



# BRACHYTHERAPY OPTIONS

Ines Cafaro - Andrea Peveri  
A.O. Istituti Ospitalieri Cremona

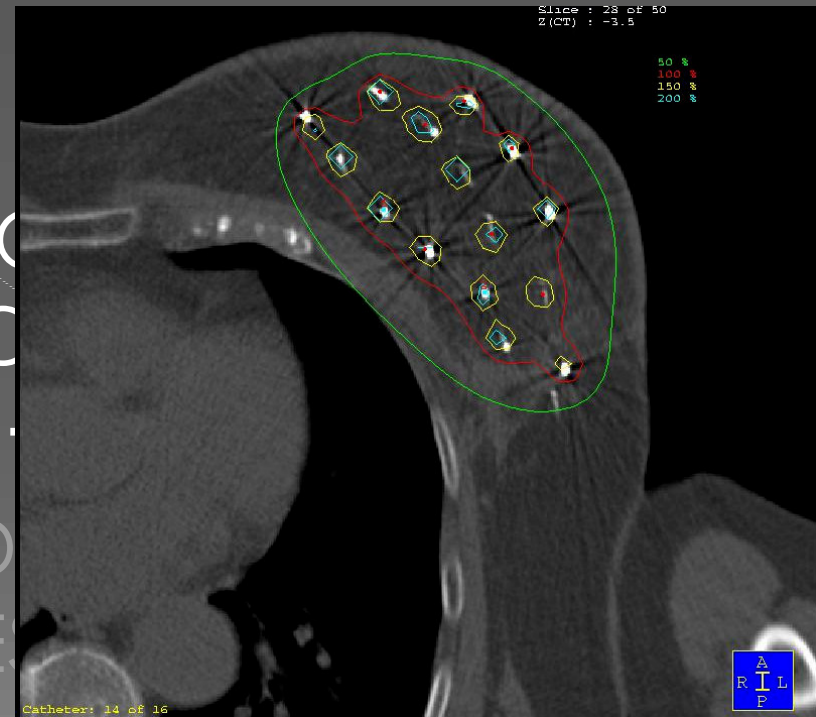
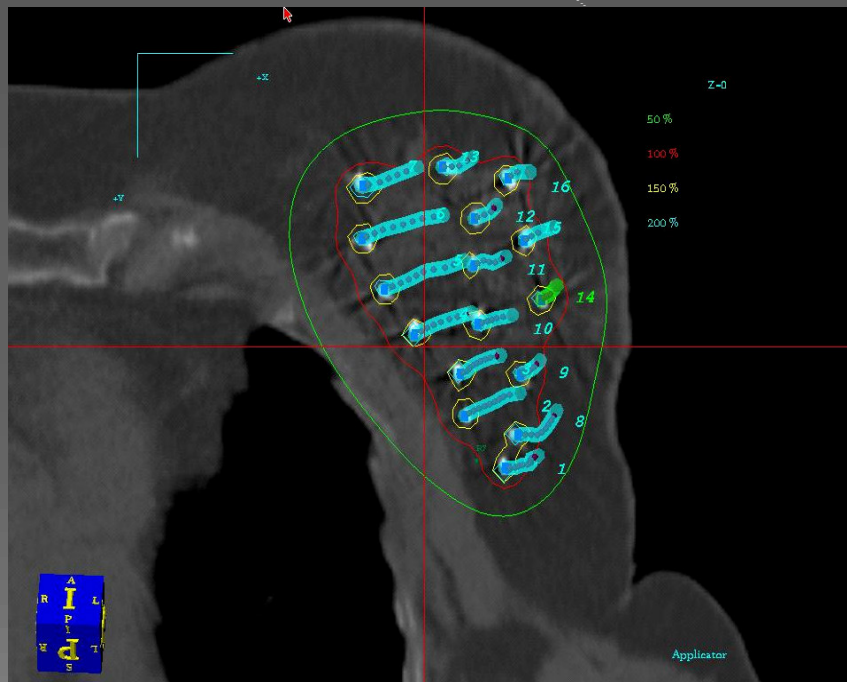


BREAST CANCER:  
TOWARD A PATIENT-CENTERED PERSPECTIVE

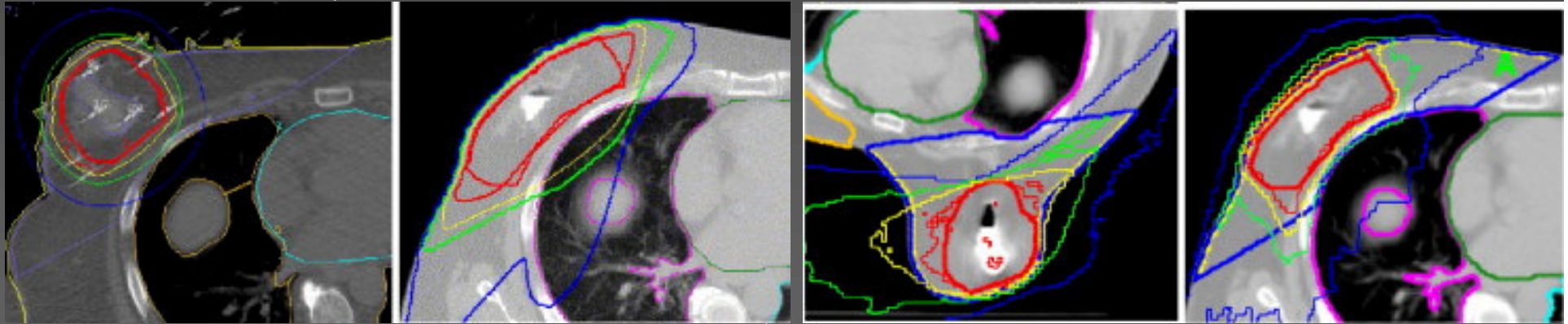
Brescia - September 30<sup>th</sup>, 2011

