



CONNECTICUT AREA MEDICAL PHYSICS SOCIETY

a chapter of the

AMERICAN ASSOCIATION OF PHYSICISTS IN MEDICINE



Contura Multilumen Device Experience For Accelerated Partial Breast Irradiation

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YALE-NEW HAVEN
HOSPITAL

Outline

- ⦿ Introduction: breast conservation therapy
- ⦿ The Contura device
- ⦿ Patient selection
- ⦿ Imaging for treatment planning
- ⦿ Treatment planning
- ⦿ Pre-treatment quality assurance
- ⦿ Results
- ⦿ Discussion
- ⦿ Conclusions

Breast Conservation Therapy

- Accelerated partial breast irradiation vs. whole breast irradiation
- Mammosite HDR brachytherapy
 - Single or multiple dwell positions
 - Limitations
 - Breast tissue conformance
 - Balloon asymmetry
 - Balloon to skin distance



Image courtesy of Hologic Inc.

The Contura device

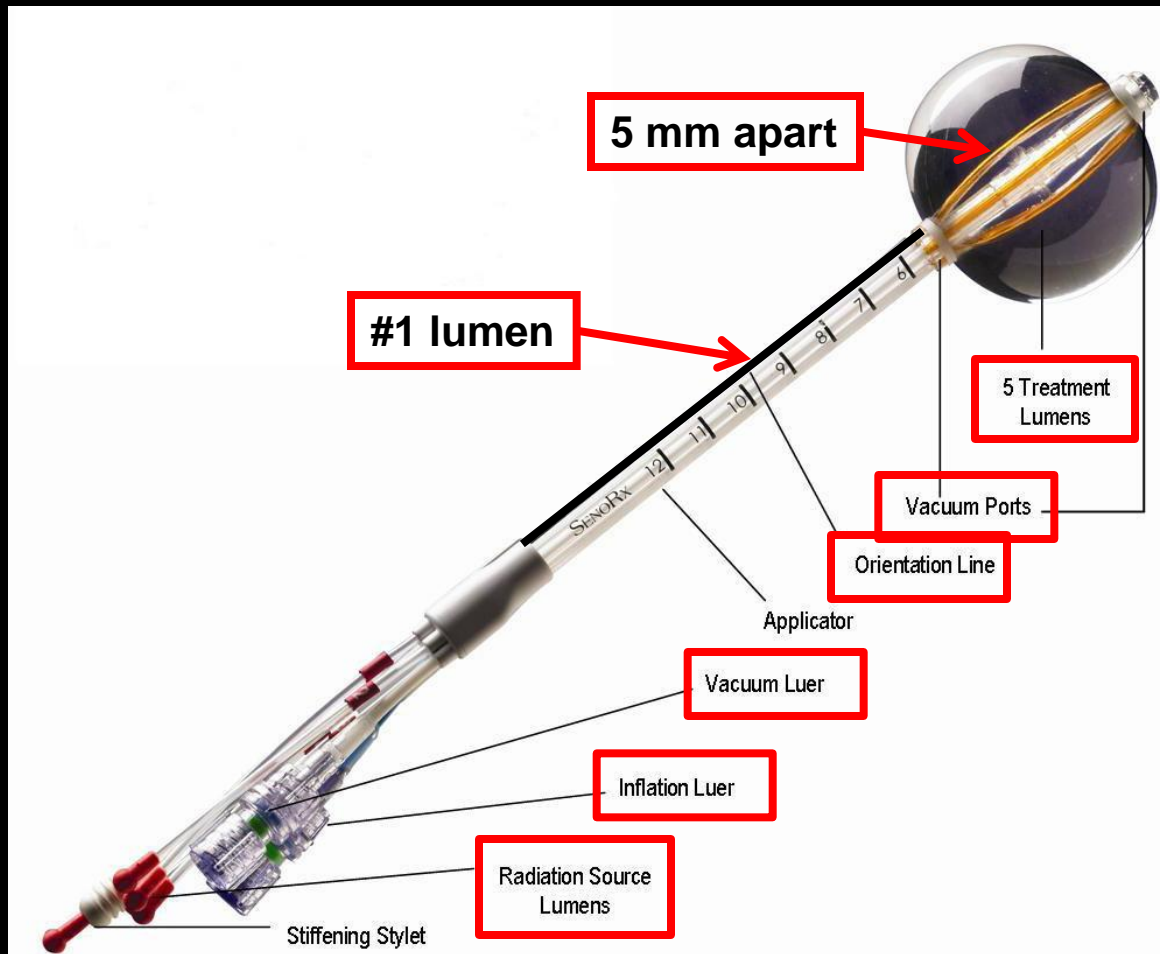
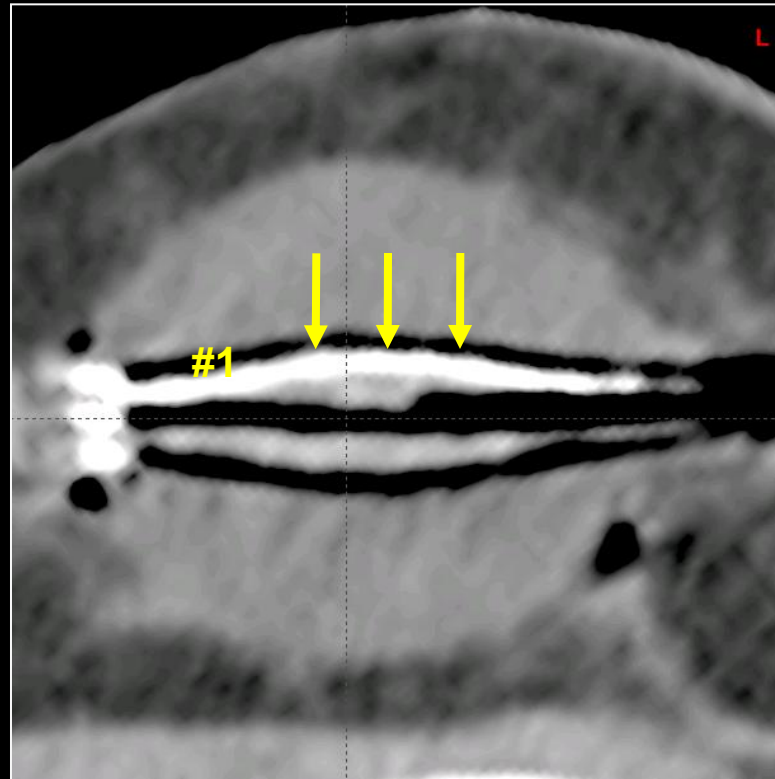
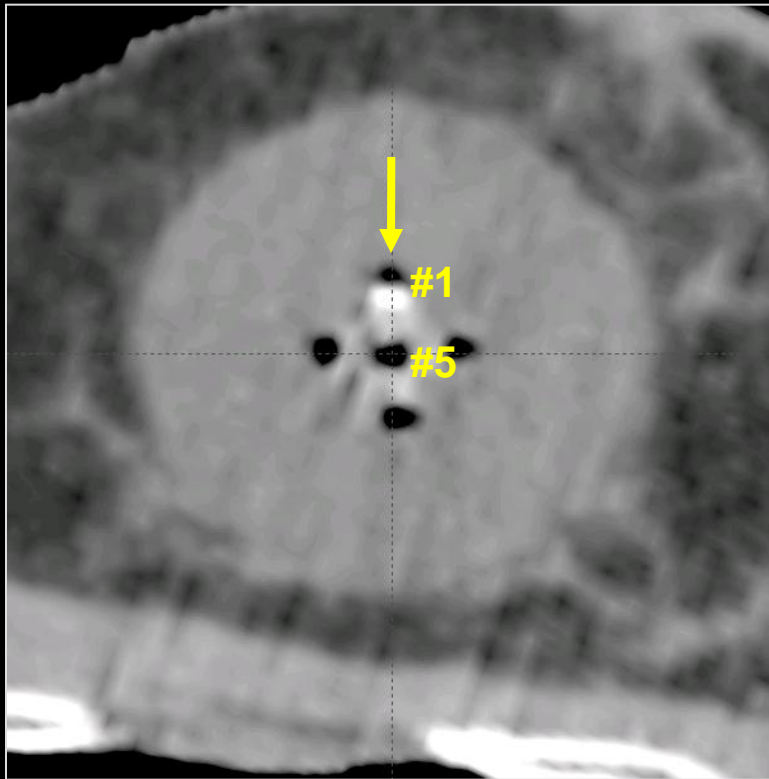


