DCIS

Clinical Case Conference

Overview

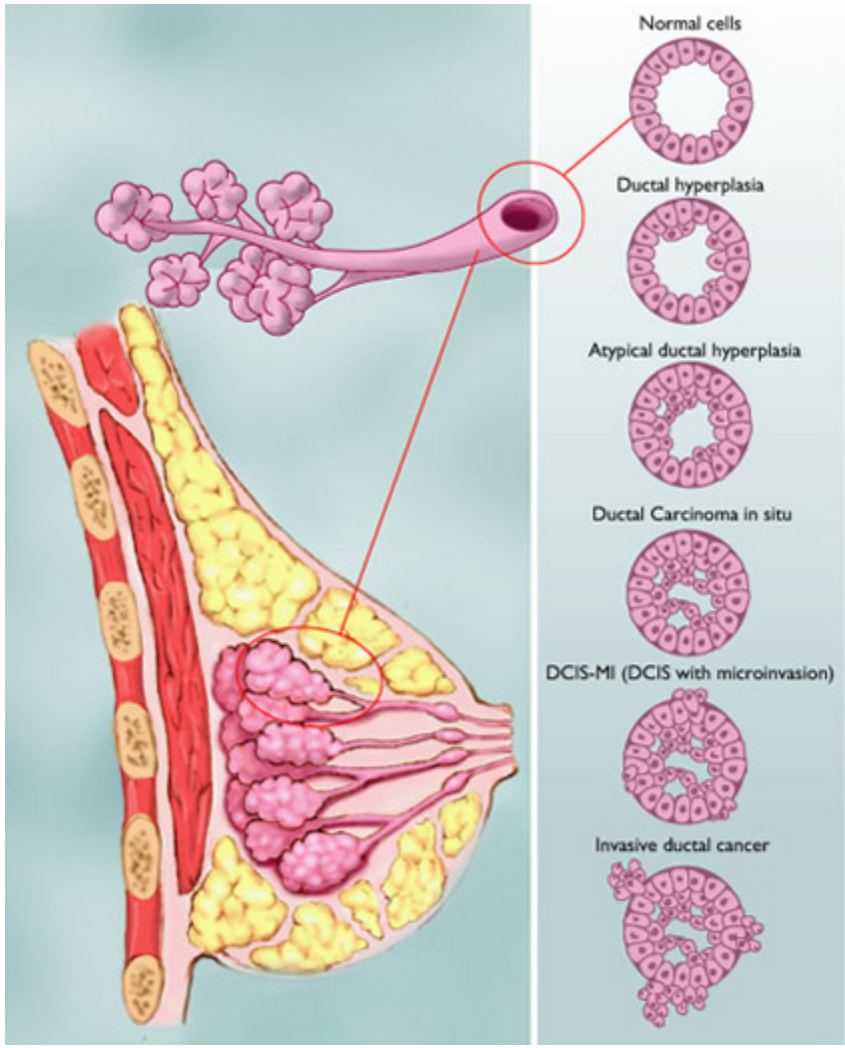
- Patient case
- Introduction (pathophysiology, epidemiology, histology)
- Treatment/evidence
  - Mastectomy
  - Lumpectomy
  - Radiation
  - Tamoxifen
- Prognostication tools
- ML treatment plan

Case

- 57 yo female diagnosed with DCIS on screening mammogram
- 8/25/13 screening mammogram showed new **clustered polymorphic calcifications** in the left posterior central region of the left breast
- 8/30/13 left diagnostic mammogram showed **cluster of calcifications in upper outer quadrant (UOQ)**
- 9/6/13 stereotactic core biopsy performed. Pathology showed DCIS, nuclear grade 3, solid with comedonecrosis and microcalcifications, involving multiple cores. No invasive cancer was identified.
- 9/16/13 **MRI showed 1.8cm linear area** of non-mass-like enhancement in UOQ, appeared to correspond with biopsy-proven lesion.
- 9/26/13 left wire localized lumpectomy by Dr. Jeannie Shen (UCLA Pasadena Oncology). Pathology showed DCIS with solid and cribriform pattern and **grade 2** nuclei, measuring **1.2cm** with no invasive component. Closest margin deep at 0.3mm.
- Re-excision of left breast inferior, medial, deep cup showed no residual DCIS. **Final inked margins inferior 16.2 mm, medial 25mm, and deep 11.3mm**. **ER was weakly positive** (5% of neoplastic cells are 2-3+) and PR was negative (very rare neoplastic nucleus is 1+).

Pathophysiology

- Ductal Carcinoma in situ (DCIS) – neoplastic process confined entirely to the duct system of the breast
- Does not disrupt the basement membrane **or** involve the breast stroma
- Thought to be direct precursor of invasive breast CA
- Risk factors same as invasive disease – family hx, nulliparity, hx of breast bx, alcohol
- Associated with increased risk of invasive cancer in ipsilateral or **contralateral breast**



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Epidemiology

Large increase in DCIS diagnosis since mid-1970s with introduction of screening mammography

- Palpable breast cancer usually has focus of invasion, rarely pure DCIS
- Incidence rose from 4,800 cases in 1983 to 50,000 annually → 10-fold increase in only 20 years
- Of 215,990 cases of breast cancer diagnosed in 2004, 59,390 were **noninvasive, of which 85% were DCIS** (Jemal et al; *Cancer J Clin* 2004)
- 90% of DCIS seen on mammography today is nonpalpable
- Incidence of DCIS per 1,000 mammograms:
  - 0.56 in 40-49yo
  - 1.07 in 70-84yo

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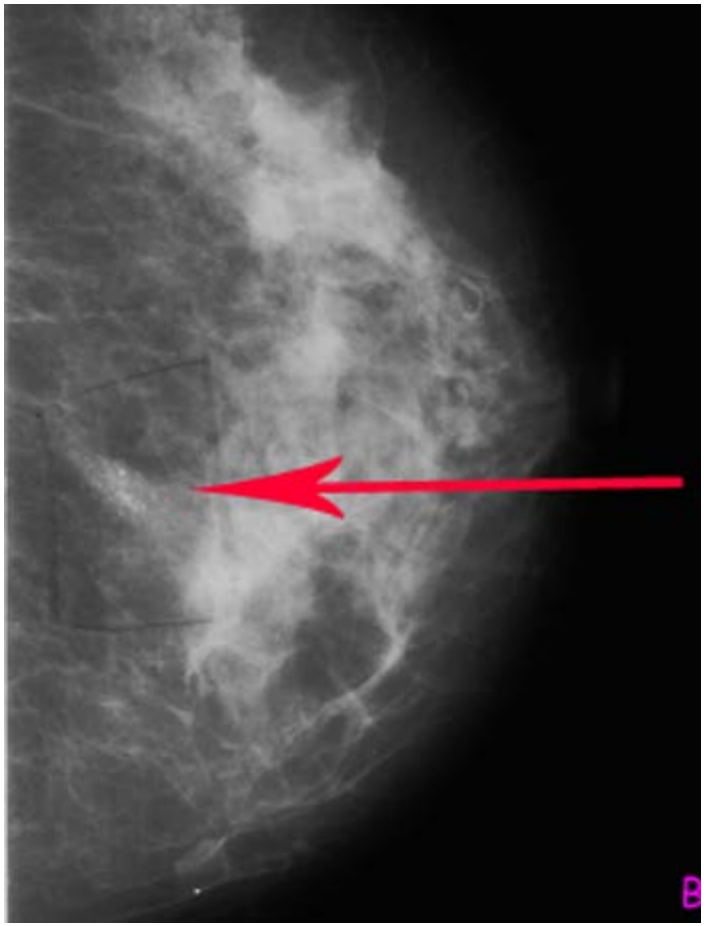
Diagnostic Imaging

- Mammography
  - 90% microcalcifications
    - Linear and branching more likely high-grade DCIS, necrosis
    - Fine and granular more likely low-grade DCIS
  - 10% asymmetric density
  - Size on mammography typically underestimated by 1-2 cm compared to pathology
- MRI
  - Started being used in 2000
  - Better estimate of size
  - Berg WA et al *JAMA* 2012 showed higher sensitivity, but lower specificity



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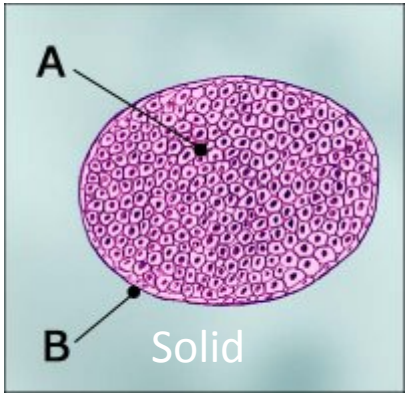
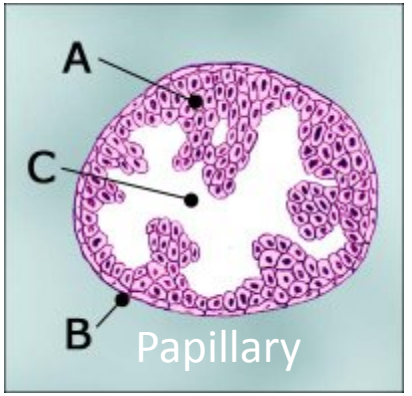
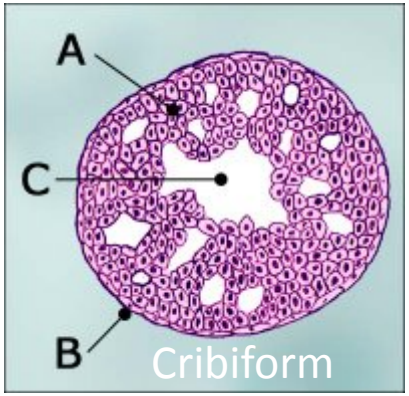
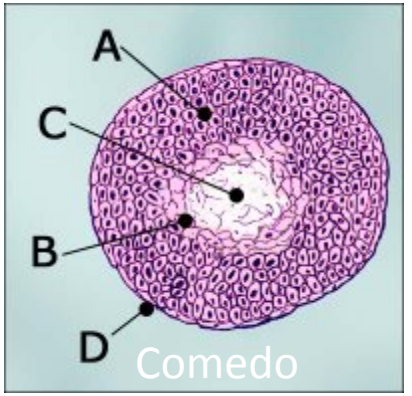
Histologic Classification

- Architecture: Solid, *micropapillary*, papillary, cribriform, comedo
- Low grade, non-comedo can be difficult to distinguish from ADH
- Other important features: nuclear grade, necrosis, margins, lesion size, microcalcifications