# Why Brachytherapy?

- ◉ SMALL VOLUMES that need ELEVATED DOSE GRADIENTS



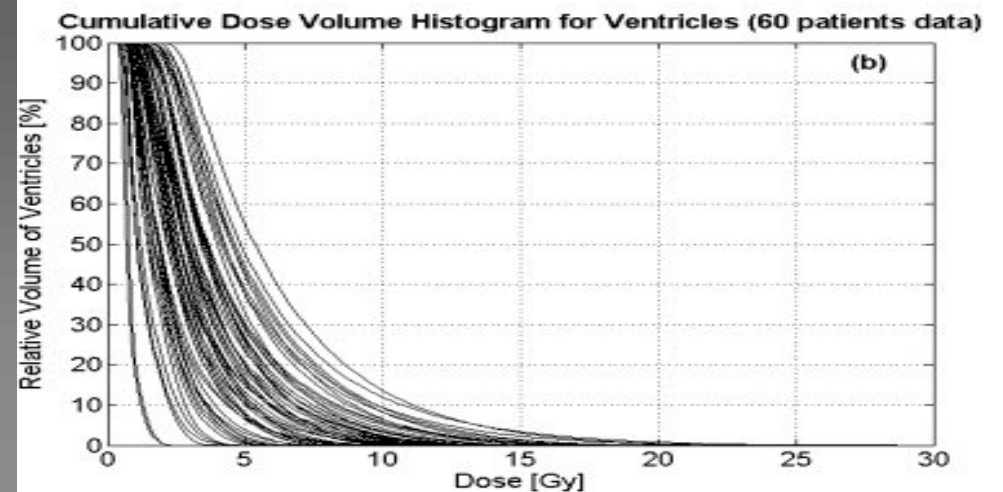
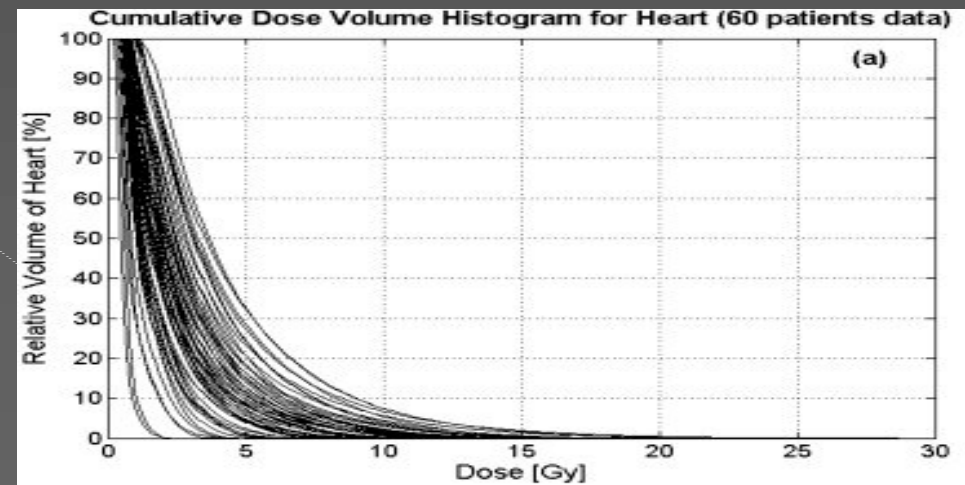
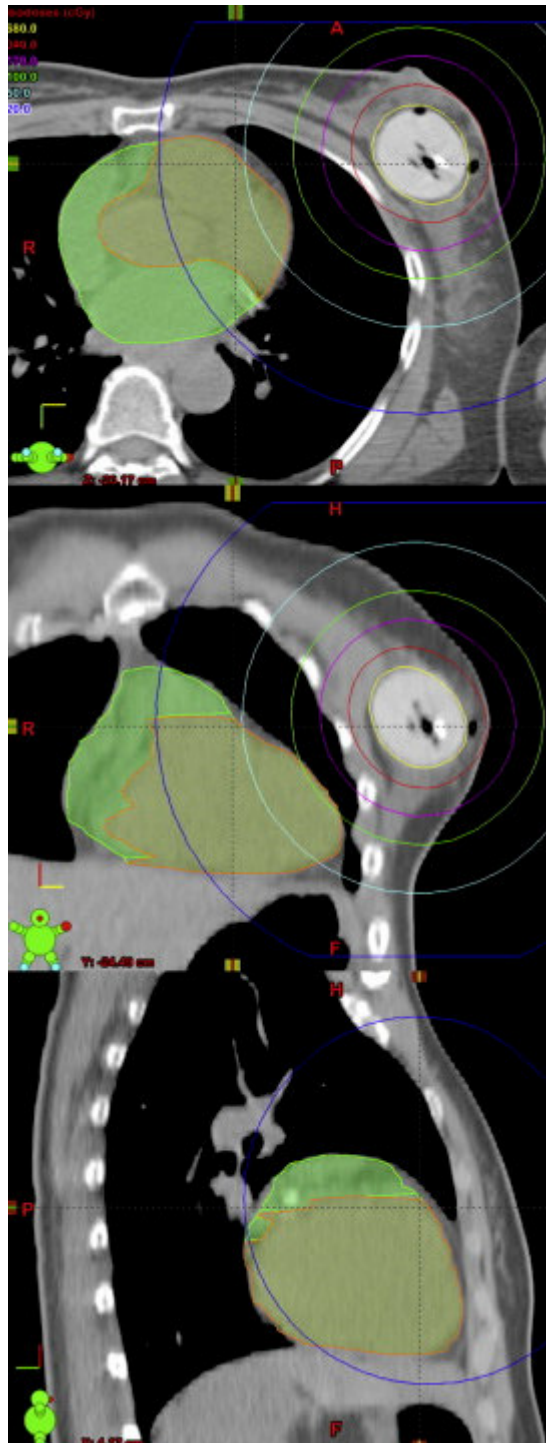
# Why Brachytherapy?