Image courtesy of SenoRx Inc.

The Contura device

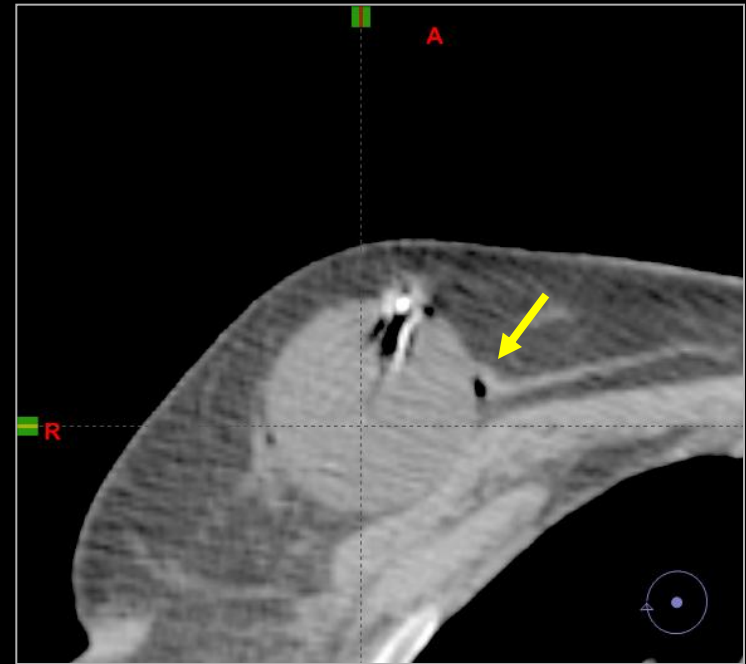


The Contura device

Vacuum port



Before air removal



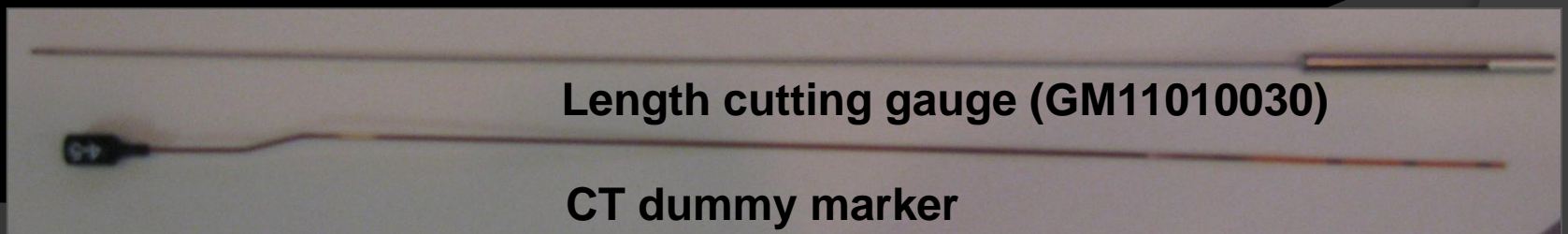
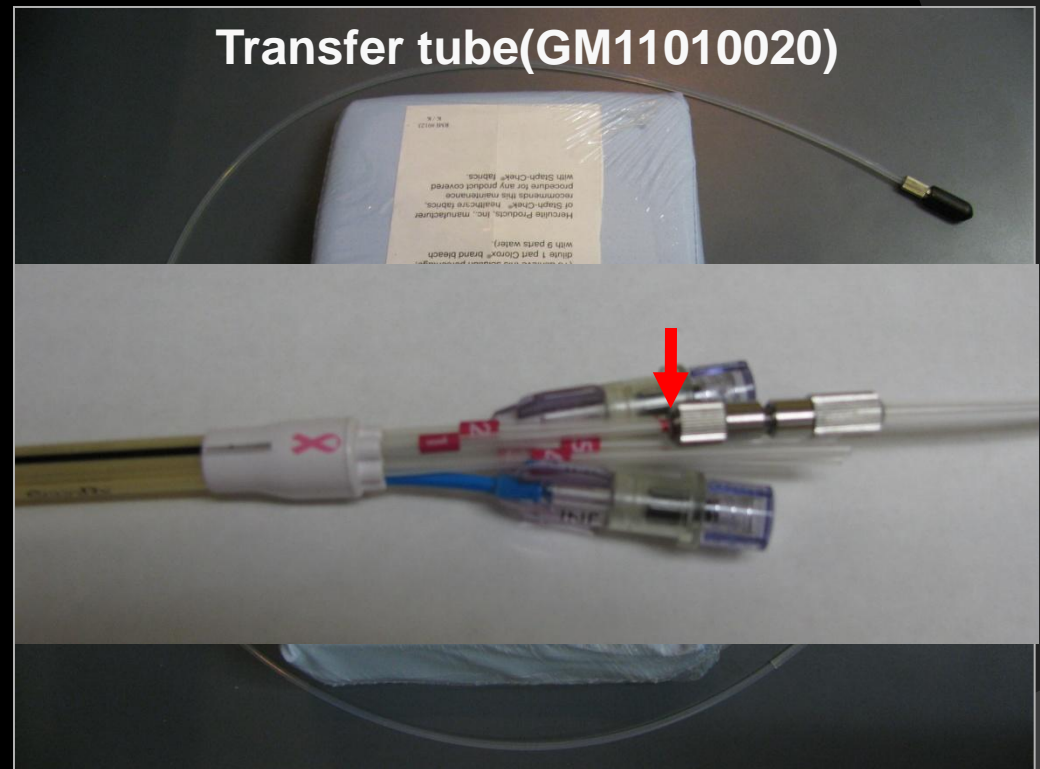
After air removal

Patient selection

- ⊙ Age: ≥ 50 y/o
- ⊙ Histological confirmation of the tumor as DCIS and/or invasive breast carcinoma
- ⊙ T_{is} , T_1 , or T_2 (≤ 3 cm in diameter)
- ⊙ Axillary node(s): N_0
- ⊙ No distant metastases (M_0)

Preparation for imaging

- Vac-lok fabrication