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Growth Pattern

- Less than 2% of cases have multicentric patterns
- Of the discontinuous cases:
  - 63% of foci separated by <5 mm
  - 83% separated by <10 mm
  - 8% > 10 mm
- 90% of poorly differentiated tumors are continuous (no gaps)
- Based on this data, surgical margins of 1 cm should completely excise 90% of tumors

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Natural History

- Autopsy series review of women not known to have breast cancer during life → median prevalence of DCIS 8.9% (range 0-15%)
- Only a few studies have looked at the progression of DCIS to invasive carcinoma after biopsy alone
- Studies show that most subsequent malignancies occur within 10 years
- Women with DCIS in one breast are at risk for developing a second tumor in contralateral breast at a rate of 0.5% to 1% per year

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Treatment Overview

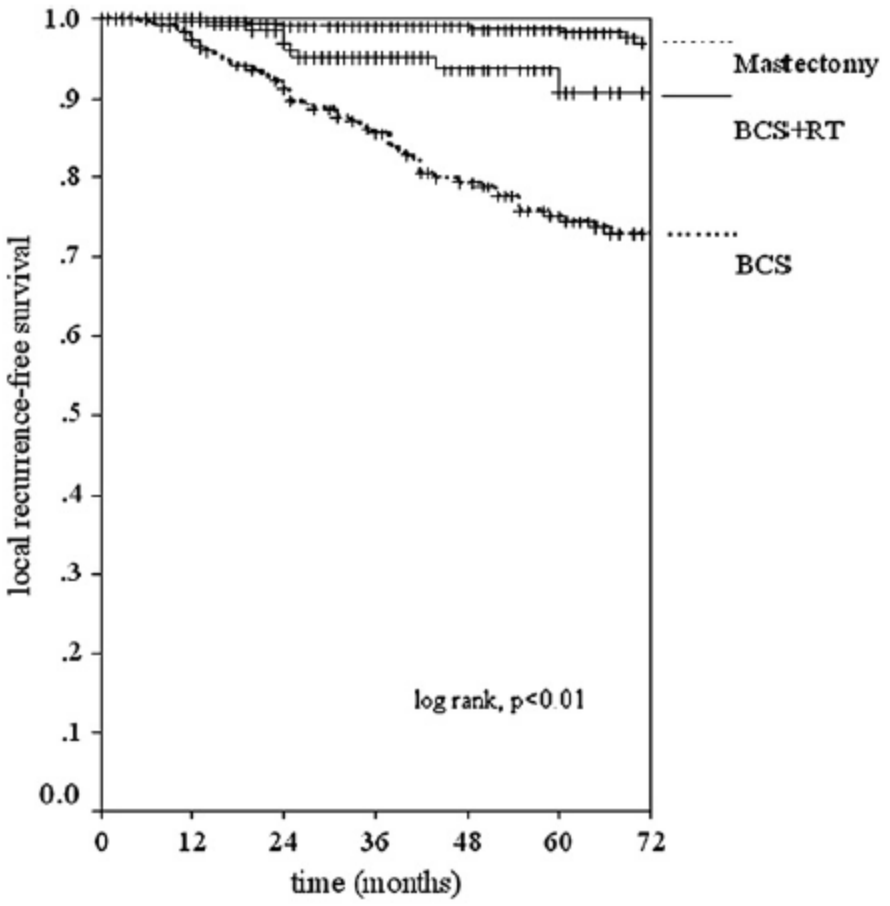
- Surgical resection is primary therapy
  - Mastectomy or breast conservation surgery (BCS)?
- Radiation therapy can be given adjuvantly
  - PORT after mastectomy?
  - Adjuvant RT after BCS?
- Adjuvant systemic therapy?
  - Hormone therapy?
  - Chemo?

Mastectomy

- Mastectomy was historically first-line choice
  - Recall that this began prior to mammography—DCIS often was presenting as a mass, and many cases turned out to be early invasive breast cancer
  - Curative for >98% of patients with DCIS
- Breast conservation surgery (i.e., BCS, “lumpectomy”)
  - Introduced in 1980s for early stage breast cancer and adopted for DCIS as well
  - BCT = BCS + adjuvant RT
- No randomized trials to compare mastectomy vs BCT

Mastectomy vs Lumpectomy

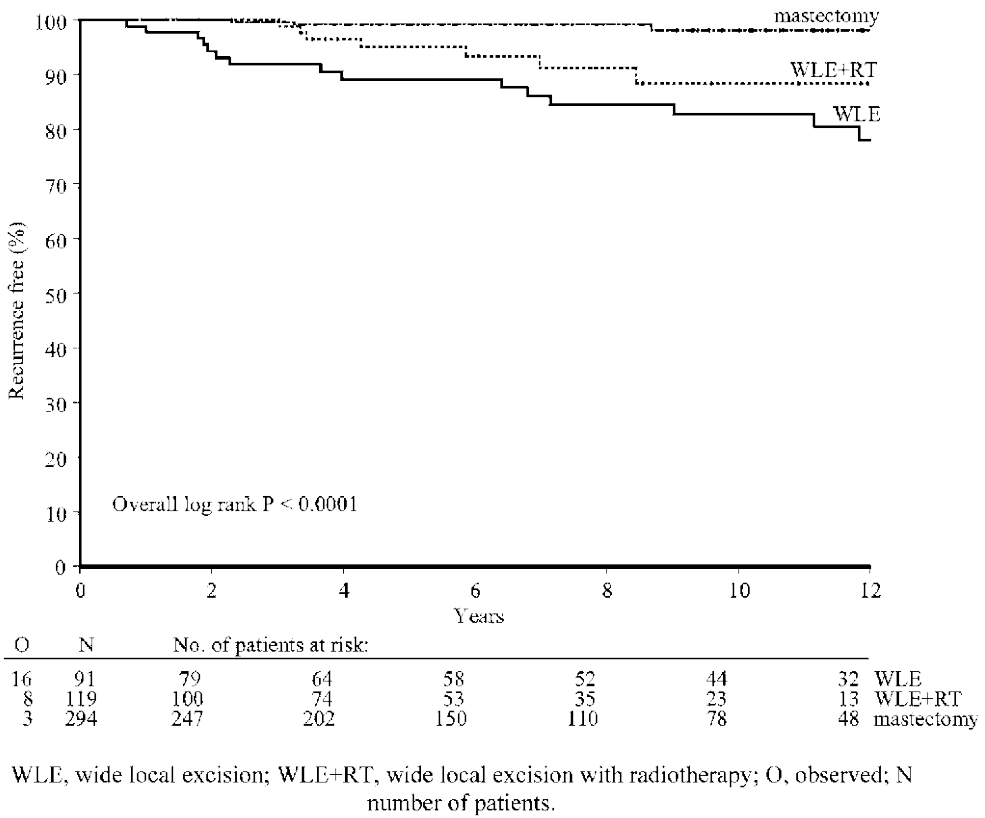
- Schouten van der Velden et al. *IJROBP* 2007
- Retrospective study
- Aim: to assess the risk of local recurrences after different treatment strategies for DCIS and to determine whether RT decreased the risk of local recurrences
- 798 patients with DCIS
  - Treated 1989-2003
- RESULTS: 5-year **recurrence-free survival**
  - 75% lumpectomy alone
  - 91% for BCS+RT
  - 99% for mastectomy



	Time (months)	6	12	18	24	30	36	42	48	60	72
Mastectomy	Cumulative events	0	1	1	3	3	3	3	3	4	7
	Number at risk	387	374	350	316	300	280	264	238	194	154
BCS+RT	Cumulative events	0	0	1	3	6	6	6	7	8	9
	Number at risk	147	145	136	116	94	81	64	51	31	17
BCS	Cumulative events	2	5	13	18	24	30	37	41	48	51
	Number at risk	224	215	200	187	173	161	148	136	113	83

Mastectomy vs Lumpectomy

- Meijnen et al. Annals of Surgical Oncology 2008
- Retrospective study for DCIS pts treated at Netherlands Cancer Institute 1986-2005
- 504 pts
  - 94 WLE
  - 119 WLE+RT
  - 294 mastectomy
- Median f/u 6.7 years
- 8yr LRR
  - 15.6% WLE
  - 8.8% WLE+RT (p=0.16)
  - 0.9% mastectomy



WLE, wide local excision; WLE+RT, wide local excision with radiotherapy; O, observed; N number of patients.

FIG. 1. Time to local recurrence by treatment. WLE wide local excision, WLE+ RT wide local excision with radiotherapy, O observed, N number of patients.

Mastectomy vs Lumpectomy

- BCT has higher local recurrence rates
- But survival is not improved with mastectomy
  - Multiple retrospective reports:
    - Fisher et al. Semin Oncol. 2001 (NSABP experience)
    - Solin et al. Cancer 2005
    - Vargas et al. IJROBP 2005
    - Cutuli et al. IJROBP 2002
    - Wapnir et al. JNCI 2011
- Given the morbidity difference, mastectomy is considered by many to be overtreatment for DCIS
  - ~30% of patients still get mastectomy in U.S. (vs 40% BCS+RT and 30% BCS alone)