- MINIMIZATION OF UNCERTAINTIES OF POSITIONING and MOVEMENTS INTER and INTRAFRACTION → CTV = PTV
- CREATION OF HIGH DOSE GRADIENTS TO SAVE NORMAL TISSUES

## A COMPREHENSIVE ANALYSIS OF CARDIAC DOSE IN BALLOON-BASED HIGH-DOSE-RATE BRACHYTHERTHERAPY FOR LEFT-SIDED BREAST CANCER

VLADIMIR VALAKH, M.D.,\* YONGBOK KIM, PH.D.,\*† E. DAY WERTS, PH.D.,\*†  
AND MARK G. TROMBETTA, M.D.\*†



# Brachytherapy Techniques

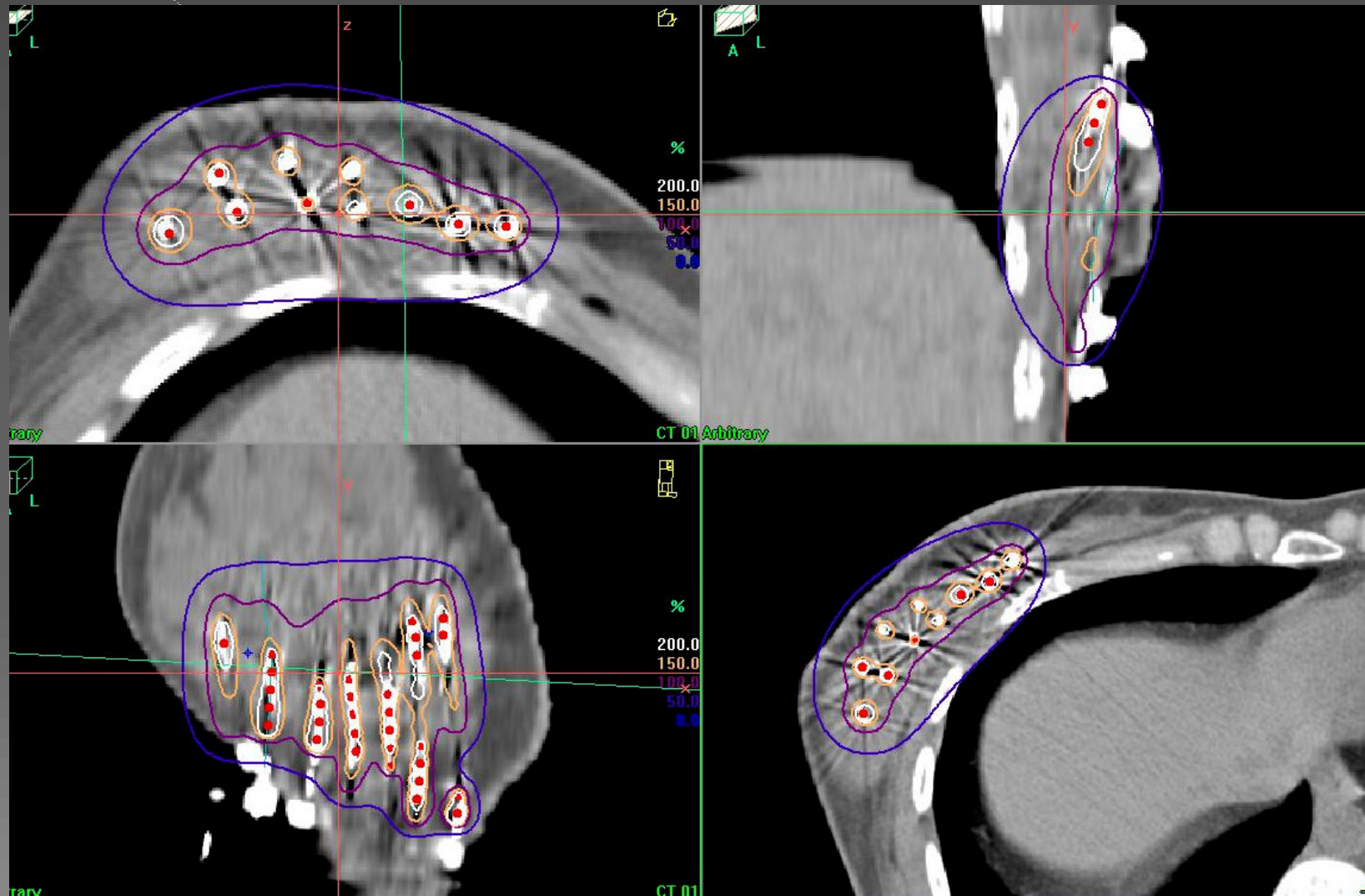
## INTRACAVITARY VS INTERSTITIAL

# Interstitial Brachytherapy



- Catheters are placed intraoperatively; usually 2-3 planes
- Typical doses with HDR = 34-42 Gy and LDR = 50-60 Gy
- Treatment delivered over one week.

