



## **Indications of Brachytherapy: Primary APBI or Boost After WBI**

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## **Disclosures**

- Non-salaried Consultant for Nucletron/Elekta
- Recipient of an Unrestricted Educational/Research Grant from Elekta to Conduct a 6-Institution Registry Trial of Interstitial Brachytherapy APBI
- Cianna Medical: minor stock options



## APBI

- Breast brachytherapy is becoming an attractive 4 or 5-day option for women with select early stage breast cancer
- In the US, approximately 12% of all women with breast cancer are receiving accelerated partial breast irradiation (APBI).

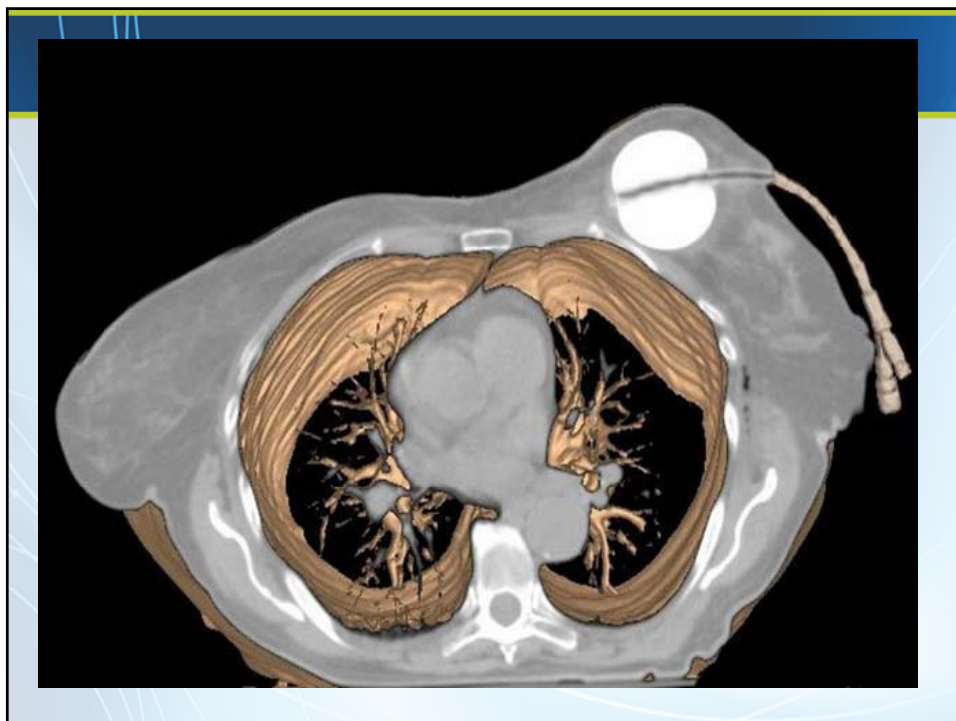
## Single Entry Devices: Menu

- MammoSite & MammoSite-ml balloons
- Contura balloon
- SAVI multi-strut (6, 8, or 10)



## Techniques of APBI

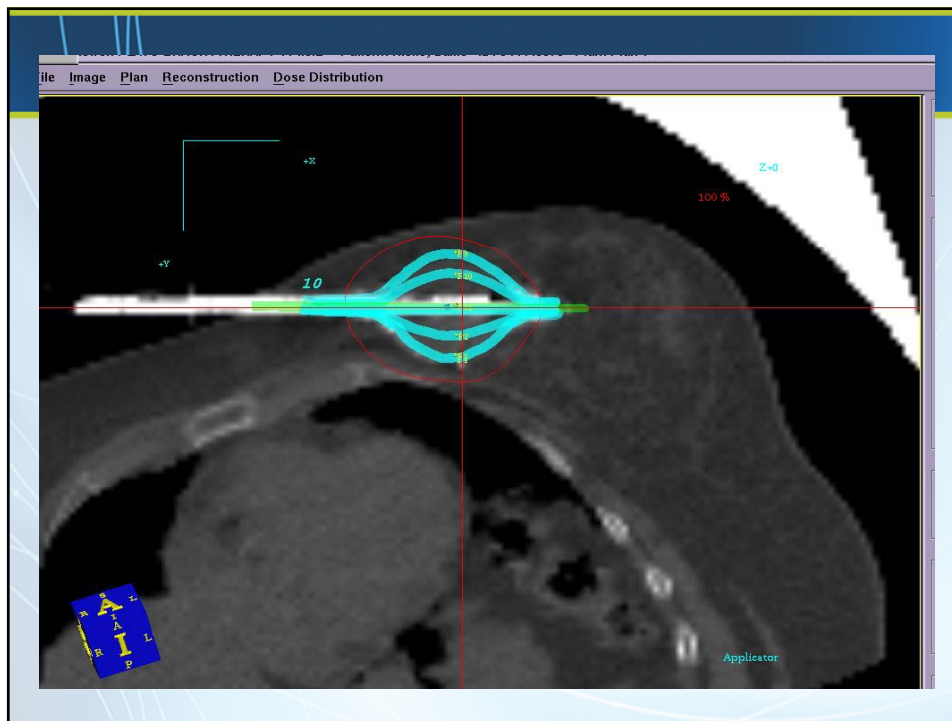
1. Interstitial Brachytherapy
- 2. Balloon catheters**
3. Single-entry strut-based device
4. External beam PBI
5. Single dose intra-operative electron beam