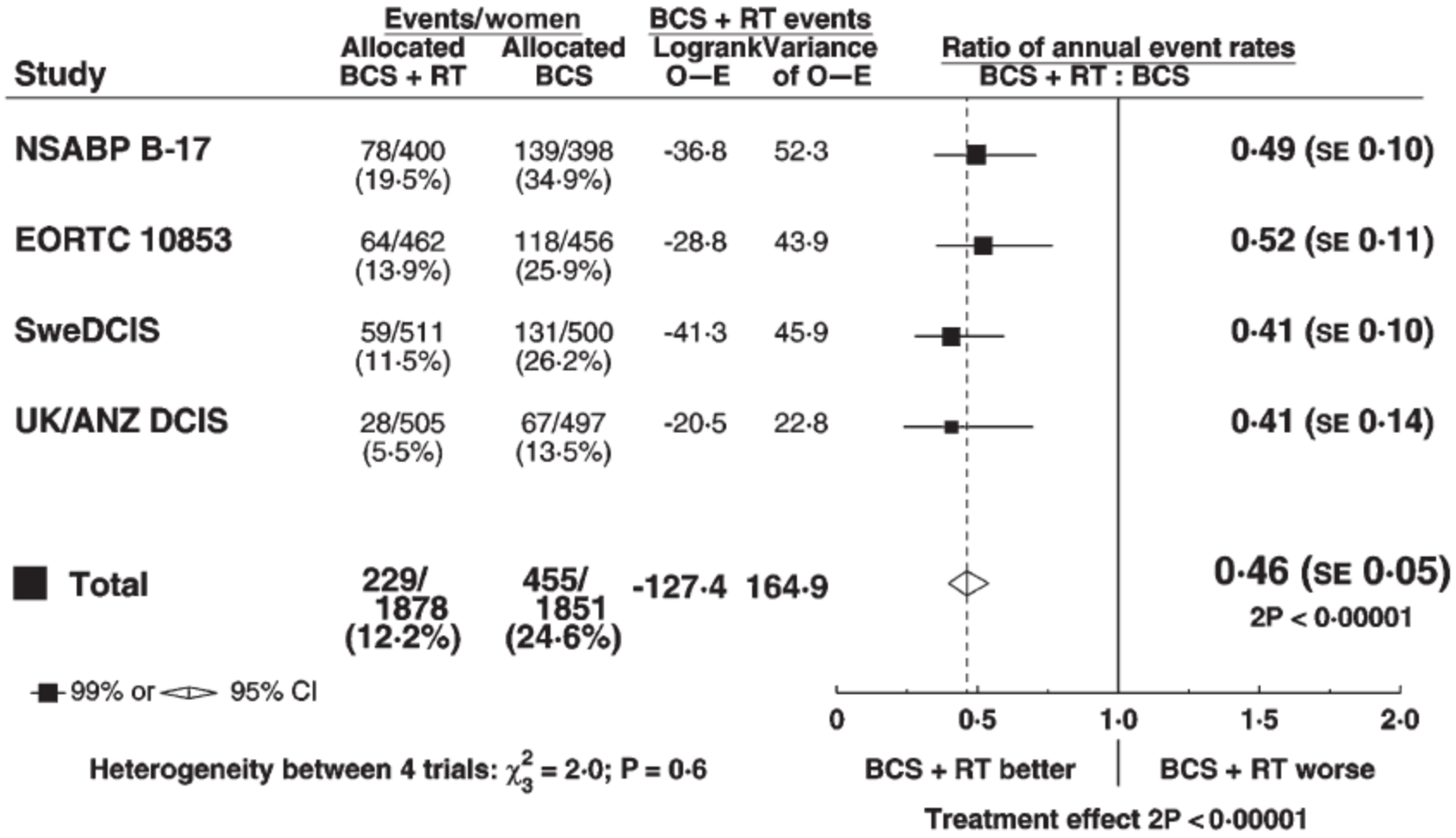
RT or no RT after BCS?

- Four large prospective trials started 1985-1990:
  - NSABP B-17
  - EORTC 10853
  - SweDCIS
  - UK/ANZ

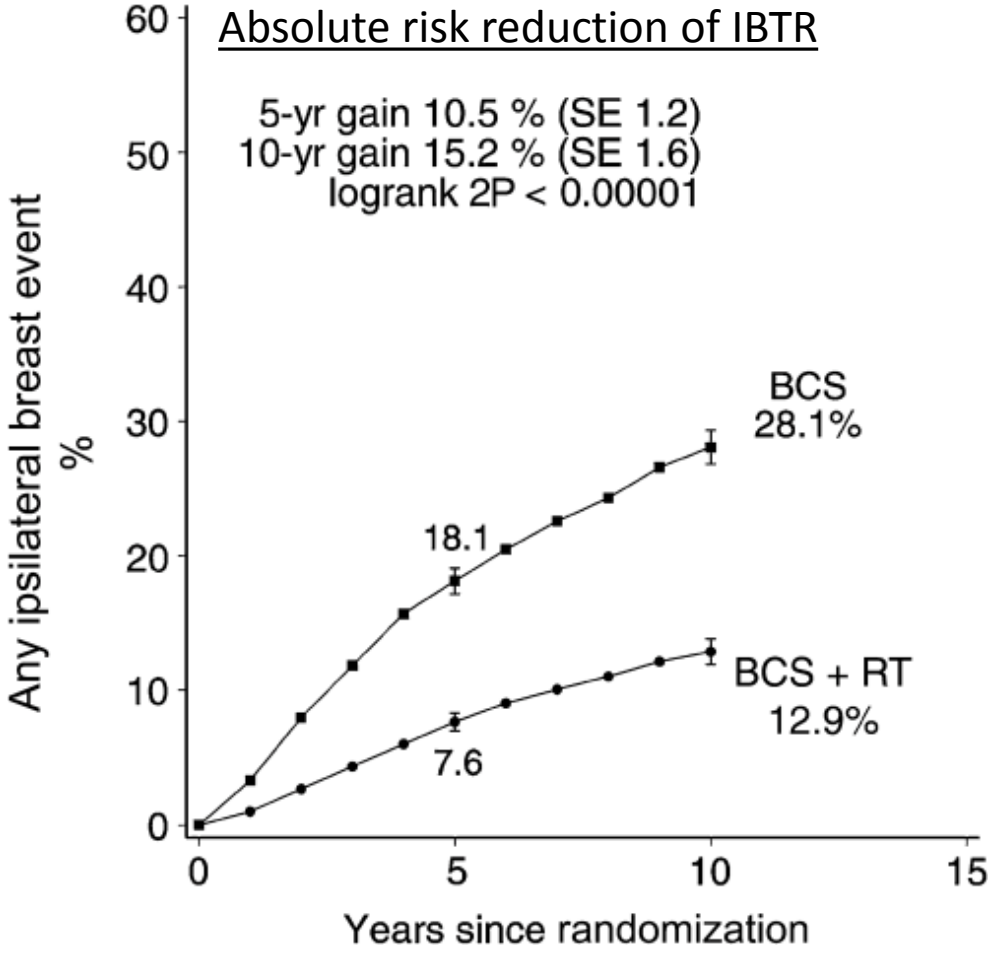
EBCTCG Meta-analysis (*JNCIM* 2010)

Year code, study name (reference)	Entry dates	No. of women randomized	No. of women eligible for analysis†	Median follow-up (yr)	Mammographic detection (%)	Breast and axillary surgery	Negative surgical margins required	Central pathological review	Breast radiotherapy
Data available for overview									
NSABP B-17 (3, 4, 5)	1985–1990	818	798	16.5	80	Local excision (37% axillary dissection)	Yes (13% involved or unknown)‡	623 (76%)	50 Gy (2 Gy/f) 9% with boost
EORTC 10853 (6, 7, 8, 9)	1986–1996	1010	918	10.4	72	Local excision (20% axillary dissection)	Yes (16% "not free," <1mm, involved or unknown)‡	824 (82%)	50 Gy (2 Gy/f) 5% with boost
SweDCIS (10, 11, 12)	1987–1999	1067	1011	8.4	79	Sector resection (17% axillary dissection)	No (11% positive, 9% unknown)‡	271 (25%)	50 Gy (2 Gy/f) (80%) or 48 Gy (2.4 Gy/f) (13%) or 54 Gy (2 Gy/f) then 2 wk gap (7%) Boost not recommended
UK/ANZ DCIS§(13)	1990–1998	1030	1002	4.8	100	Local excision (No axillary dissection)	Yes	0 (0%)	50 Gy (2 Gy/f) Boost not recommended

EBCTCG Meta-analysis (*JNCIM* 2010)

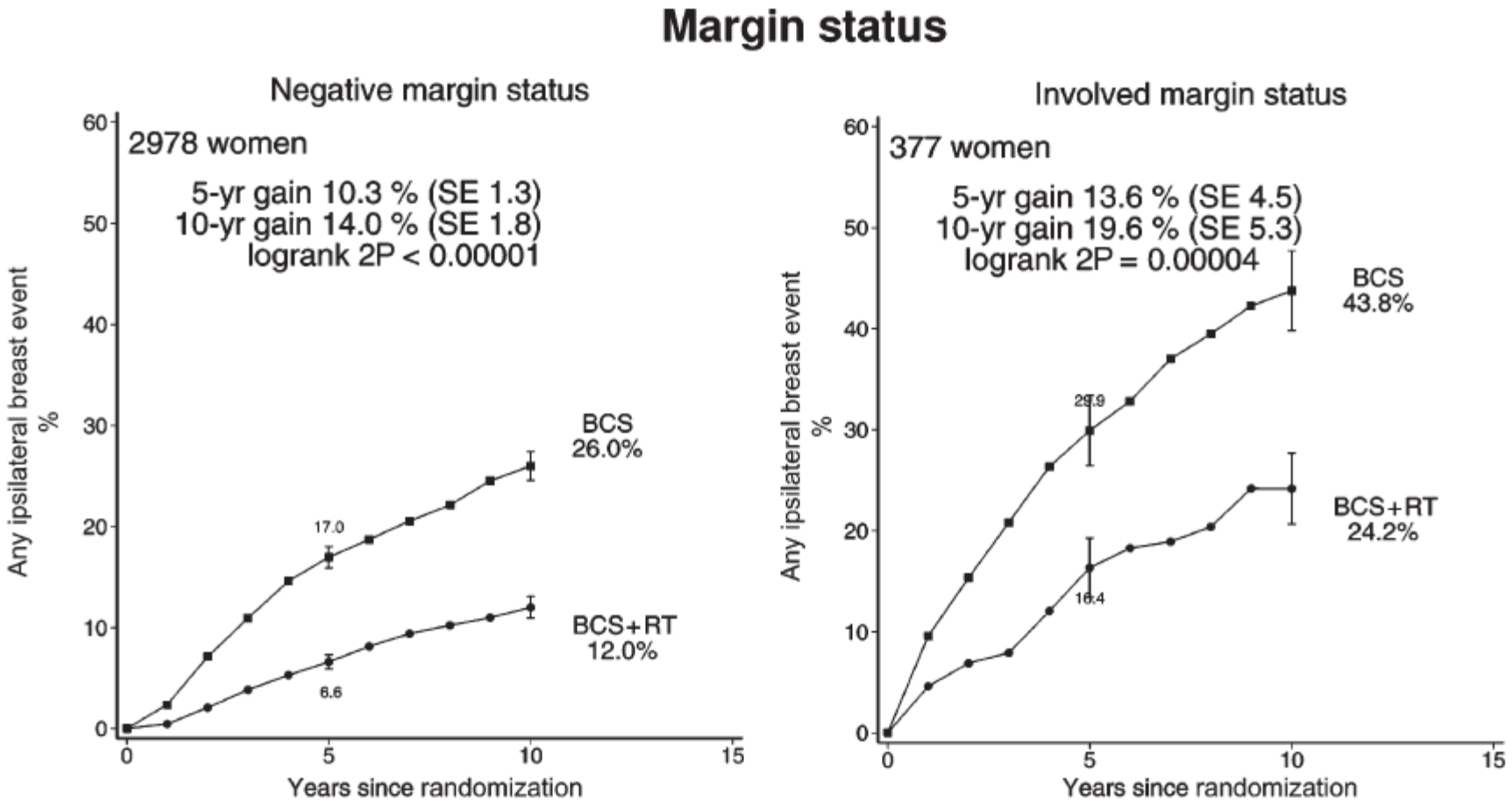


EBCTCG Meta-analysis (*JNCIM* 2010)



- 3,729 women from 4 RCTs
- ARR regardless of:
  - age at diagnosis
  - extent of breast-conserving surgery
  - use of tamoxifen (only 15%)
  - method of DCIS detection
  - margin status → CLOSE margin (<2mm) was categorized as NEGATIVE
  - Focality
  - Grade
  - Comedonecrosis
  - Architecture
  - Tumor size

EBCTCG Meta-analysis (*JNCIM* 2010)



CLOSE margin (<2mm) was categorized as NEGATIVE for this review.

