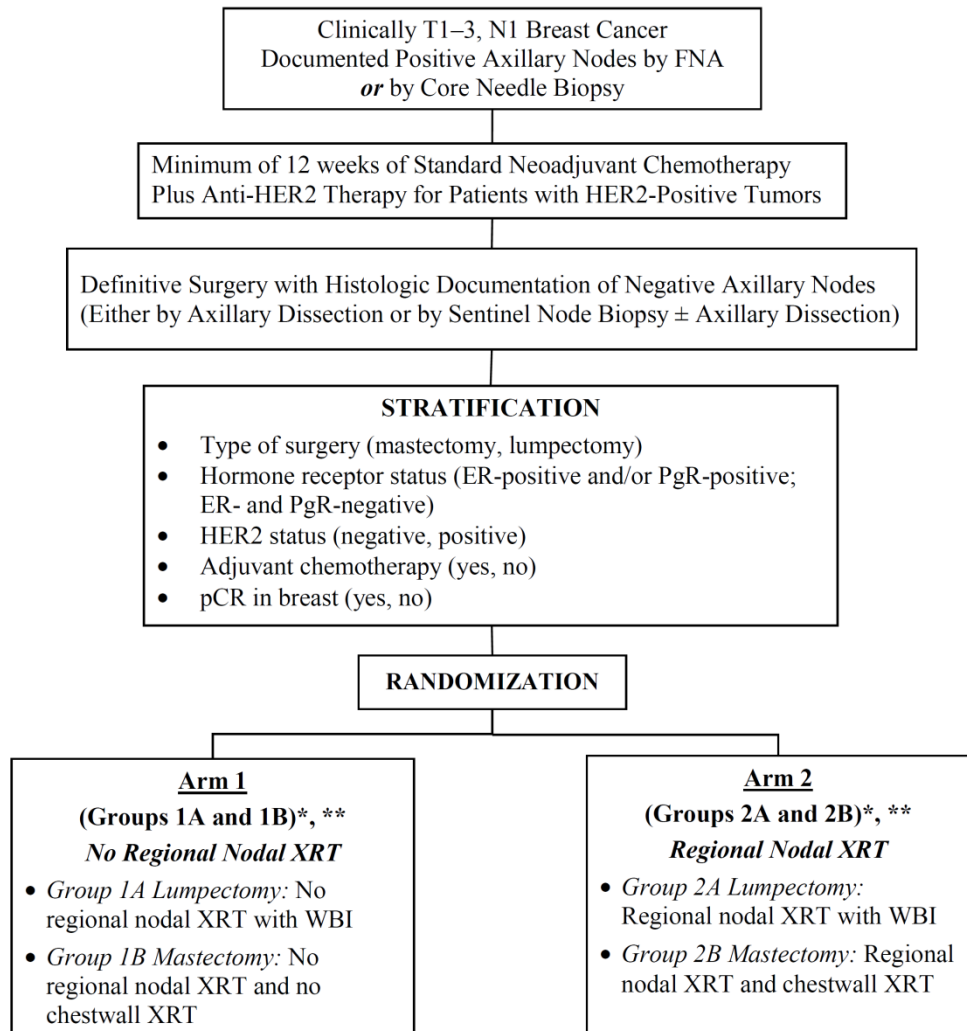
	N	5-yr	<i>P</i>
ENI	25	96.0%	0.535
No ENI	39	89.7%	

	N	5-yr	<i>P</i>
ENI	6	83.3%	0.083
No ENI	18	100%	

	N	5-yr	<i>P</i>
ENI	32	78.1%	0.302
No ENI	33	87.9%	

# NSABP B-51/RTOG 1304

1636 patients



\* Patients will be randomized to one of the following:

- **Arm 1**
  - **Radiation therapy for Group 1A**  
Whole breast irradiation + boost
  - **No radiation therapy for Group 1B**
- **Arm 2**
  - **Radiation therapy for Group 2A**  
Whole breast irradiation + boost and regional nodal irradiation
  - **Radiation therapy for Group 2B**  
Chest wall and regional nodal irradiation

# Summary

- In **ypCR patients**, the survivals are better than non-ypCR patients and depend on ypT stage.
- In **retrospective analysis**, the addition of PMRT in ypN0 mastectomy patients or ENI in ypN0 BCS patients might have **no benefits regardless of primary tumor response (ypCR or non-ypCR)**. However, the role of RT should be determined according to molecular subtypes.
- A **ongoing prospective randomized study (NSABP B-51/RTOG 1304)** would confirm the feasibility of whether PMRT or ENI in BCS patients can be safely omitted in good response patients after NAC for breast cancer.

**Thank you for your attention!**