# Interstitial Brachytherapy



# Interstitial Brachytherapy

## ○ LOCAL RELAPSE

Study	N	Median f/u (months)	IBFR (%)	EFR (%)
King, 2000	160	84	2.5	1.2
Vicini, 2003	199	65	2.5	1.5
Arthur, 2003	44	42	0.0	0.0
Strnad, 2010	274	63	2.9	2.9



# Interstitial Brachytherapy

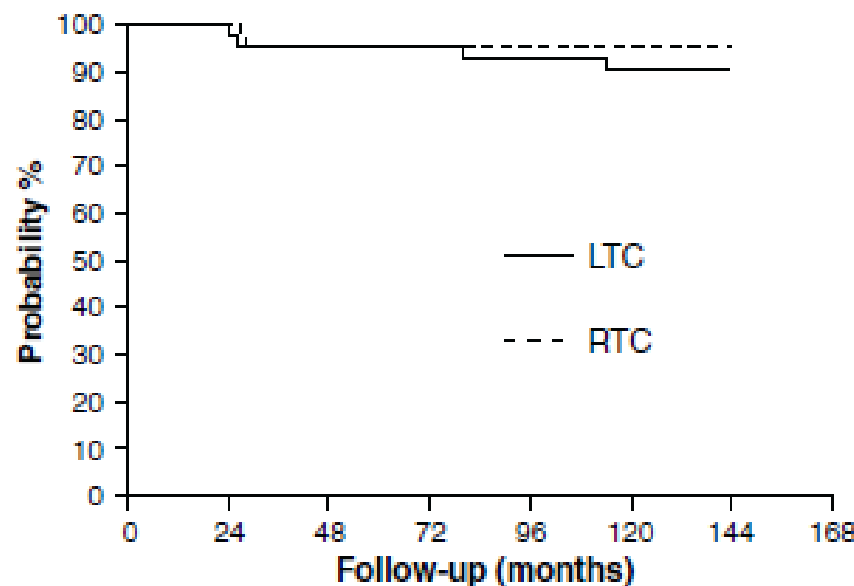
## ● COSMESIS

Study	N	Median f/u (months)	Excellent/ good cosmesis (%)
Polgar, 2004	45	81	84
Chen, 2006	199	76	>90
Kaufman, 2007	32	60	89
Strnad, 2010	274	63	90
Polgar, 2010	45	133	78

## Accelerated partial breast irradiation

# Accelerated partial-breast irradiation using high-dose-rate interstitial brachytherapy: 12-year update of a prospective clinical study

Csaba Polgár<sup>a,\*</sup>, Tibor Major<sup>a</sup>, János Fodor<sup>a</sup>, Zoltán Sulyok<sup>b</sup>, András Somogyi<sup>a</sup>, Katalin Lövey<sup>a</sup>, György Németh<sup>a</sup>, Miklós Kásler<sup>c</sup>



**Fig. 1.** Time to local and regional recurrence by Kaplan–Meier estimates. LTC = local tumour control; RTC = regional tumour control. 12-year LTC = 90.7%; 12-year RTC = 95.6%.

*Radiotherapy and Oncology 94 (2010) 274–279*

### Skin side effects

Grade 0	37 (82.2%)
Grade 1	6 (13.3%)
Grade 2	2 (4.4%)
Grade 3	0 (0%)

### Fibrosis

Grade 0	26 (57.8%)
Grade 1	9 (20.0%)
Grade 2	9 (20.0%)
Grade 3	1 (2.2%)

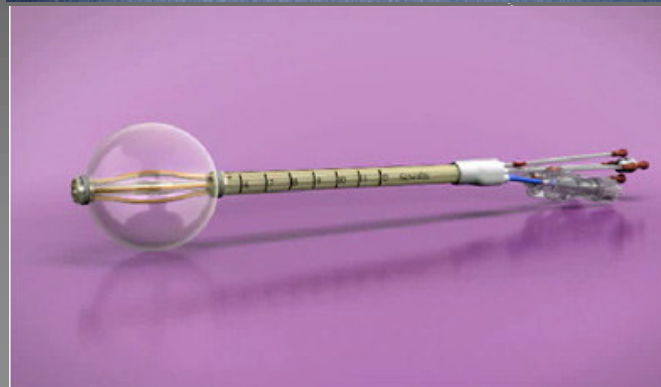
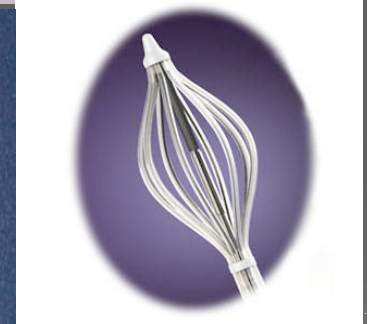
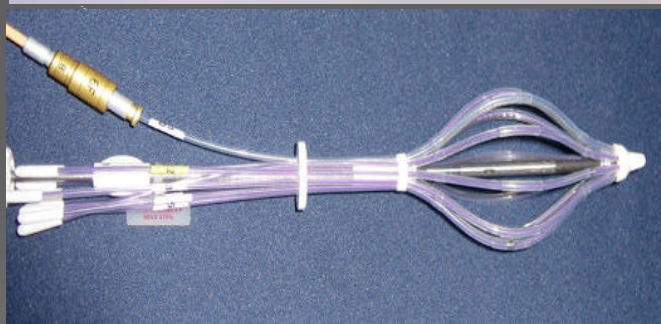
### Fat necrosis