- Varian GammaMed Plus ix: trimming of each lumen
 - Length cutting gauge (GM11010030)
 - Marker for daily connection
 - Accessory pad(s)



Imaging for treatment planning

◎ Initial evaluation imaging

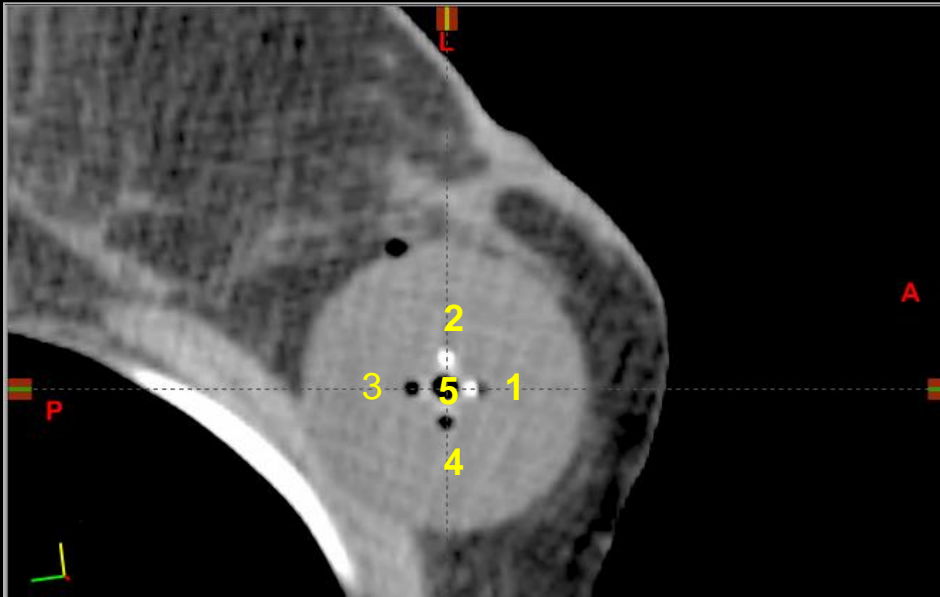
- 5 mm slice thickness
- Air/fluid removal

◎ Planning imaging

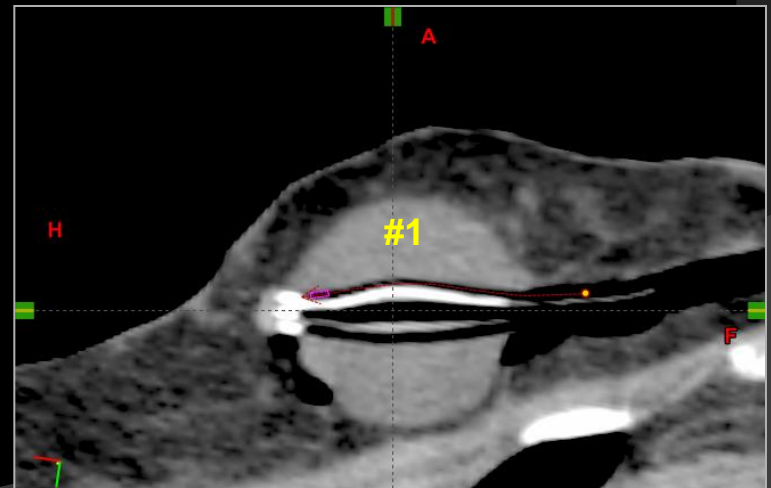
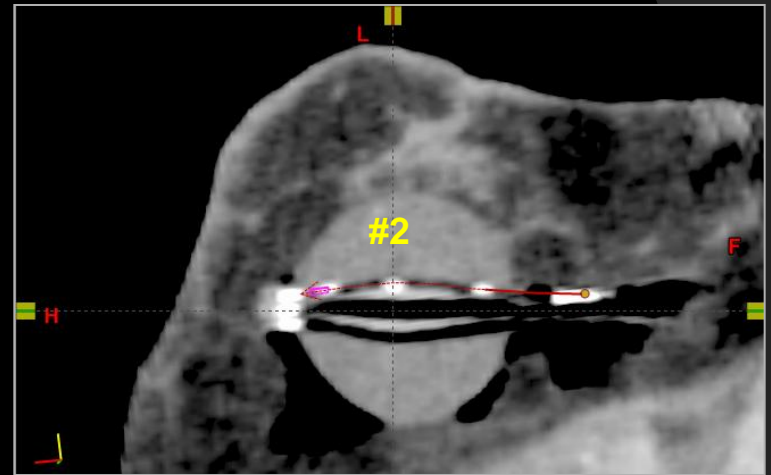
- 1.25 mm slice thickness
- 5 cm superior and inferior to the Contura balloon
- Normal breathing
- No contrast agent used
- CT dummy in # 2 lumen