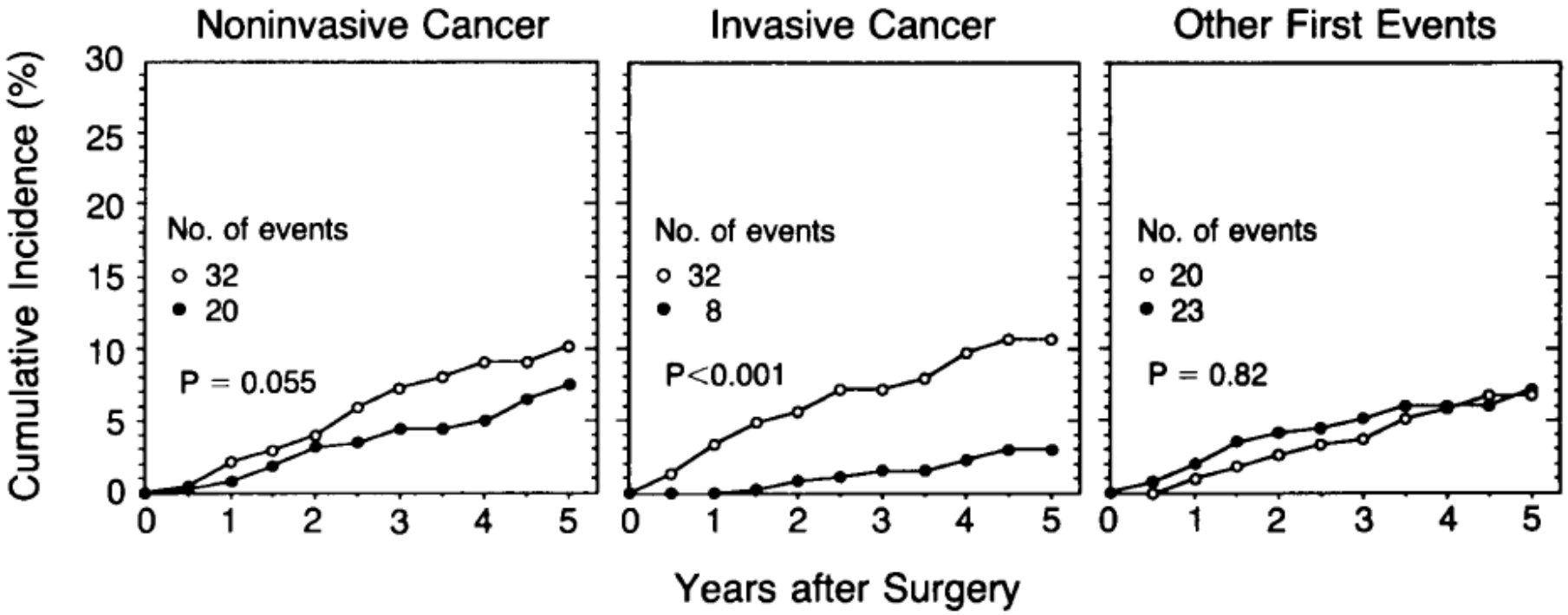
NSABP B17

Fisher et al. *NEJM* 1993.

- 1985-1990
- 818 patients with DCIS
  - Margins "histologically tumor-free"
- Lumpectomy +/- RT
  - 50Gy/25 whole breast
  - only 9% had RT boost to tumor bed
- Main endpoint: local recurrence, invasive or intraductal

Characteristic	Lumpectomy (N = 391)	Radiation Therapy (N = 399)
	percent	
Age (yr)		
≤49	33.5	33.1
50–59	28.4	32.3
≥60	38.1	34.6
Race		
White	86.9	87.0
Black	5.9	6.3
Other	4.1	5.0
Unknown	3.1	1.7
Operative procedure		
No axillary dissection	61.6	62.4
Axillary dissection	38.4	37.6
Type of carcinoma in situ		
Ductal	93.6	93.2
Ductal plus lobular	6.4	6.8
Comedo necrosis†		
Absent or slight	34.5	34.1
Moderate or marked	46.8	49.6
Could not be evaluated	18.7	16.3
Tumor size (cm)‡		
<0.1	42.2	44.6
0.1–1.0	30.7	29.8
1.1–2.0	15.1	13.3
>2.0	7.7	8.0
Unknown	4.3	4.3
Mean ±SD	1.3±1.2	1.2±0.9
Method of detection		
Mammography	81.1	80.5
Clinical	8.2	8.0
Both	10.7	11.5

NSABP B17



- 5yr event free survival = 84.4% vs. 73.8%
  - **Lumpectomy alone = 64/391 IBTR → 32 non-invasive, 32 invasive**
  - Lump+RT = 28/399 IBTR → 20 non-invasive, 8 invasive
  - Non-invasive 10.4% to 7.5% (p=0.055)
  - Invasive 10.5% to 2.9%
- This difference has remained at 12-year follow-up

ECOG DCIS Trial

- 1997-2002
- Prospective, nonrandomized
- 670 patients treated with lumpectomy alone
- Eligible:
  - Non-palpable
  - Size:
    - At least 3mm
    - low- or intermediate-grade DCIS measuring ≤2.5 cm (565 patients)
    - high-grade DCIS measuring ≤ 1 cm (105 patients)
  - Margin ≥3 mm
  - No residual calcs on post-op mammogram
- Patients entered in 2000 and later could opt for tamoxifen

ECOG DCIS Trial

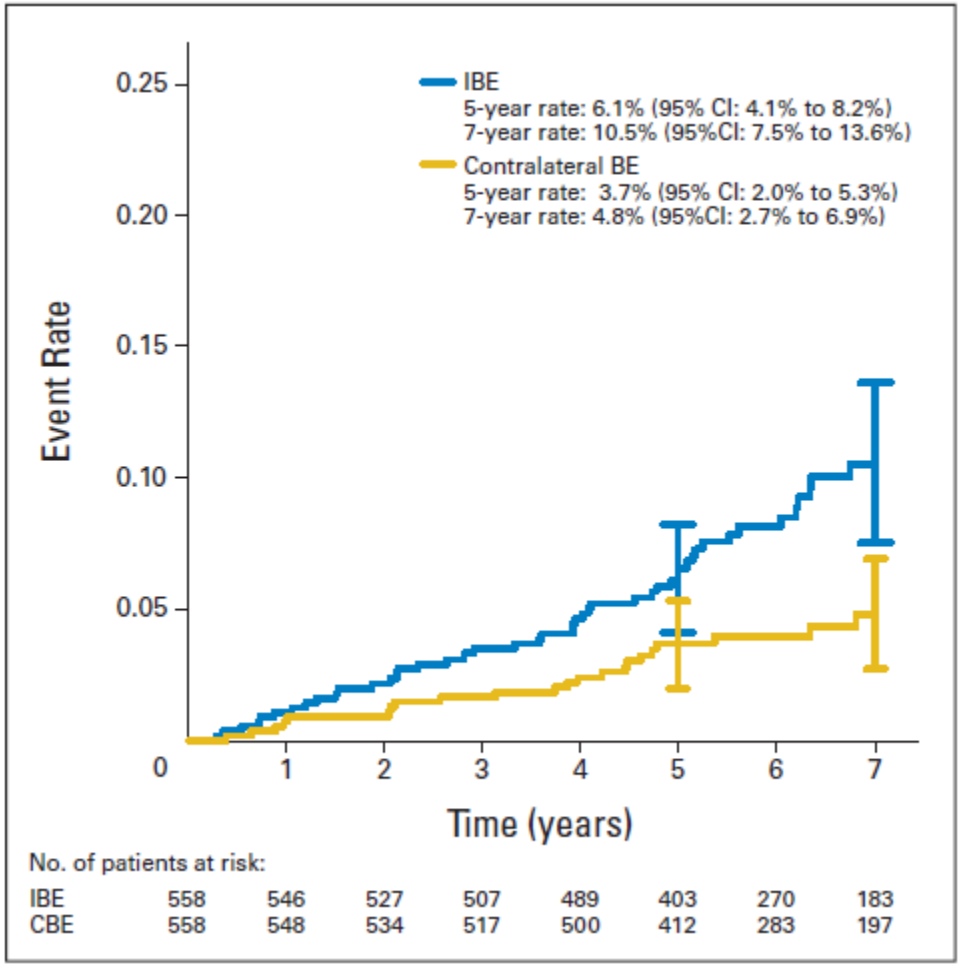
- Median age 60yo (at last surgery)
- Median tumor size in two strata were 6 mm and 5 mm*
- Median follow-up of 6.3 years
- 12% took Tamoxifen

- 5-year rate of ipsilateral breast events:
  - 6.1% in low/intermediate grade
  - 15.3% in high grade