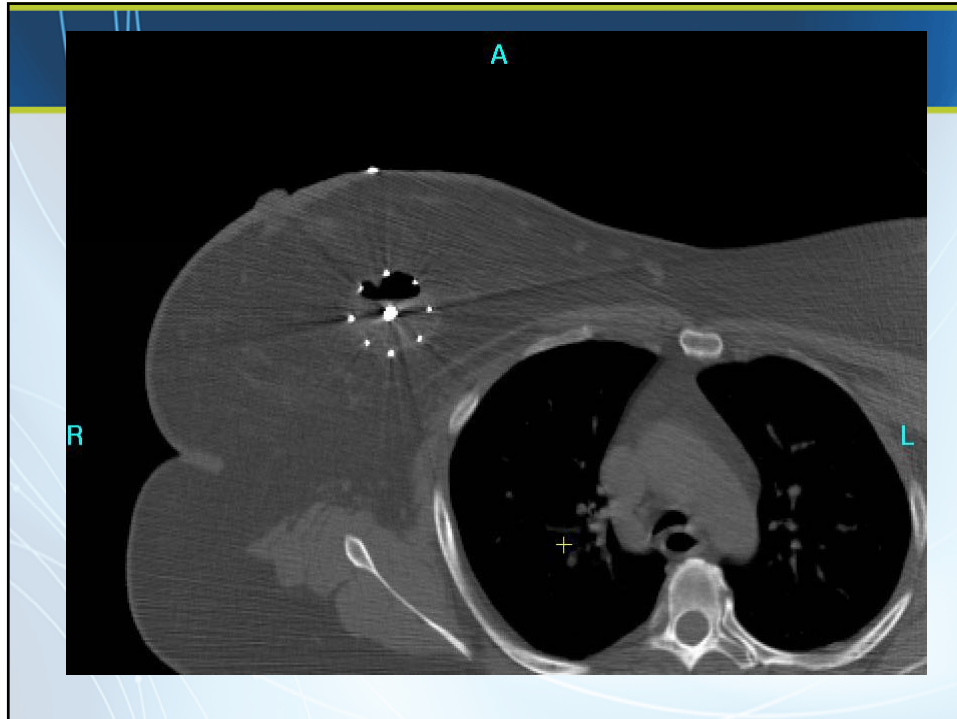


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## Single Entry Devices: Advantages

- Simplicity and Ease of Use
- Surgeon can place the SAVI, Contura, or MS
- Only one hole in the breast
- ASBS MammoSite and SAVI Registry Studies have published low tumor recurrence, low toxicity, and excellent cosmetic outcomes



## Single Entry Devices: Advantages

- Sometimes less intimidating to patient
- Sometimes less intimidating to the doctors
- Currently the most commonly used

## Single Entry Devices: Disadvantages

- Medical physics: Fewer degrees of freedom to shape the dose cloud
- Lower dose homogeneity index  
(SAVI < MammoSite < Contura < Interstitial)
- Confluent zones of high isodose, rather than punctate spots
- Only treats 1 cm beyond surgical cavity edge



## Single Entry Devices: Disadvantages

- Data is less mature and robust
- MD Anderson SEER data-base (MammoSite patients treated between 2002 and 2007): increased mastectomy, infection, and fat necrosis rates
- But the balloon device was FDA-approved in 2002, so doctors were going up the learning curve and learning dosimetric constraints