Grade 0	28 (62.2%)
Grade 1	8 (17.8%)
Grade 2	8 (17.8%)
Grade 3	0 (0%)
Grade 4	1 (2.2%)

# INTRACAVITARY BT

Many devices:

- Mammosite®
- SAVI®
- Contura®

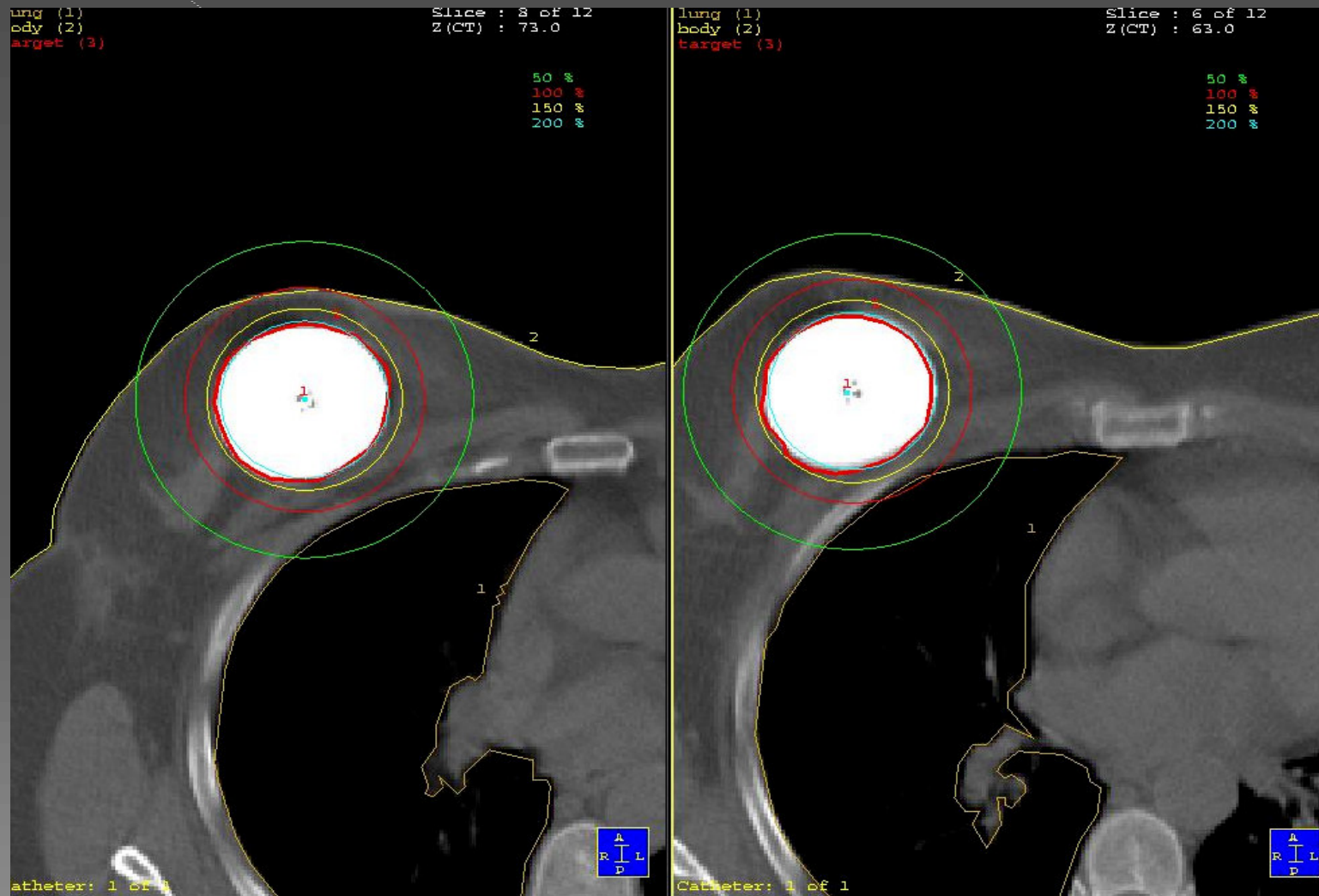


# MammoSite brachytherapy

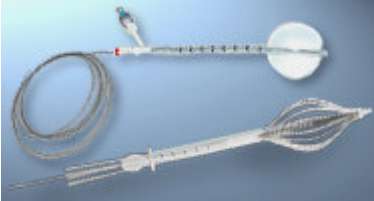
- Balloon is placed into surgical cavity.
- Balloon available in spherical and elliptical shapes.
- Balloon sizes are 4-5 cm.
- Ten fractions given in 5 days, 34 Gy.



# MammoSite brachytherapy



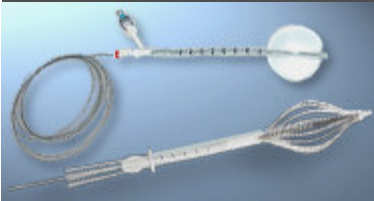
# Intracavitary Brachytherapy



## ● LOCAL RELAPSE

Study	N	Median f/u (months)	LR (%)	EFR (%)
Voth, 2006*	55	24	3.6	1.2
Chao, 2007*	80	36	2.5	1.5
Dragun, 2007*	70	26	5.7	0.0
Goyal, 2010*	70	51.5	1.4	8.9
Yashar, 2009+	63	18	1	2.9