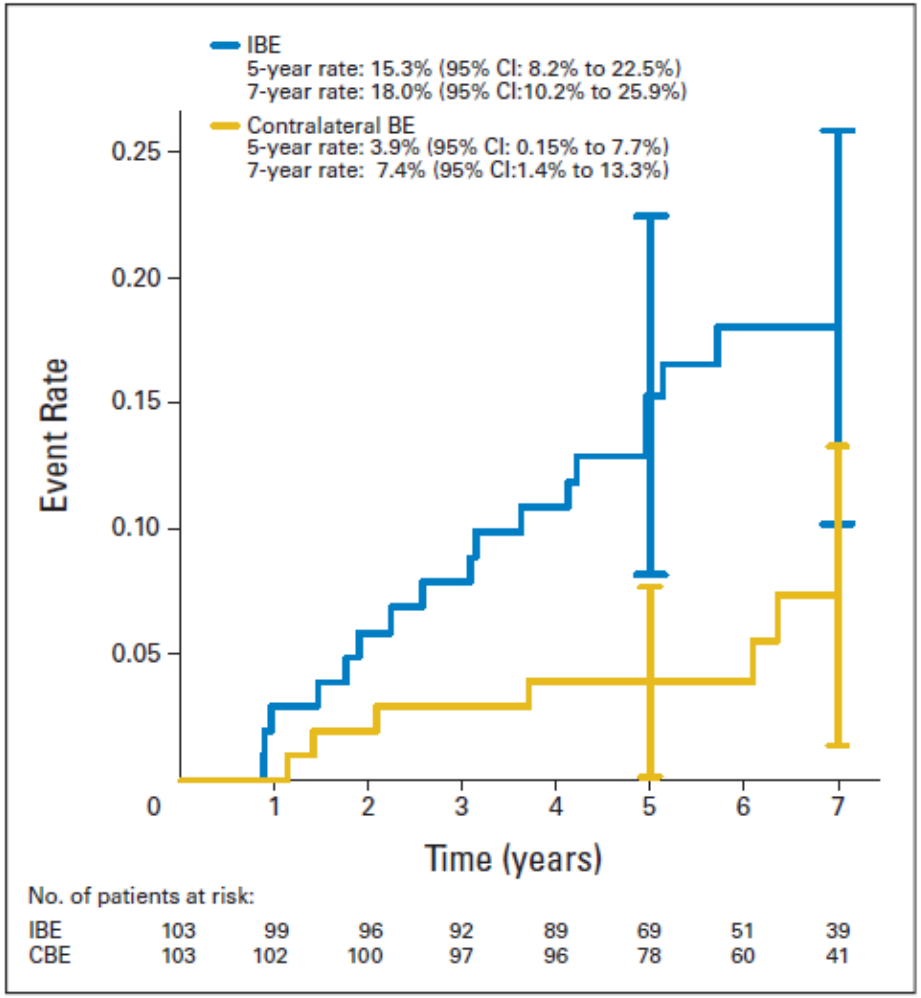
- CONCLUSION: appears safe to omit RT for grade 1-2 and small lesions with good margin

ECOG DCIS Trial

LOW-INTERMEDIATE GRADE

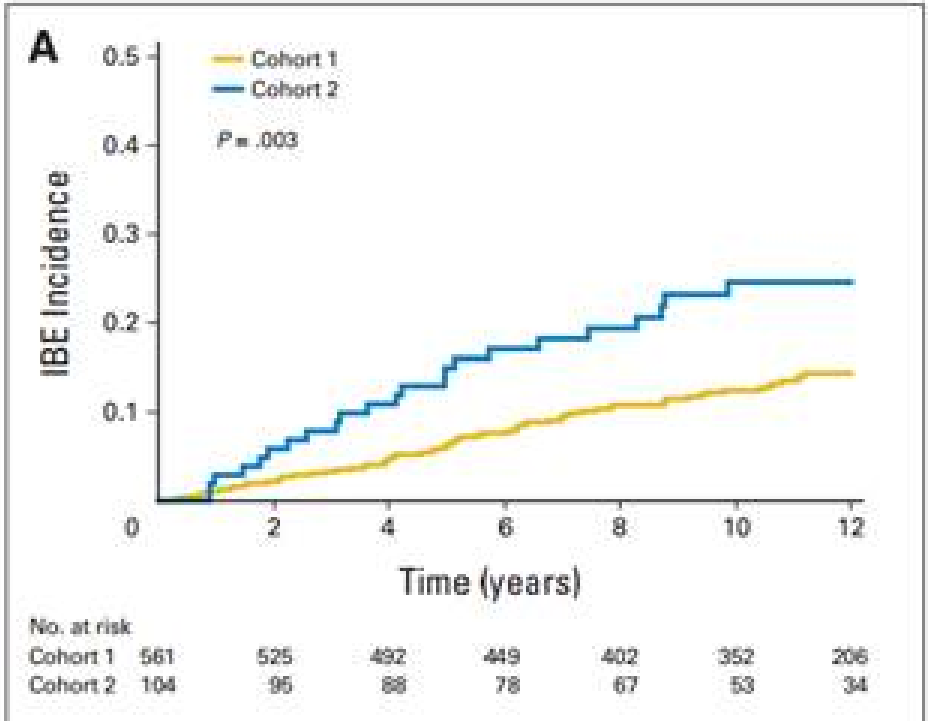


HIGH GRADE



ECOG DCIS Trial 12 year follow-up

- Grade 1-2 DCIS <2.5cm had ipsilateral breast event rate of 14.4% (Cohort 1)
- Grade 3 <1cm had event rate 24.6% (Cohort 2), noting no plateau and again 50% of recurrences being invasive.



DCIS “Receptor” Status

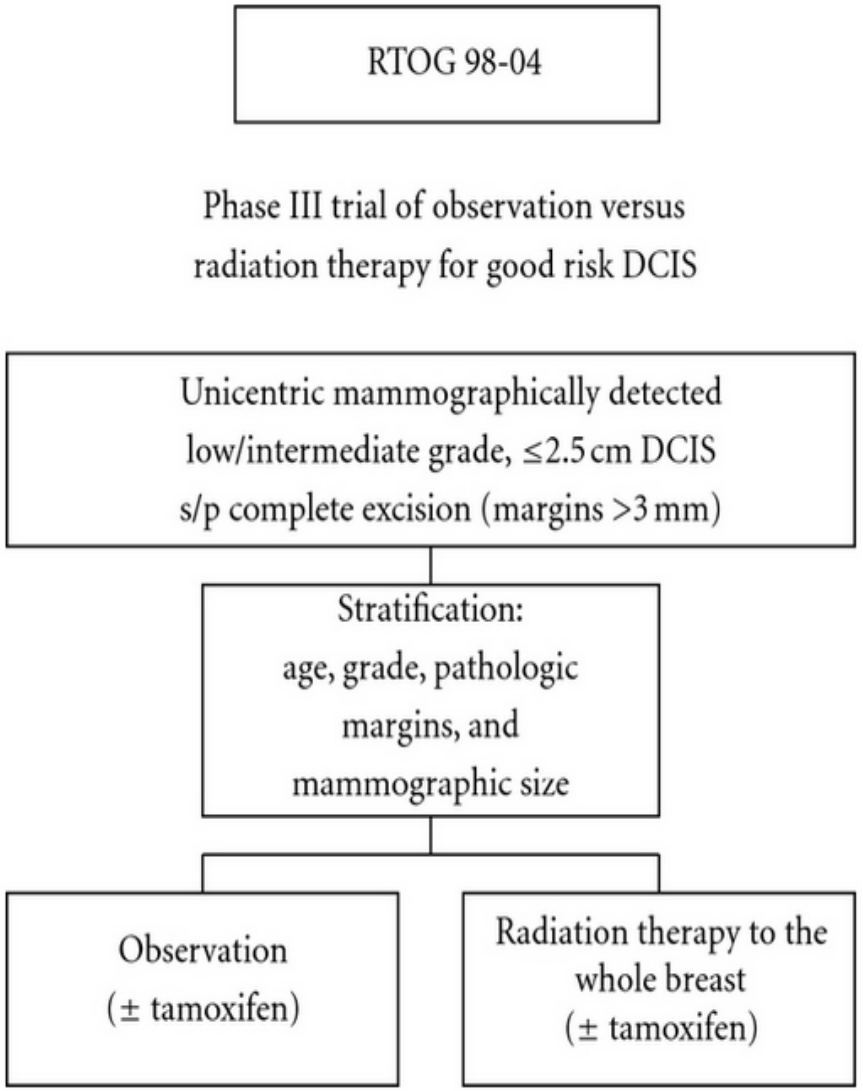
- ER+ in 70%, more often in low-grade
- HER2+ in 50%, more often in high-grade

Role of Tamoxifen in DCIS

- Selective estrogen receptor modulator (SERM)
  - Widely used in adjuvant treatment for women with hormone receptor positive invasive breast cancer
  - SERMs have estrogen agonist AND antagonist effects
    - Anti-estrogen effect in breast, CNS, and vagina mucosa
    - Pro-estrogen effect in liver (↓cholesterol), **bone**, and **endometrium**

RTOG 98-04

- McCormick et al IJROBP 2012
  - 585 patients eligible for analysis, median f/u 7.2 years
  - 62% received tamoxifen (was optional)
- Closed early due to low accrual
- Results at 7 years
  - Local failure 6.4% for observation vs 0.9% for RT
  - 12/18 failures in obs arm in same quadrant, but neither of the 2 failures in RT arm was in same quadrant
  - Grade 1-2 acute toxicity: 30% vs 76%
  - Grade 3 acute toxicity: 4.0% vs 4.2%

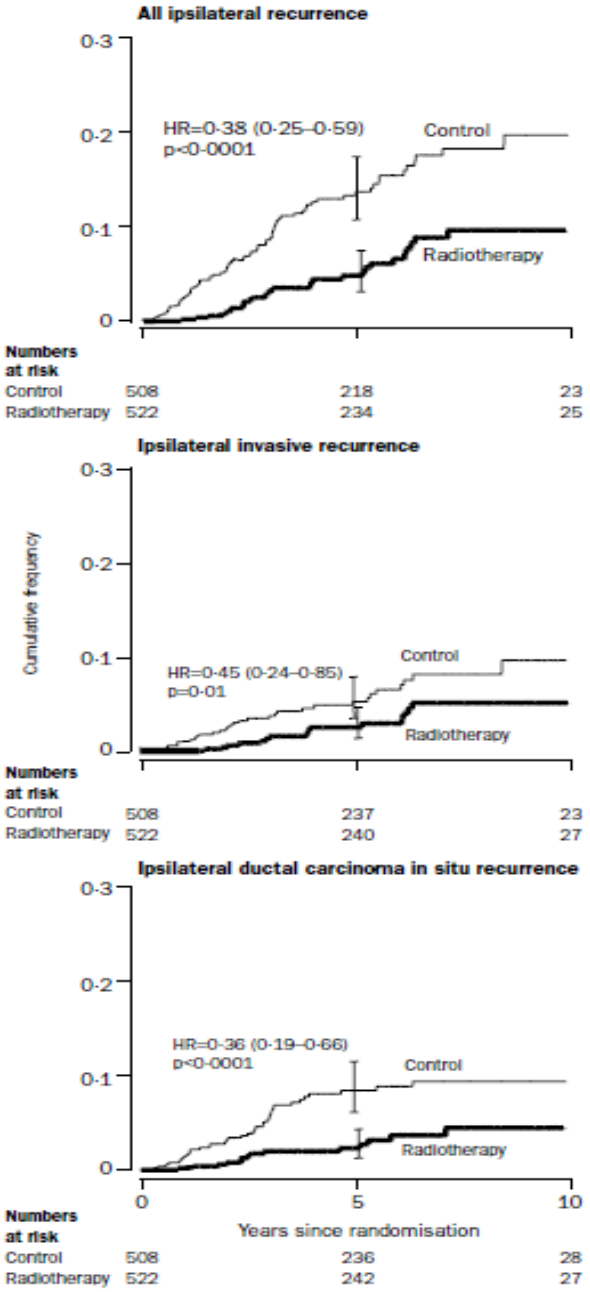


UK Trial

- 1701 women underwent excision of DCIS with **clear margins** (1990-98) and randomly assigned to 2x2 factorial design:*
  - Excision alone
  - Excision plus RT (50 Gy)
  - Excision plus tamoxifen
  - Excision plus RT plus tamoxifen