Treatment planning

Identify 5 lumens

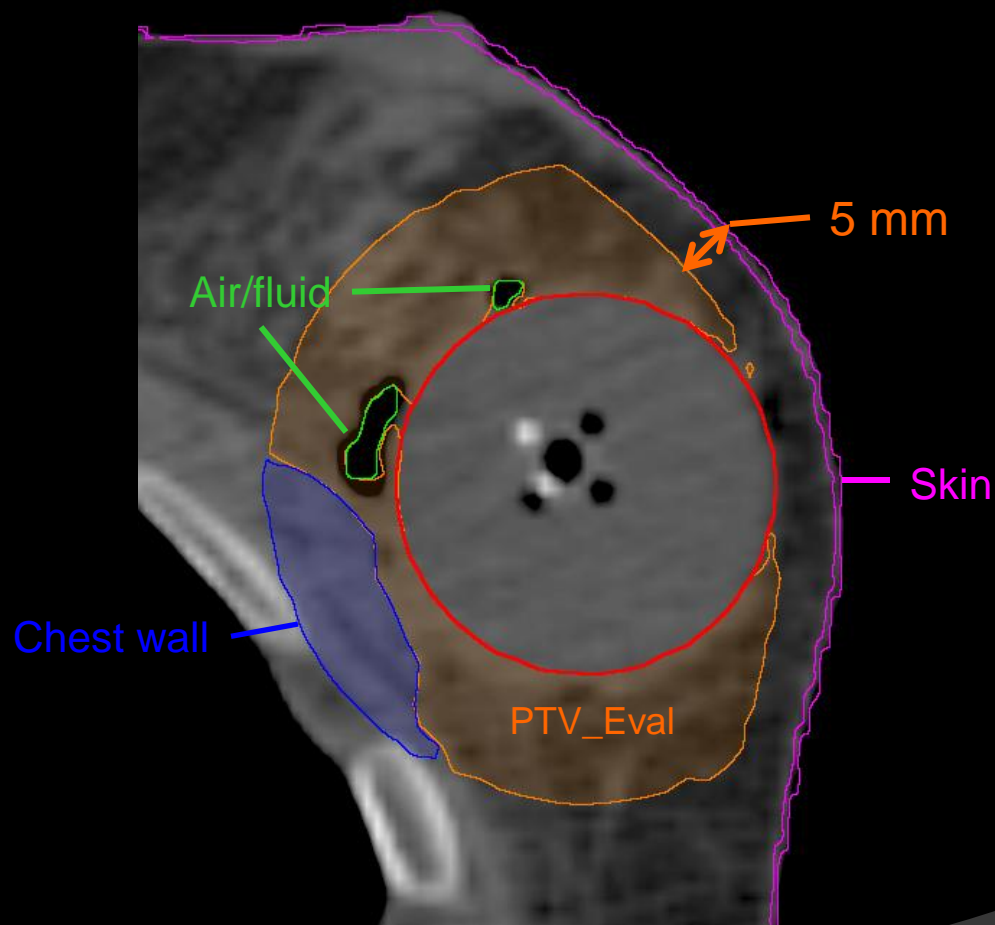


CT dummy maker in #2



Permanent maker in #1

Treatment planning



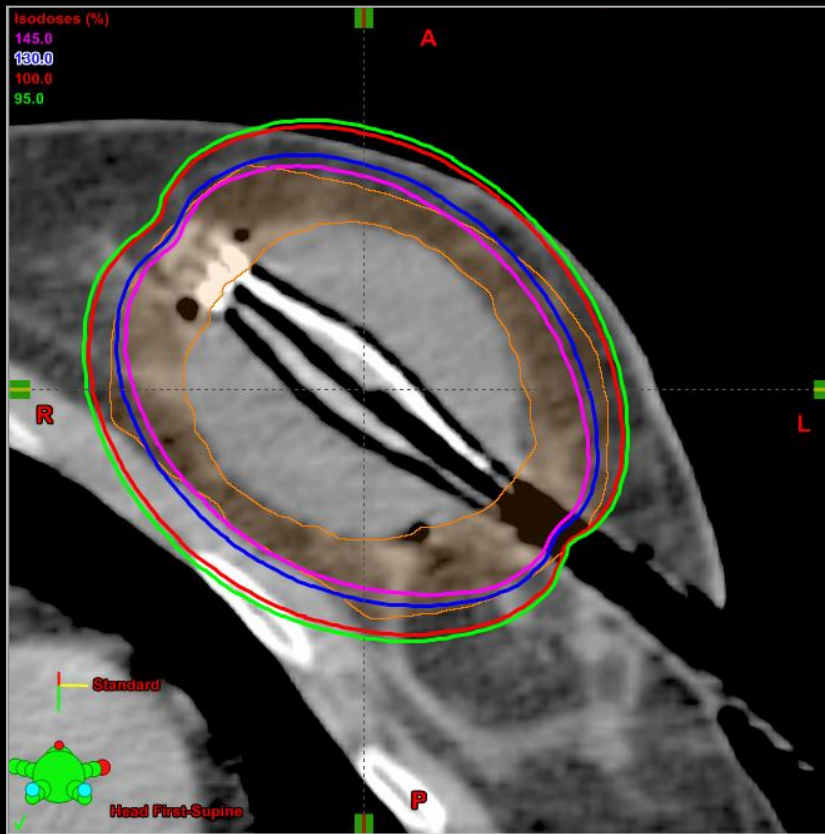
Treatment planning

- ⦿ Prescribed dose (PD): 34 Gy in 10 fractions
 - 5 working days
 - at least 6 hours between two fractions
- ⦿ Dosimetric goals:

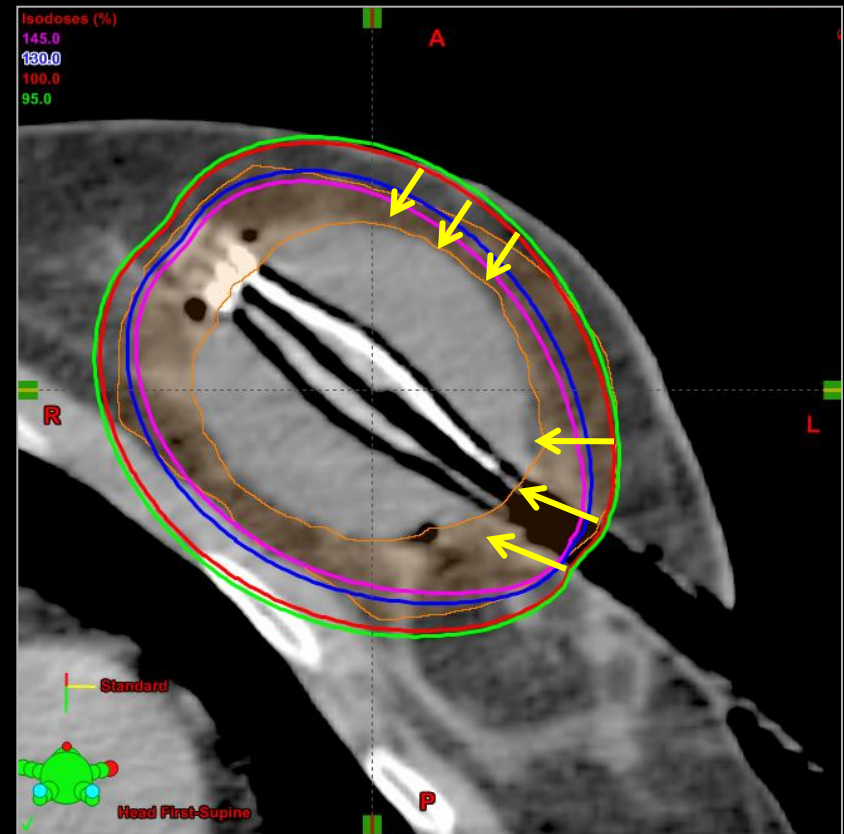
$V_{95\%}(\%)$	$V_{150\%}(CC)$	$V_{200\%}(CC)$	Skin Dose (% of PD)
$\geq 100\%$ of PTV_Eval	≤ 50	≤ 10	≤ 130

- ⦿ 5 mm step size between dwell positions

Treatment planning



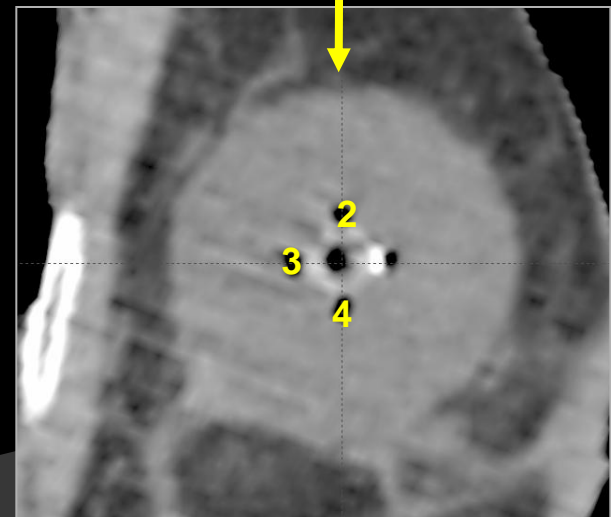
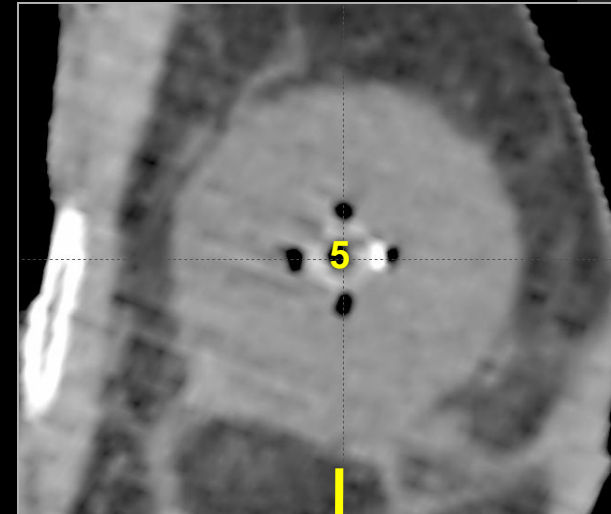
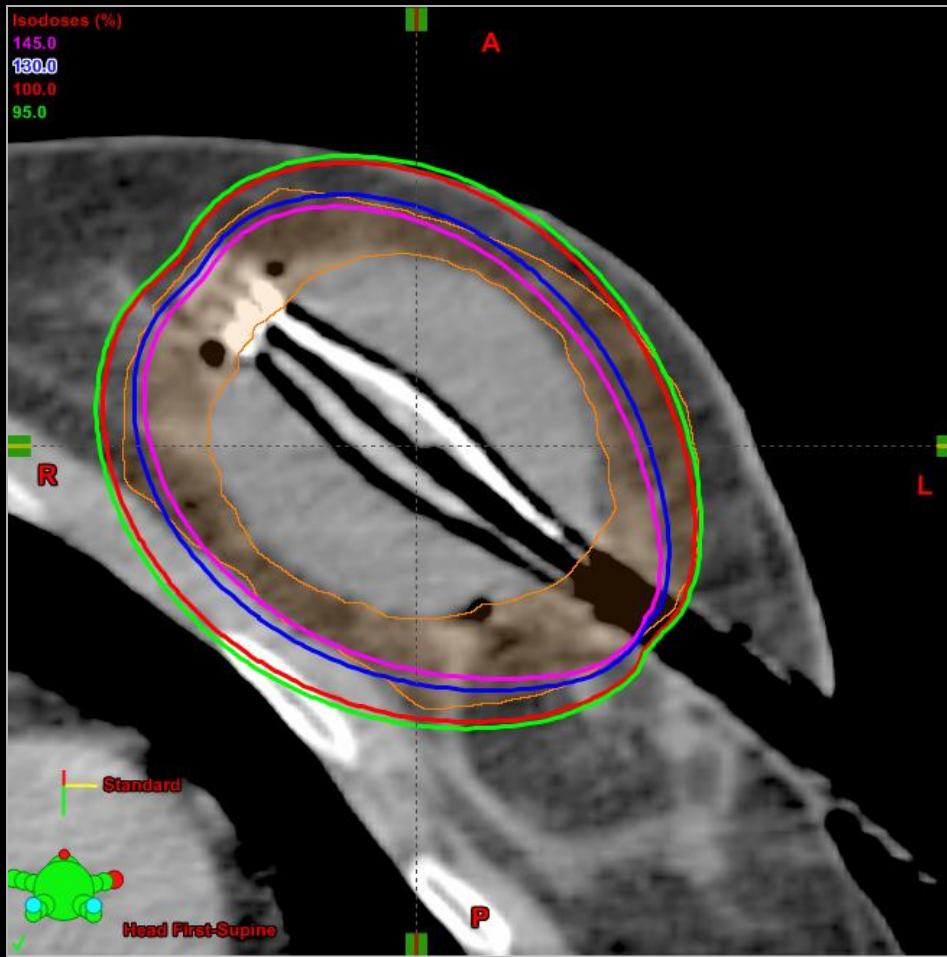
Only #5 (central) lumen used