## APBI: Selecting the Best Technique

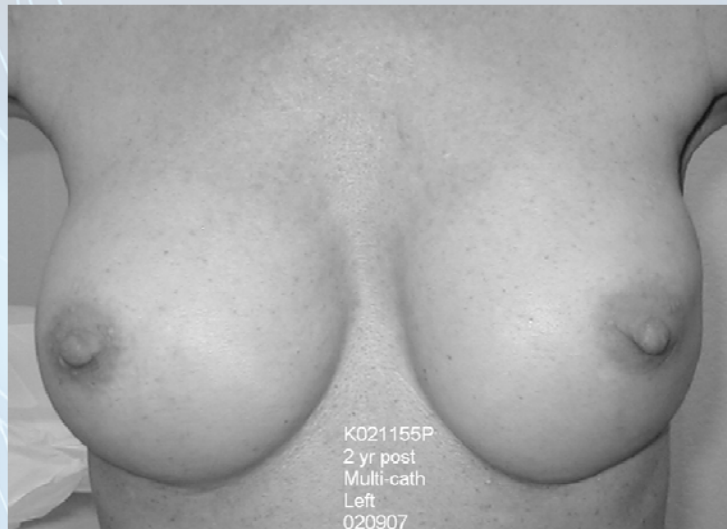
- With 22 years experience using all brachy techniques. I choose interstitial multicatheter brachytherapy for:
  - 1) age under age 50 years
  - 2) aggressive breast cancers: Grade 3 tumors with triple-negative or Her-2 (+)
  - 3) tight surgical margins < 2 mm
  - 4) lobular histologies, LVI, EIC, or node-positive



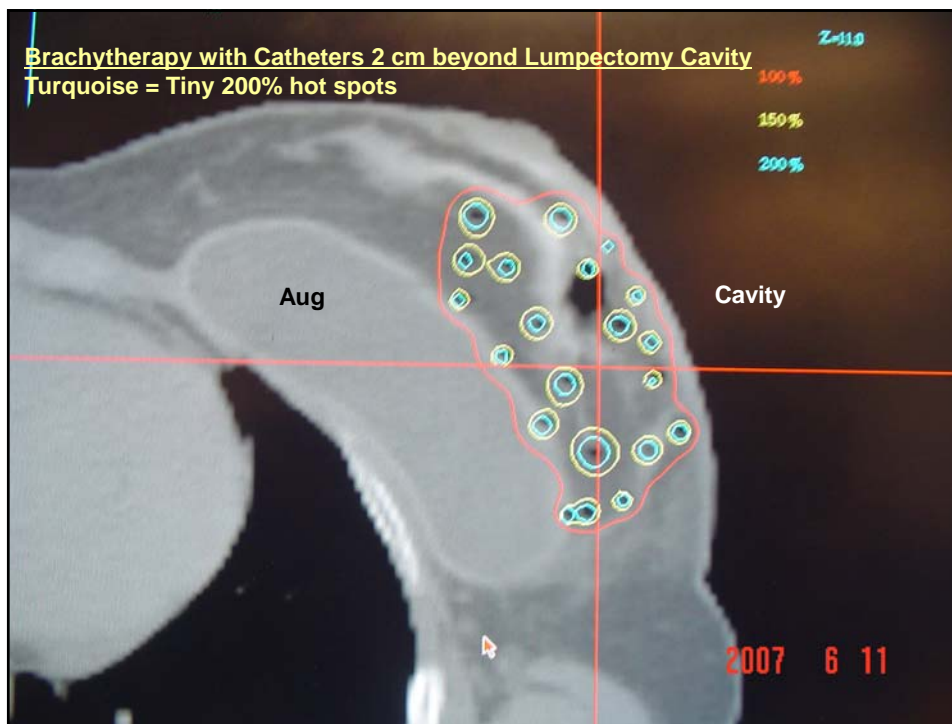
## APBI: Selecting the Best Technique

- With 22 years experience using all brachy techniques, I choose interstitial multicatheter brachytherapy in:
  - 5) women with implants (augmentation)
  - 6) oncoplastic surgery (no surgical cavity)
  - 7) tumors in challenging locations (e.g. inner quadrant or axillary tail breast cancers where tissue planes are thin)