- 53 month follow-up results*
  - Observation 22%
  - TAM alone 18%
  - RT alone 8%
  - TAM+RT 6%

*46% of patients chose one therapy, were randomized only to +/- second therapy

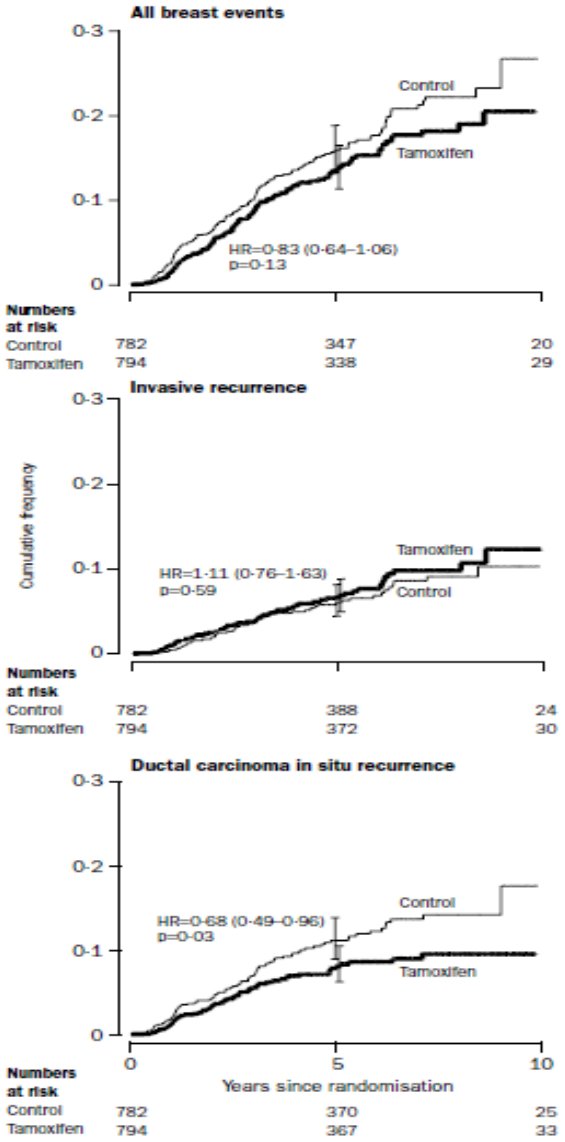


Houghton *Lancet* 2003

UK Trial: Tamoxifen

- Benefit for **bilateral DCIS**
- No synergy with RT

		Randomised to tamoxifen (n=794)	Randomised to no tamoxifen (n=782)	Hazard ratio (95% CI)	p
No RT	**Patients not receiving radiotherapy (1053)**				
	Ipsilateral invasive	37 (5%)	29 (4%)	1·32 (0·81–2·14)	0·26
	Ipsilateral DCIS	50 (6%)	68 (9%)	0·73 (0·51–1·06)	0·10
	Total invasive	42 (5%)	39 (5%)	1·11 (0·72–1·72)	0·64
	Total DCIS	51 (6%)	75 (10%)	0·68 (0·47–0·97)	0·03
	Total invasive or DCIS	94 (12%)	117 (15%)	0·80 (0·61–1·05)	0·11
RT	**Patients receiving radiotherapy (523)**				
	Ipsilateral invasive	8 (1%)	6 (1%)	1·25 (0·43–3·61)	0·68
	Ipsilateral DCIS	7 (1%)	9 (1%)	0·75 (0·28–2·02)	0·57
	Total invasive	13 (2%)	11 (1%)	1·11 (0·50–2·48)	0·80
	Total DCIS	7 (1%)	9 (1%)	0·75 (0·28–2·02)	0·57
	Total invasive or DCIS	20 (3%)	20 (3%)	0·95 (0·51–1·77)	0·88



Houghton *Lancet* 2003

NSABP B-24

- 1991-1994
- 1804 women with DCIS undergoing lumpectomy + RT
  - RT 50Gy, no boost
- Prospective, randomized to adjuvant tamoxifen or placebo
- Stratified by age, tumor type, method of detection
  - 81-84% mammographically detected

- Tamoxifen reduced breast recurrence 13.4% → 8.2%
  → but included 16% with *positive margins*
  → absolute difference not much larger than in UK trial
- Overall survival at 7 years was same

Tamoxifen Adherence

NSABP B-24

- **31%** of patients discontinued treatment
  - 269 in placebo group, 295 in tamoxifen group
- Why?
  - Side effects (**98 placebo**, 146 tamoxifen)
  - Personal reasons (146 placebo, 124 tamoxifen)
  - Unspecified reasons (25 placebo, 25 tamoxifen)

UK Trial

- Of 794 patients randomised to tamoxifen, 86 (**11%**) stopped early
- 56/86 patients had taken at least 2 years of treatment

NSABP B-43

- First prospective, randomized phase III multi-institution international clinical trial targeting HER2+ DCIS
- BCS followed by:
  - RT alone vs. RT + concurrent trastuzumab
- Eligible: >18yo, ECOG 0-1, DCIS excised with negative margins, pN0
- Goal to reduce IBTR, increase BCS

- Opened 11/9/08
- As of 7/31/2013 → 5,861 patients have had specimens received centrally, and 5,645 of those had analyzable blocks → 1,969 (34.9 %) were HER2 positive.

Siziopikou et al. *Breast Cancer Res Treat* 2013.

Risk stratification

- USC/Van Nuys prognostic index (USC/VNPI)
  - Quantitative algorithm which uses size, margin width, age, and histologic classification to predict likelihood of local recurrence
  - Assigned scores of 1, 2, or 3 to size, margin, histologic type and came up with total

USC/Van Nuys

- 949 pts with DCIS treated at USC through 2009
  - 604 excision alone, 345 excision + RT
- No hormonal therapy
- Used the updated USC / Van Nuys scoring system (size, margin, DCIS classification, age) which gives scores 4-12
- Median f/u 86 months (7.1 yrs)
- 165 local recurrences (103 - excision alone, 62 - RT).
- 12-yr local recurrence:
  - score 4-6, ≤ 6% (NS difference for RT vs no RT)
  - score 10-12, ≥40% (for excision + RT)

USC/Van Nuys

New treatment recommendations to achieve a local recurrence rate of less than 20% at 12 years using the University of Southern California/Van Nuys Prognostic Index (USC/VNPI)

Updated VNPI Scoring Index

Parameter	1 Point	2 Points	3 Points
Size	<=15 mm	16-40 mm	>40 mm
Grade	Grade I-II	Grade I-II + necrosis	Grade III
Margin	>= 10 mm	1-9 mm	<1 mm
Age	>60	40-60	<40

10-year VNPI Local Recurrence

Points	Overall LR	BCS Alone LR	BCS+RT LR	p-value
4-6	3%	3%	3%	NS
7-9	27%	36%	21%	SS
10-12	66%	88%	41%	SS

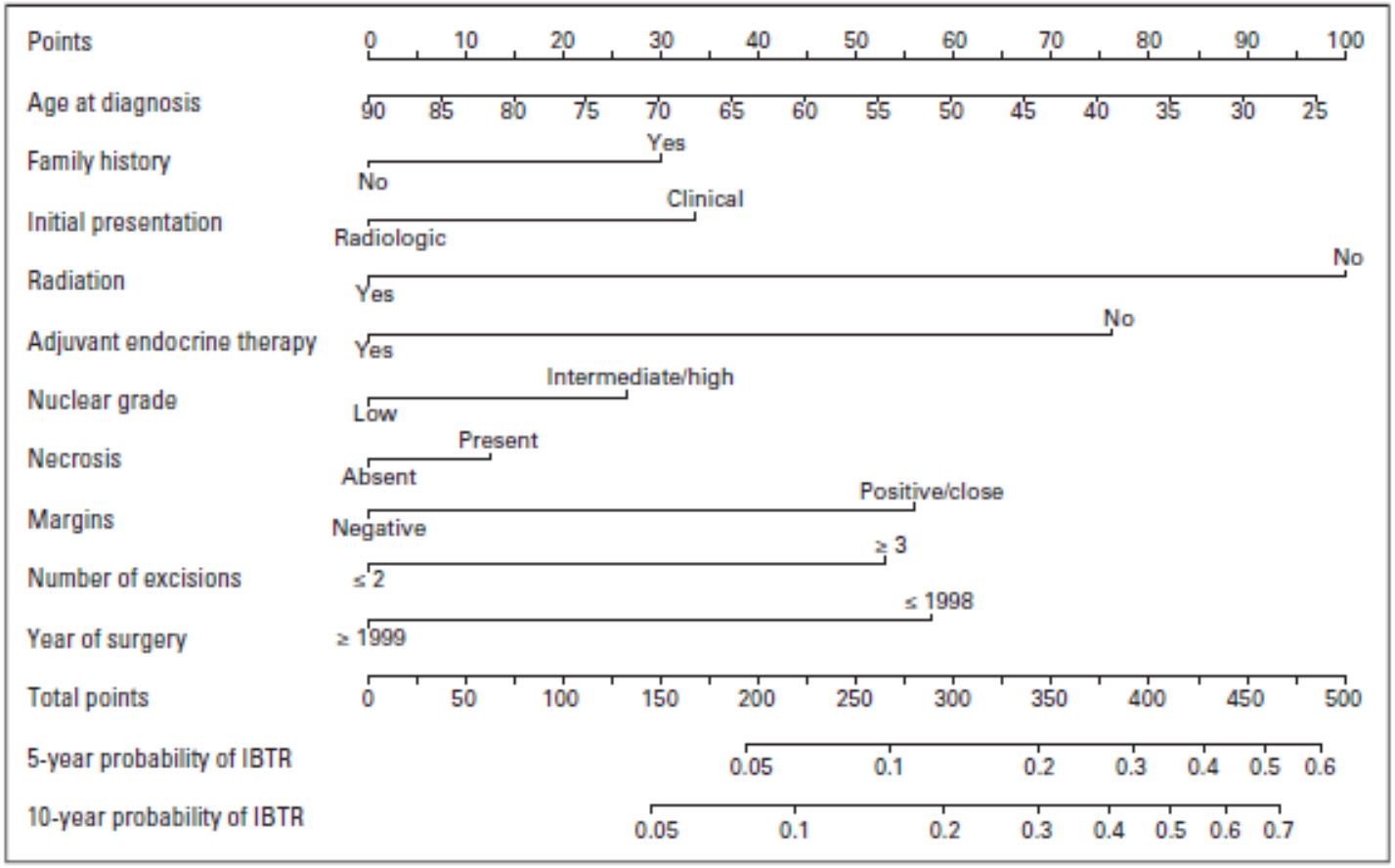
USC/VNPI Score	Recommended treatment	12-yr LR
4-6	Excision alone	<= 6
7, margins ≥ 3 mm	Excision alone	16
7, margins < 3 mm	RT	14
8, margins ≥ 3 mm	RT	15
8, margins < 3 mm	Mastectomy	1
9, margins ≥ 5 mm	RT	19
9, margins < 5 mm	Mastectomy	1
10-12	Mastectomy	4

Caveat: Single institution study, not validated by other groups

Silverstein *JNCIM* 2010.