# Intracavitary Brachytherapy

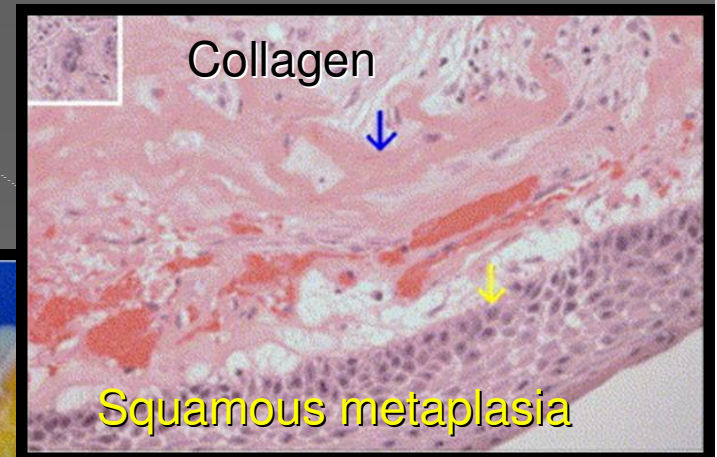


○ COSMESIS

Study	N	Median f/u (months)	Excellent/ good cosmesis (%)
Dickler, 2005	30	13	93
Sadgehi, 2006	67	13	96
Benitez, 2007	43	66	83
Vicini, 2010	95	72	85

# Toxicities of Mammosite

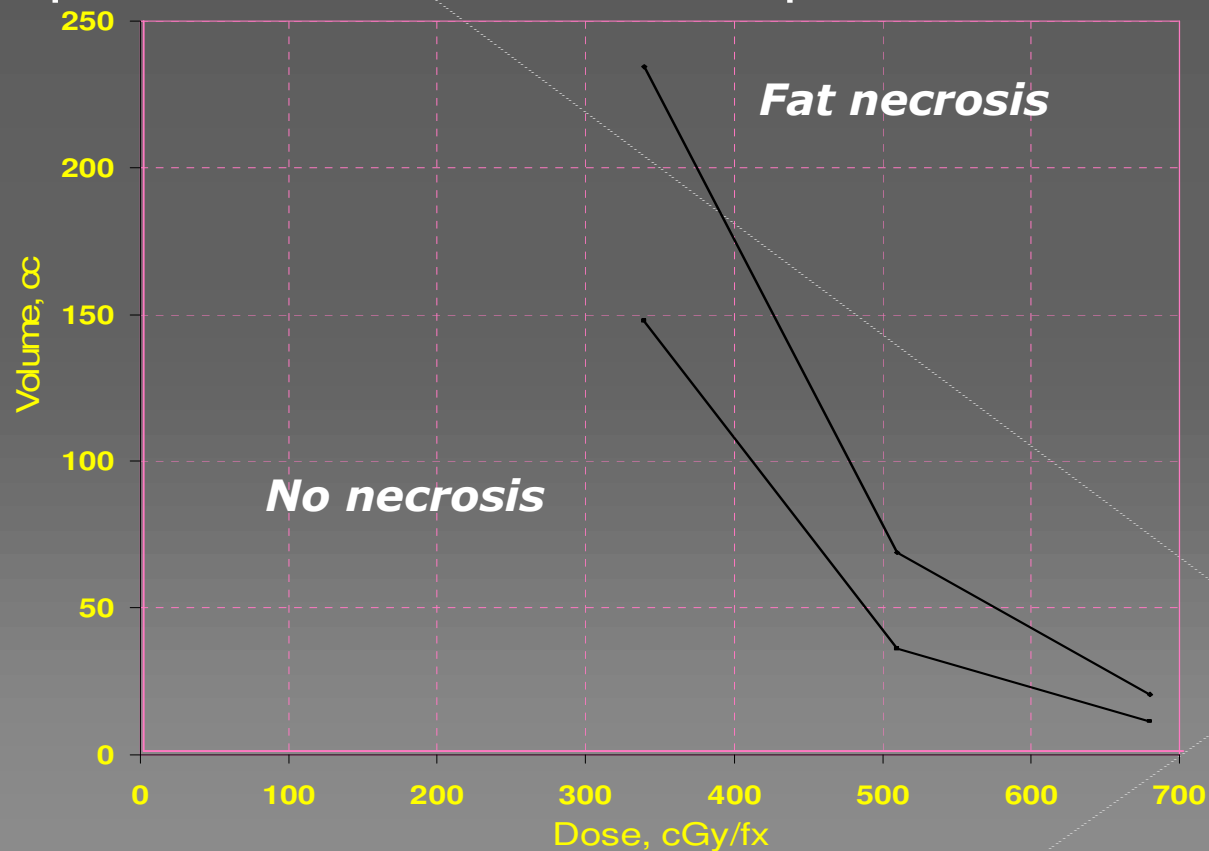
- Seroma formation: Risk is increased with open technique for placement. In Beaumont series, found 60% risk with open cavity vs. 30% in closed cavity; overall rate of 45%, with 10% symptomatic.





# Toxicities of Mammosite

- Fat necrosis: Risk may be slightly lower than with Interstitial and no difference with placement technique.