#2,3,4 lumens used

Treatment planning

Only #5 (central) lumen used

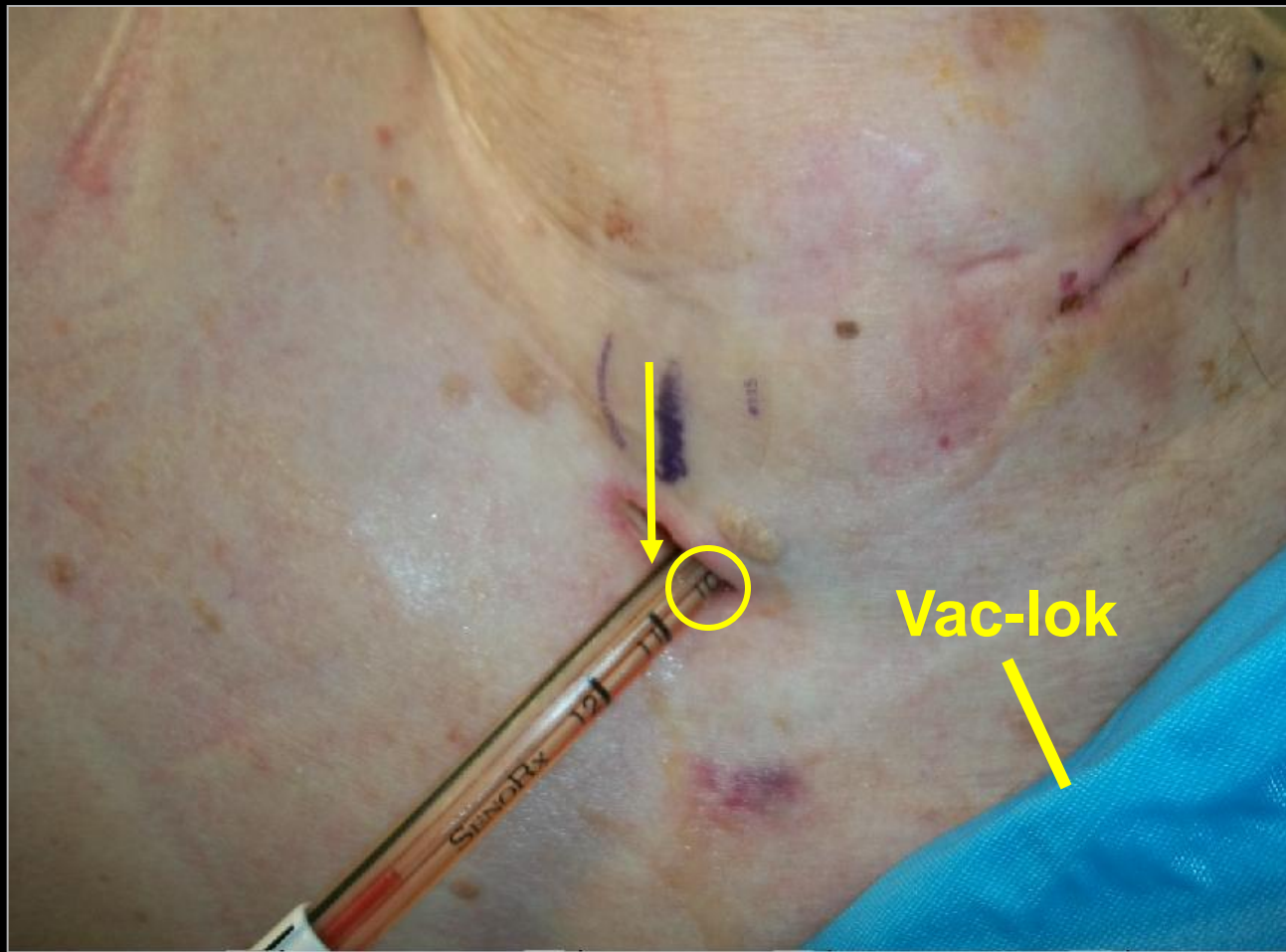


#2,3,4 lumens used

Pre-treatment quality assurance

- ⊙ **Balloon diameter verification**
 - Ultrasound: every fraction vs. baseline
- ⊙ **Air/fluid removal**
- ⊙ **Skin marker verification**
 - Rotation
 - Distance index
- ⊙ **Length of each lumen verification**
 - Length gauge (130 cm wire)