MSKCC Nomogram

Rudloff et al *JCO* 2010 (MSKCC) based on 1,868 consecutive DCIS pts treated with BCS



Nomogram for predicting 5- and 10-year probability of IBTR after BCS for DCIS. To estimate risk, calculate points for each variable by drawing a straight line from patient's variable value to the axis labeled "Points." Sum all points and draw a straight line from the total point axis to the 5- and 10-year local recurrence axis.

Partial Breast

- ASTRO Consensus:
  - "cautionary" for pure DCIS ≤ 3cm
  - "unsuitable" for pure DCIS > 3cm
- ABS guideline for acceptable (published July 2013)

Criteria	
Age	≥50 y old
Size	≤3 cm
Histology	All invasive subtypes and DCIS
Estrogen receptor	Positive/negative
Surgical margins	Negative
Lymphovascular space invasion	Not present
Nodal status	Negative

Summary

- BCT is the treatment of choice for patients with localized DCIS
  - Mastectomy should be considered for women with multicentric DCIS or extensive/diffuse DCIS
  - PMRT no good evidence to support (Childs S et al *IJROBP* 2012, Harvard)
  - 2mm path margins sufficient (Dunne et al *JCO* 2009, meta-analysis)
- General consensus is still for RT after BCT
  - Consider omitting RT after BCS if small, widely excised, low-grade DCIS without necrosis
  - Currently, there is a lack of good data identifying subsets of DCIS that don't require RT
- Tamoxifen for DCIS reduces local recurrence after BCT + RT, although benefit is small. Generally recommended for ER+ DCIS (Kaiser<UCSD)
- Herceptin for HER2+ DCIS is under study

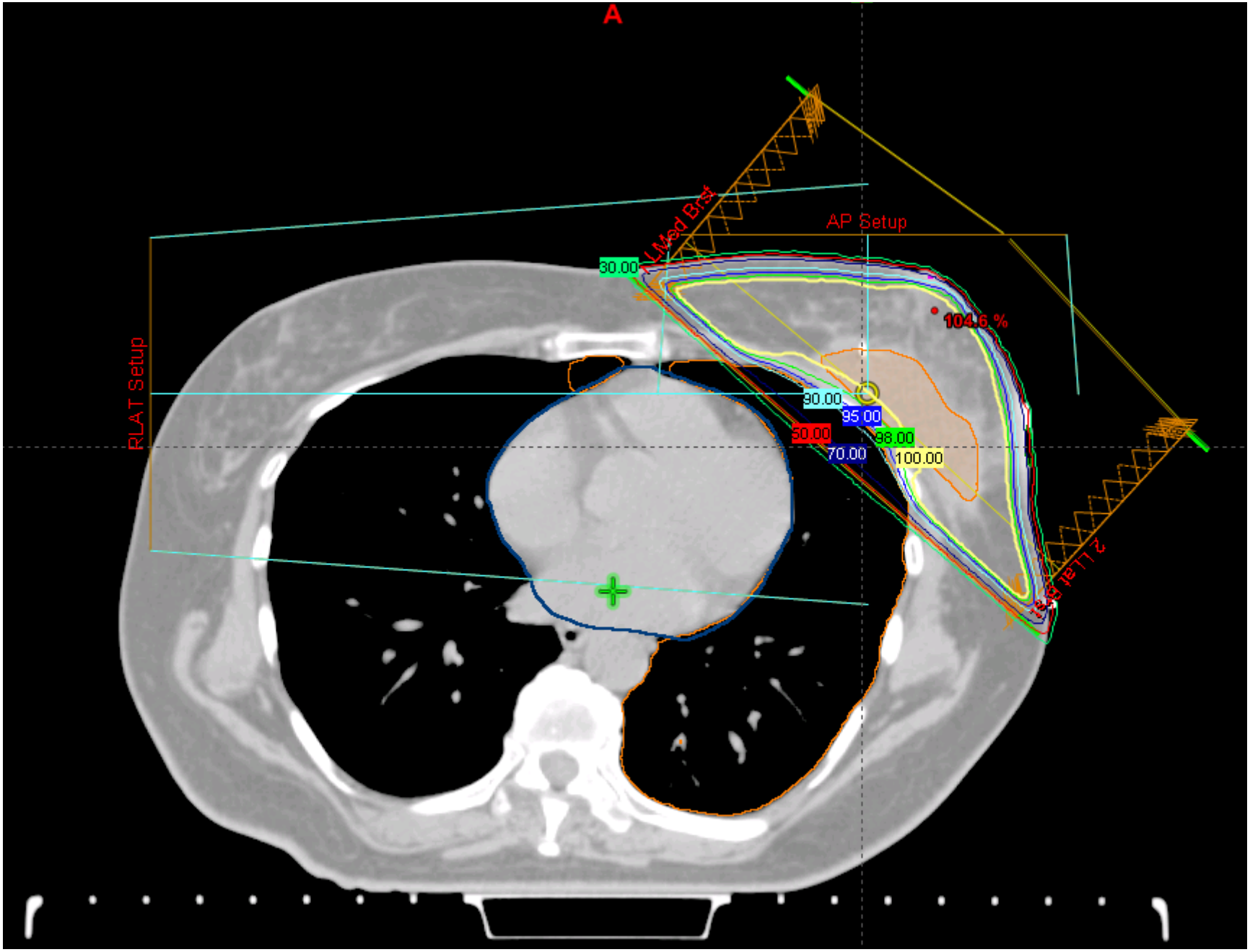
Case

HPI:

- 57 yo F diagnosed with DCIS on screening mammogram
- 9/26/13 left wire loc lumpectomy. Pathology showed DCIS with solid and cribriform pattern and **grade 2** nuclei, measuring **1.2cm.**
- Closest margin after re-excision was 11.3mm. ER weakly positive (5% of cells).

ASSESSMENT: Advised patient risk of recurrence 7-10%, could omit RT. Patient opted for treatment.

PLAN: Whole breast 50Gy/25 tangents (with heart block) with boost 10Gy to tumor bed (re-scanned for boost). Completed RT with expected minimal radiation dermatitis. Patient still deciding on tamoxifen.