# COMMON ASPECTS

- ◉ Eligibility criteria
- ◉ Intraoperative implant
- ◉ Target definition and planning
- ◉ HDR
- ◉ After Loading
- ◉ Dose & Timing

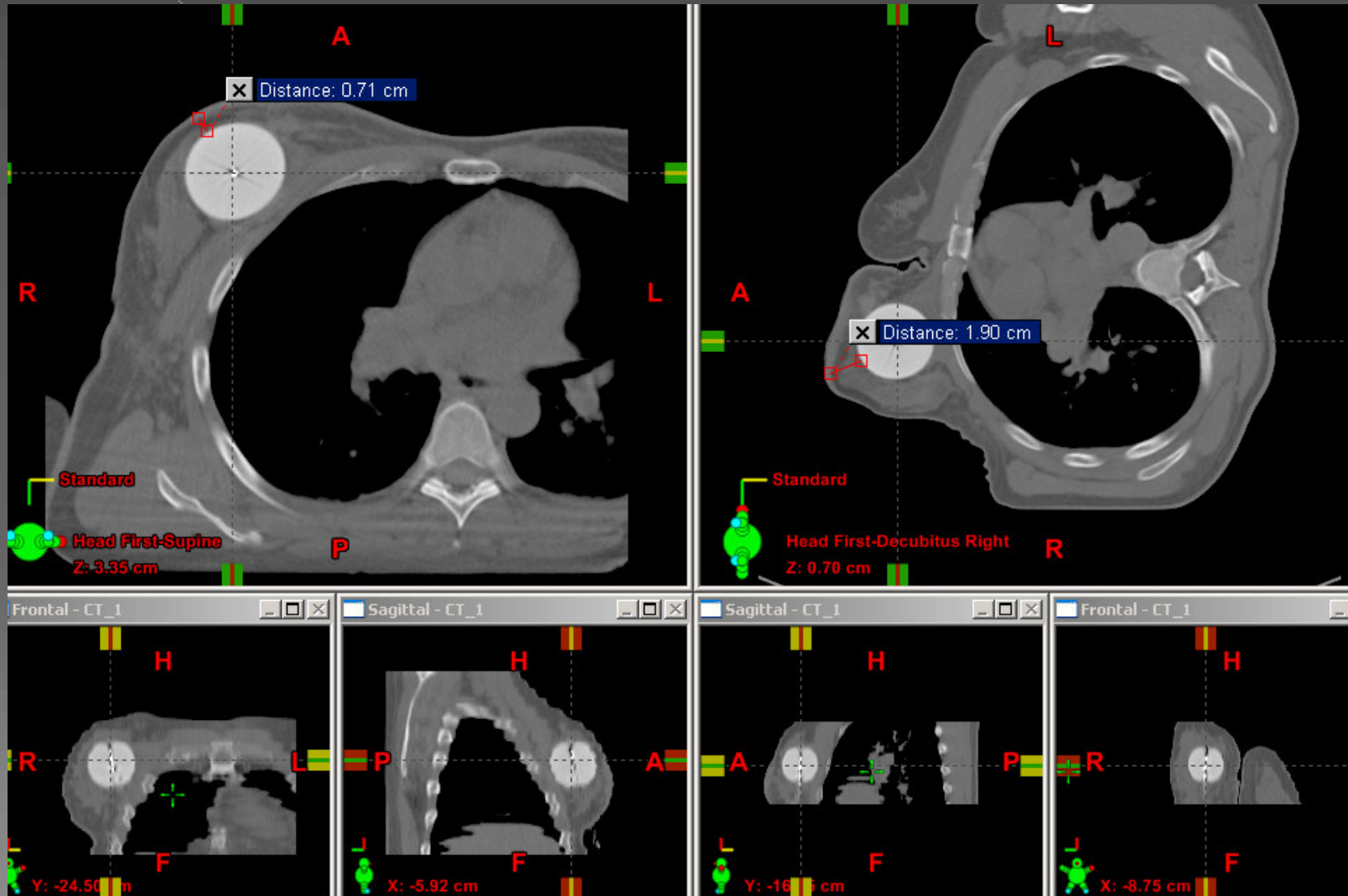
# Interstitial or Intracavitary?



DEPENDS ON:

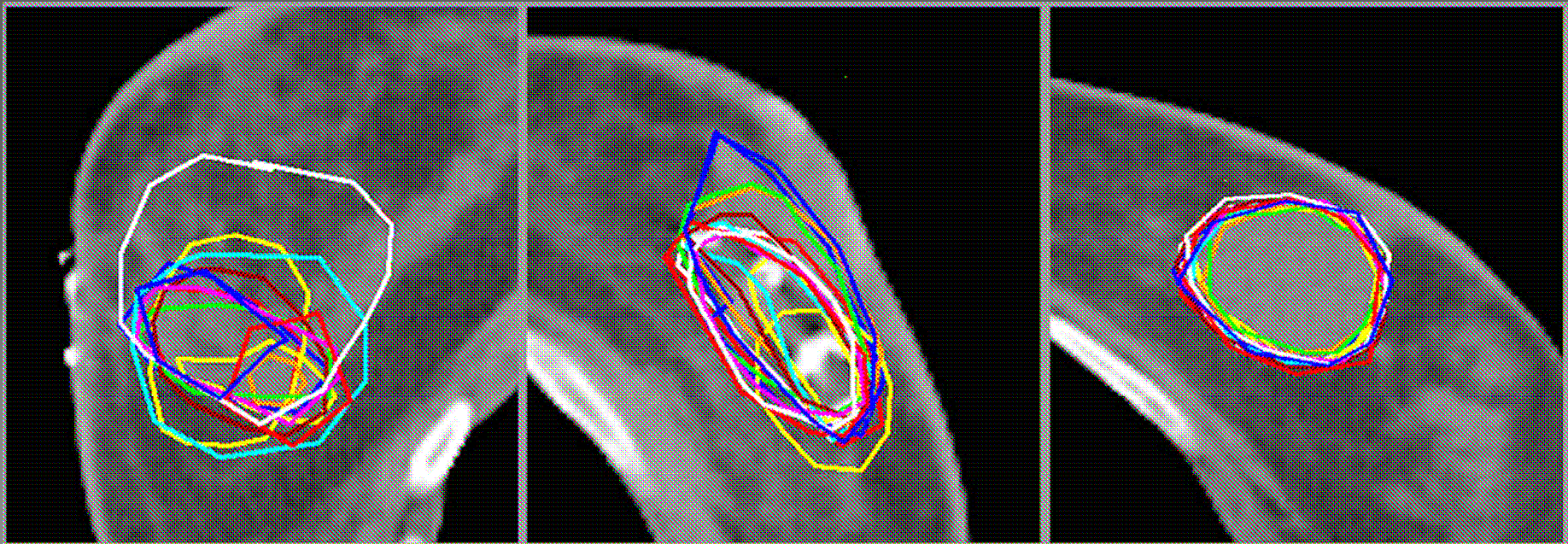
- BREAST SHAPE and TUMOR BED SIDE
- Brachytherapist experience