Pre-treatment quality assurance



Results: our patients

Summary of our 7 patients

- ◎ Balloon volume: average 39.0 cc
- ◎ $V_{95\%}$ (%): median 102.9 (96.4-107.0)
- ◎ $V_{150\%}$ (cc): median 32.6 (26.5-37.5)
- ◎ $V_{200\%}$ (cc): median 10.1 (7.9-11.8)
- ◎ Skin max. dose (% of PD): median 121.1 (85.2-139.4)
- ◎ Balloon-to-skin-distance (mm): 2.8-13.1

Results: current study

Int. J. Radiation Oncology Biol. Phys., Vol. 79, No. 1, pp. 26-33, 2011

IMPROVEMENTS IN CRITICAL DOSIMETRIC ENDPOINTS USING THE CONTURA MULTILUMEN BALLOON BREAST BRACHYTHERAPY CATHETER TO DELIVER ACCELERATED PARTIAL BREAST IRRADIATION: PRELIMINARY DOSIMETRIC FINDINGS OF A PHASE IV TRIAL

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V_{95%}(%)	V_{150%}(CC)	V_{200%}(CC)	Skin Dose (% of PD)	Rib Dose (% of PD)
≥95% of PTV_Eval	≤ 50	≤ 10	≤ 125	≤ 145

Results: Arthur et al.

Summary of 144 patients

- ⊙ Balloon volume: average 46.5 cc
- ⊙ $V_{95\%}$ (%): median 96.0 (84.8-107.7)
- ⊙ $V_{150\%}$ (cc): median 26.7 (11.6-46.0)
- ⊙ $V_{200\%}$ (cc): median 5.7 (0.0-12.5)
- ⊙ Skin max. dose (% of PD): median 91.7 (33.2-144.0)
- ⊙ Balloon-to-skin-distance (mm): 1.2-35.0

Results: Arthur et al.

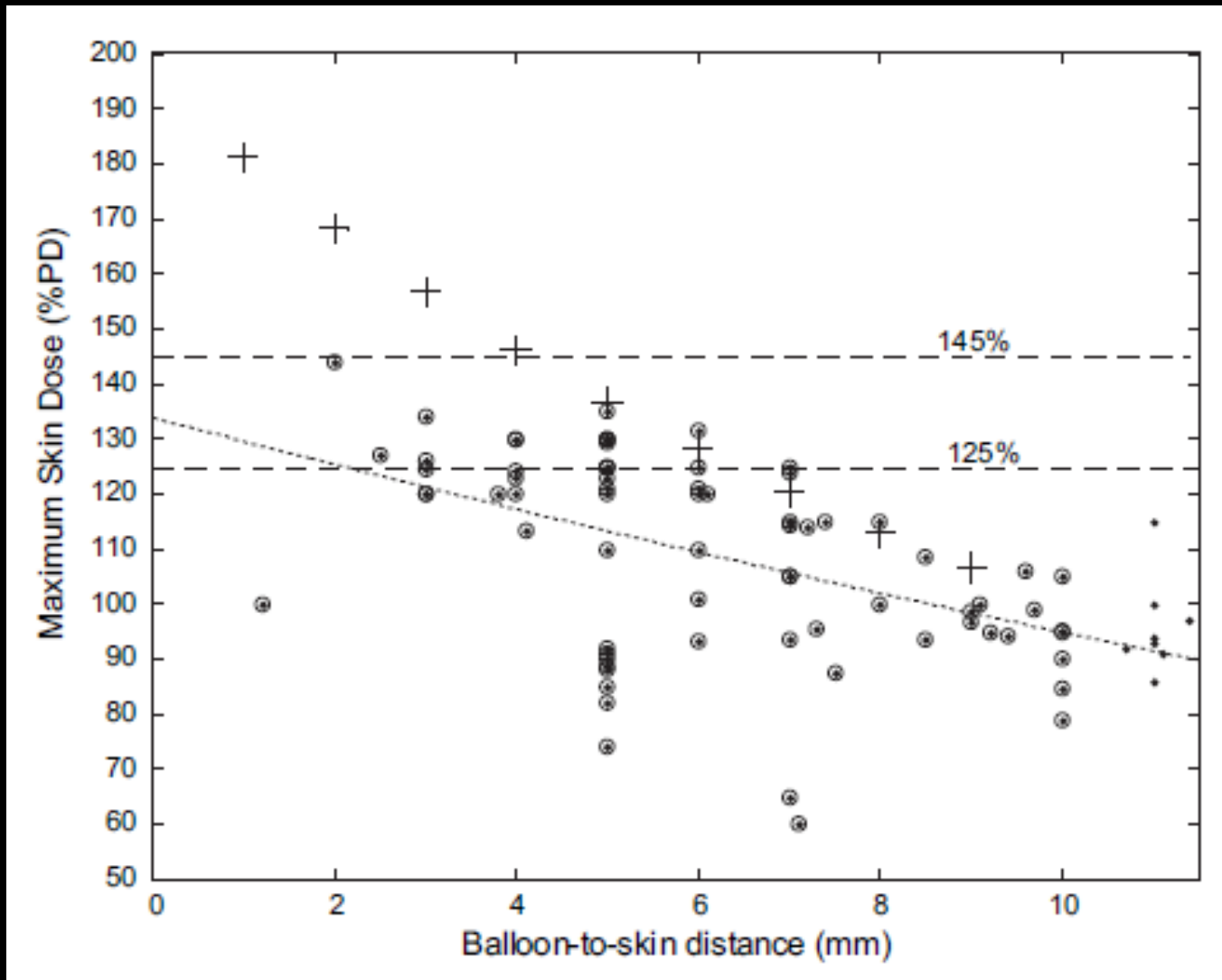


Fig. 4. Int. J. Radiation Oncology Biol. Phys., Vol. 79, No. 1, pp. 26-33, 2011

Results: Arthur et al.