## Breast Cancer in Augmented Women: Avoiding capsular contracture







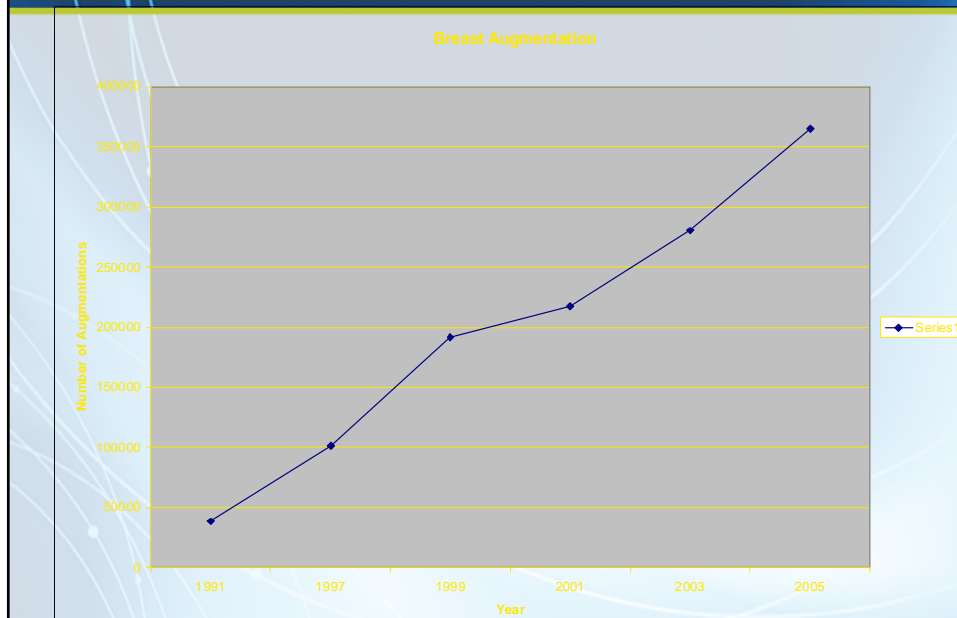
## Brachy Methods in Augmentation

- A template with pre-drilled holes compresses the breast tissue up and away from the implant while pushing the implant away
- Breast CT with the template attached





## Augmentation has Increased by 64% per year since 1991



## APBI: Selecting the Best Technique

- I choose single-entry devices when:
  - 1) the patient is over age 60 years with favorable histology
  - 2) generous surgical margins  $\geq 5$  mm
  - 3) node-negative
  - 4) surgeon's preference



## APBI with External Beam

- I choose 3-d conformal RT APBI when:
  - 1) Patients are absolutely needle-phobic
  - 2) Patients are so sick from co-morbidities that they cannot tolerate a procedure  
e.g. anti-coagulated

## APBI with IORT

- Current options for IORT:
  - 1) Intrabeam (Zeiss, Drs. Michael Baum and Jayant Vaidya)
    - Randomized phase III trial=TARGIT
    - Metal ball in cavity, soft x-rays
  - 2) Electrons (Milan, Dr. Umberto Veronesi)
    - Randomized phase III trial=ELIOT
    - Undermine remaining breast tissue and manipulate into the hole
    - Cylinder cone targets tissue inside wound
  - 3) XOFT (Electronic brachytherapy, miniature accelerator, inside a balloon applicator)



## ***IORT MOBILE ACCELERATOR***

- **NOVAC 7: An IORT dedicated electron accelerator**
- **Conventional OR (no shielding needed)**
- **Mobile and easily docked**
- **Electron beams of 4 different energies: 3, 5, 7, 9 MeV**



## **APBI with IORT: Problems & Issues**

- IORT issues:
  - 1) the lack of pathology confirmation that the patient is even a candidate for APBI, such as + margins or multiple positive nodes or extracapsular extension
  - 2) the single large dose of radiation, radiobiologically causing normal tissue damage
  - 3) the lack of quality control





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## APBI with IORT: Problems & Issues

- IORT issues:
  - 4) Poor definition of the target volume
  - 5) Ensuring & documenting PTV coverage
  - 6) potential difficulty in re-treating the patient with WBI if adverse lumpectomy/axillary pathology
  - 7) Intrabeam treats only 2 mm of tissue



## APBI with IORT

- When will I offer IORT?  
Perhaps in another century or two
- Why would you embrace an inferior treatment when you have expertise in a radiation modality (brachytherapy) that guarantees and documents coverage of the PTV?

## Summary & Conclusions

- Patients and physicians are seeking a shorter more convenient alternative to conventional 6-7 weeks of WBI
- Less radiation exposure to the heart, lung, chest wall, and the other 3 quadrants of the breast
- There are multiple options for a 1-5 day APBI
- My rankings: Interstitial > Single entry > 3dCRT > IORT > Lumpectomy alone without any RT



## Slide 29

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- c1 This information is stated in the Shaitelman abstract (Radiation Oncology, Suppl 2011) but not the Beitsch study - confirm ok to keep and reference as Shaitelman  
cherilynh, 3/19/2012