# BRACHYTHERAPY GAINS (I)



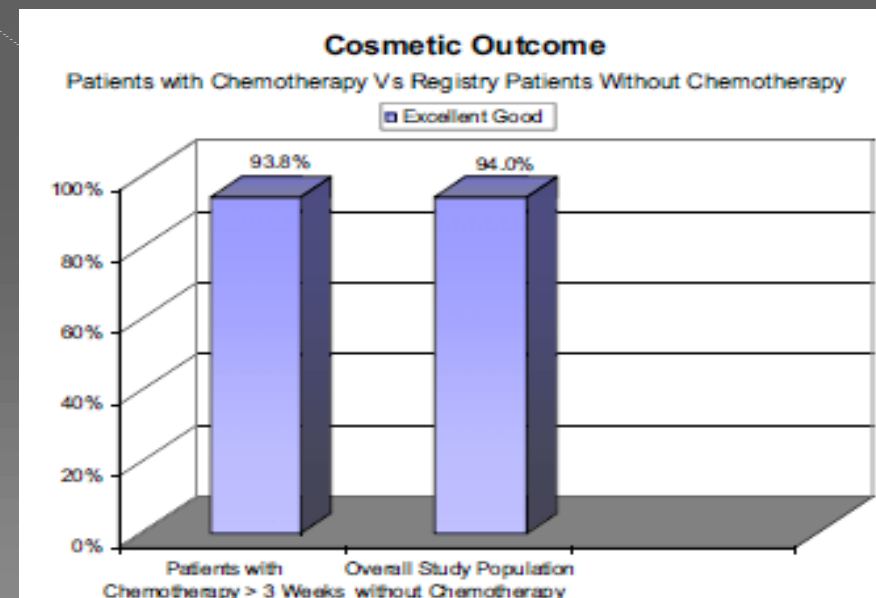
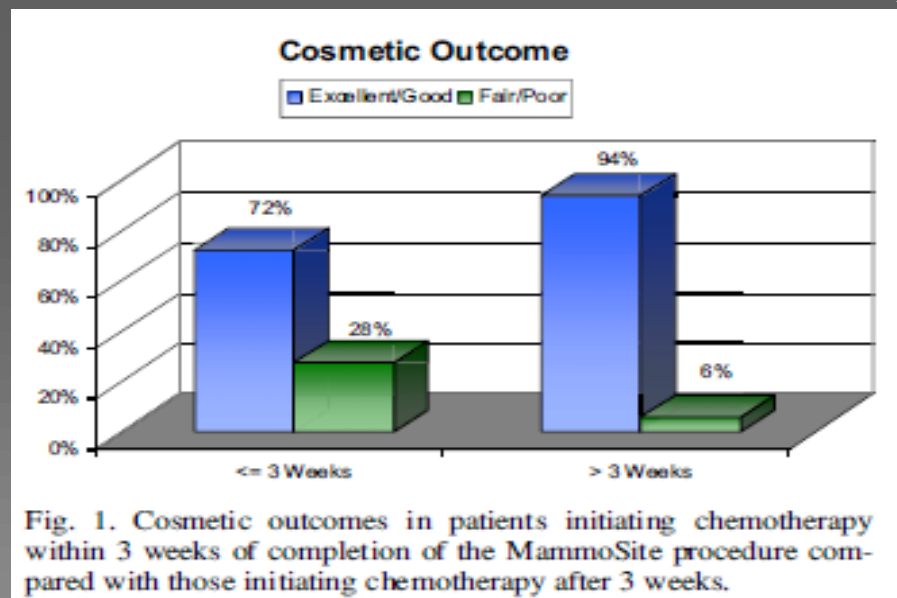
## BRACHYTHERAPY GAINS (II)

- The possibility to define the tumor bed INTRAOPERATIVELY erase every uncertainty on CTV definition and every inter-operator difference



# BRACHYTHERAPY GAINS (III)

- At the same time, the possibility to complete the therapy in few days after the implant allow a better timing with chemotherapy and this results in better outcome in LR and in cosmesis



# BRACHYTHERAPY LOSS

- Invasive and bloody technique
- Very **operator dependent**, especially on number of cases performed.
- Certain toxicities increase over time (telangiectasias and fat necrosis) while others stabilize (breast pain, breast edema).
- Cosmetic results appear to improve over time.

# BRACHYTHERAPY LOSS





# Brachytherapy: cosmesis



# RESUMING

- CTV=PTV
- ? TOX OAR
- ?CTV uncertainties
- 😊 timing

- Invasive technique
- Operator dependent



# Perspectives