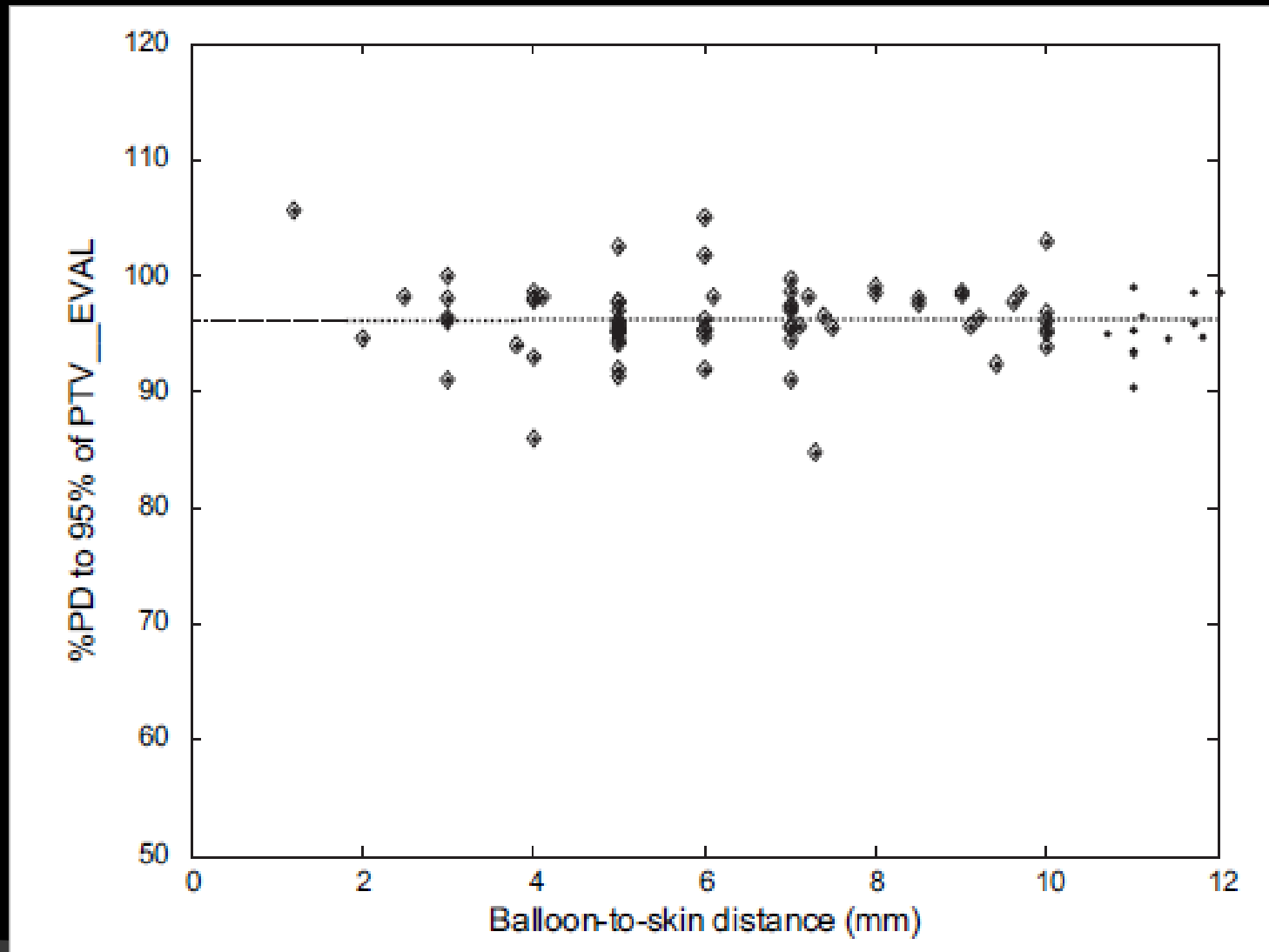


Fig. 5. Int. J. Radiation Oncology Biol. Phys., Vol. 79, No. 1, pp. 26-33, 2011

Discussion

◎ The impact of the vacuum port

Tokita et al., *brachytherapy* 2010

- $V_{\text{air/fluid}}$ around Contura balloon before and after vacuum port use
 - Median $V_{\text{air/fluid}}$ decreased from 6.8 cc to 0.8 cc
 - Before: 10 (31.3%) of 32 patients with $V_{\text{air/fluid}} \geq 10\%$ of PTV_Eval
 - After: median $V_{\text{air/fluid}}$ is 1.6% of PTV_Eval
 - After: median $V_{90\%}$ increased 8%

Discussion

⦿ Dosimetric advantages of Contura (n=45) over MammoSite (n=137)

Wilder et al., *Brachytherapy* 2009

- Satisfaction of treatment planning goals: 89% of Contura vs. 36% of MammoSite
- Contura no explantation required
 - 16% (7 of 45) of patients with 3-6 mm skin space
 - 11% (5 of 45) of patients with $V_{\text{air/fluid}} \geq 10\%$ of PTV_Eval
- Mammosite explantation required
 - 10% of patients with skin space < 7 mm
 - 13% of patients with a large air/fluid pocket next to balloon

Discussion

- A dosimetric comparison of Contura (n=33) vs. MammoSite (n=33)

Brown et al., *Brachytherapy* 2011

- Coverage of PTV_Eval: Contura is either equal or better
- $V_{150\%}$ and $V_{200\%}$: no difference

	Contura	MammoSite
Skin dose (median)	112% of PD	134% of PD
Rib dose (with < 4mm space)	144% of PD	191% of PD

Conclusions

- ◎ The use of the Contura for APBI tailors the dose away from skin with good target coverage and acceptable hot spot volumes ($V_{150\%}$ and $V_{200\%}$).
- ◎ Higher dosimetric goals compared to NSABP B-39/RTOG 0413 can be set and achieved.

NSABP: National Surgical Adjuvant Breast and Bowel Project
RTOG: Radiation Therapy Oncology Group