A
L Med Brst
AP Setup
30.00
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90.00
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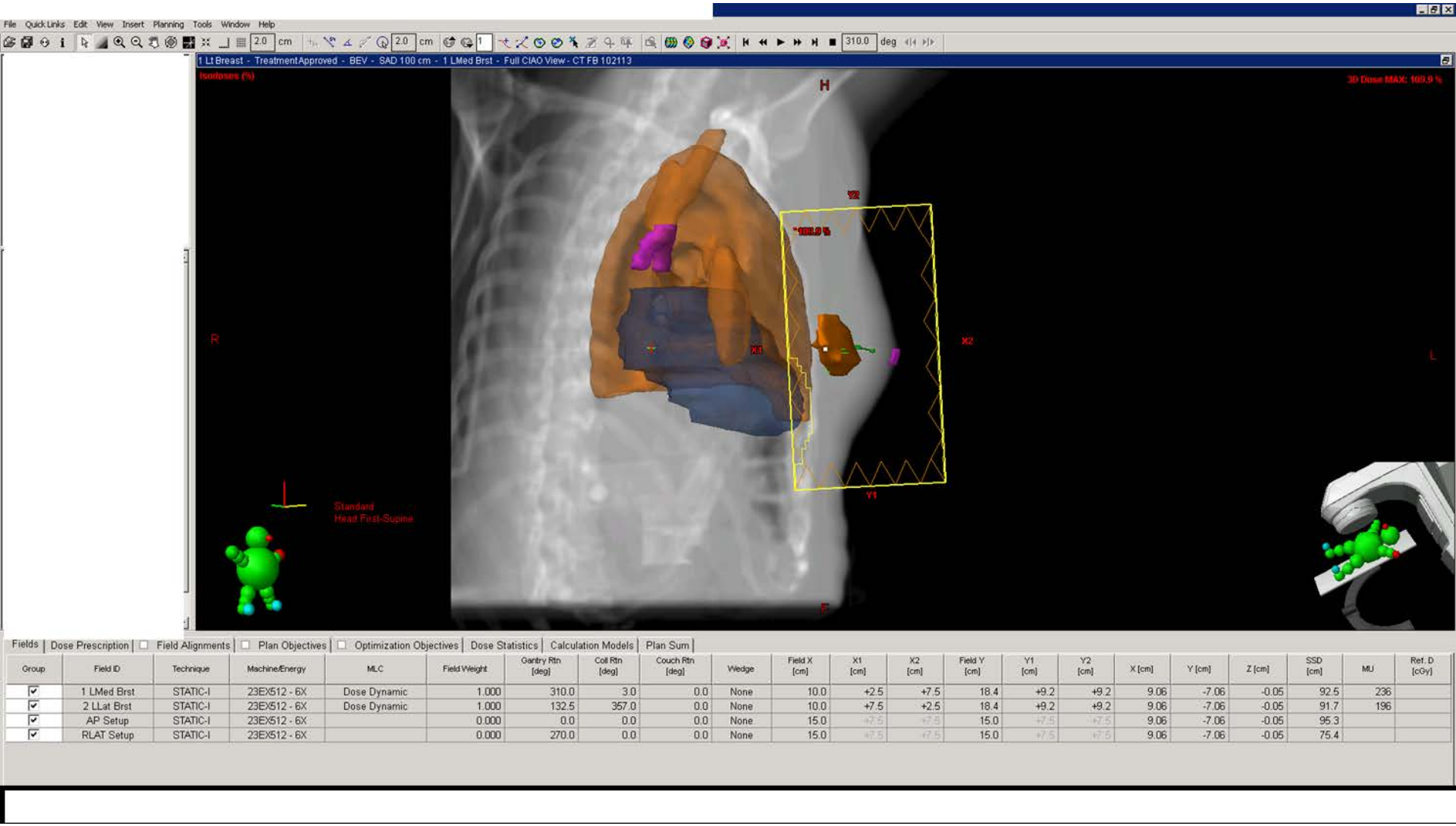
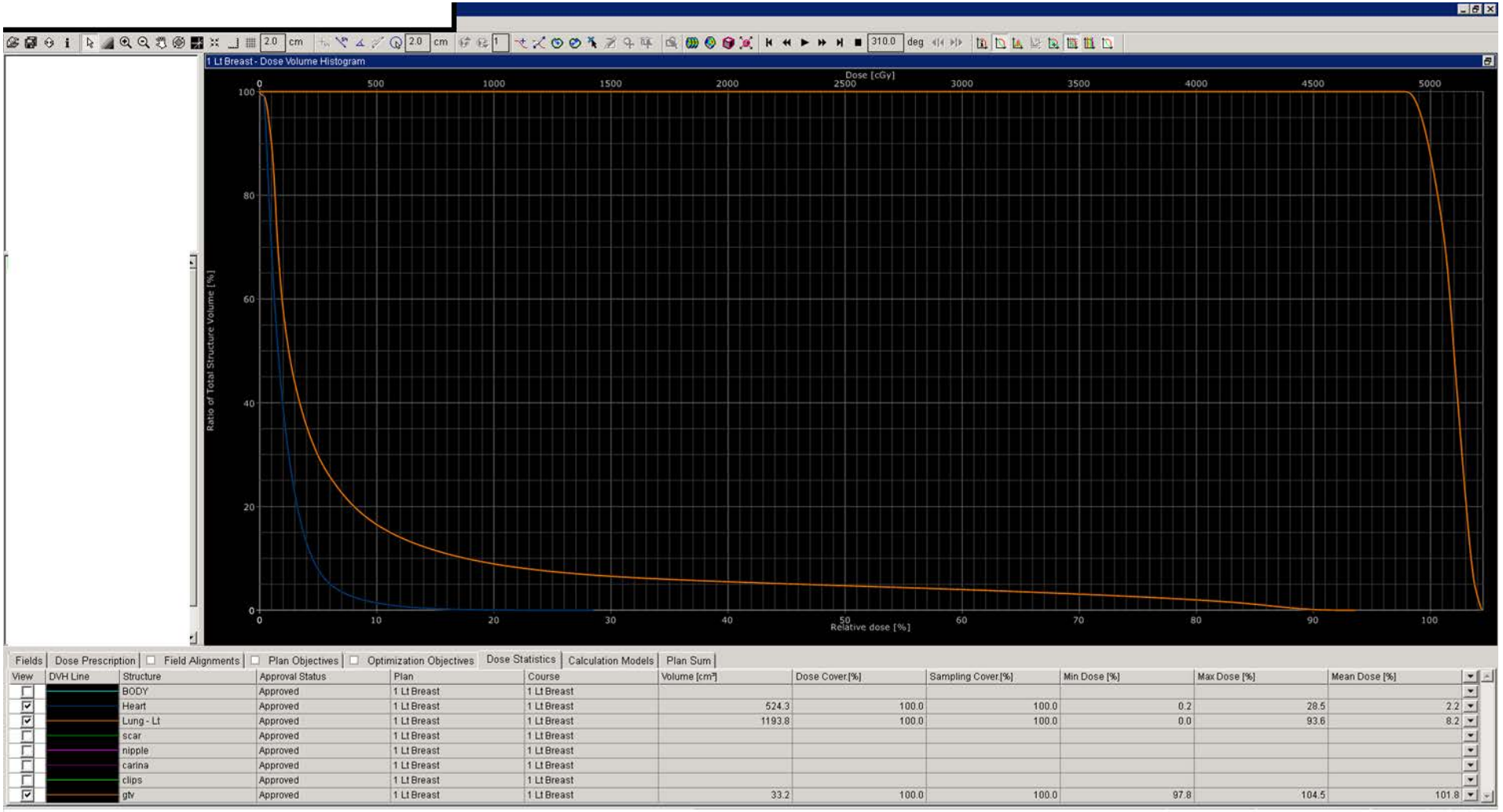
2 LLat Ptl

Heart block



Fields | Dose Prescription | Field Alignments | Plan Objectives | Optimization Objectives | Dose Statistics | Calculation Models | Plan Sum

Group	Field ID	Technique	Machine/Energy	MLC	Field Weight	Gantry Rtn [deg]	Coll Rtn [deg]	Couch Rtn [deg]	Wedge	Field X [cm]	X1 [cm]	X2 [cm]	Field Y [cm]	Y1 [cm]	Y2 [cm]	X [cm]	Y [cm]	Z [cm]	SSD [cm]	MU	Ref. D [cGy]
☑	1 LMed Brst	STATIC-I	23EX512 - 6X	Dose Dynamic	1.000	310.0	3.0	0.0	None	10.0	+2.5	+7.5	18.4	+9.2	+9.2	9.06	-7.06	-0.05	92.5	236	
☑	2 LLat Brst	STATIC-I	23EX512 - 6X	Dose Dynamic	1.000	132.5	357.0	0.0	None	10.0	+7.5	+2.5	18.4	+9.2	+9.2	9.06	-7.06	-0.05	91.7	196	
☑	AP Setup	STATIC-I	23EX512 - 6X		0.000	0.0	0.0	0.0	None	15.0	+7.5	+7.5	15.0	+7.5	+7.5	9.06	-7.06	-0.05	95.3		
☑	RLAT Setup	STATIC-I	23EX512 - 6X		0.000	270.0	0.0	0.0	None	15.0	+7.5	+7.5	15.0	+7.5	+7.5	9.06	-7.06	-0.05	75.4		



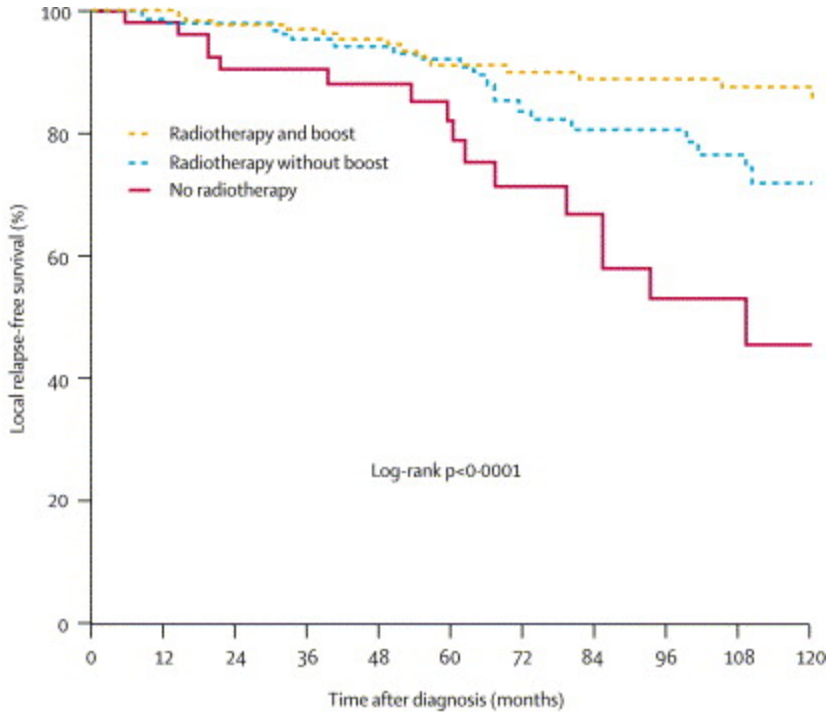
Fields | Dose Prescription | Field Alignments | Plan Objectives | Optimization Objectives | Dose Statistics | Calculation Models | Plan Sum

View	DVH Line	Structure	Approval Status	Plan	Course	Volume [cm³]	Dose Cover.[%]	Sampling Cover.[%]	Min Dose [%]	Max Dose [%]	Mean Dose [%]
☐		BODY	Approved	1 Lt Breast	1 Lt Breast						
☑		Heart	Approved	1 Lt Breast	1 Lt Breast	524.3	100.0	100.0	0.2	28.5	2.2
☑		Lung - Lt	Approved	1 Lt Breast	1 Lt Breast	1193.8	100.0	100.0	0.0	93.6	8.2
☐		scar	Approved	1 Lt Breast	1 Lt Breast						
☐		nipple	Approved	1 Lt Breast	1 Lt Breast						
☐		carina	Approved	1 Lt Breast	1 Lt Breast						
☐		clips	Approved	1 Lt Breast	1 Lt Breast						
☑		gtv	Approved	1 Lt Breast	1 Lt Breast	33.2	100.0	100.0	97.8	104.5	101.8

Mean heart dose 110cGy

Boost

- Omlin et- Lancet 2006
  - Retrospective. 373 women age 45 or younger from 18 institutions. TisN0, <=45, BCS. 15% no RT, 45% RT 50 Gy, 40% RT 50 Gy + 10 Gy boost. Median F/U 6 years
  - LR rate: LR-free survival at 10 years: No RT 46% vs. 72% RT no boost vs. 86% RT boost (SS)
  - Predictors: age <40, margin, RT boost
  - Conclusion: consider boost in patients <=45 years



Number at risk											
Radiotherapy and boost	150	143	133	126	115	99	90	78	64	51	44
Radiotherapy without boost	166	148	125	103	88	68	56	50	43	34	24
No radiotherapy	57	53	46	39	33	26	17	15	10	7	3

Boost and Margin Status

- Institut Curie
- Retrospective. 208 women, DCIS, BCT with close (<2 mm) or involved margins. Re-excision 29% or RT + boost 71%.
- Median RT dose 67 Gy. Median F/U 7.4 years
- Outcome: On re-excision, 56% residual DCIS and 6% residual IDC
- 7-year LRF if re-excision 9.6% vs RT + boost 9.3% (NS)
- Conclusion: In selected patients, re-excision may be avoided by increasing RT dose to tumor bed to at least 66 Gy

Monteau, IJROBP. 2009

Tumor Bed Boost

- No evidence from prospective trials for boost <u>in DCIS</u>
  - In fact, <10% in NSABP B-17 and EORTC, and none in UK and SweDCIS trials got boost
- Retrospective study from McGill (*IJROBP* 2012)
  - 220 consecutive pts treated with BCS+RT from 2000-2006
  - 36% received boost
  - Boost group more positive and <0.1-cm margins (48% vs. 8%) ($p < 0.0001$) and more high risk by VNPI ($p = 0.006$).
  - Median f/u 46 mon → 0/79 w/ boost had LR vs. 8/141 w/o boost ($p = 0.03$)
  - Only presence of necrosis SS on UVA (p=0.003)
  - *Despite close margins and higher VNPI, boost ↓LR*
- Extrapolate from invasive studies
  - Continuum of one disease?