

# Partial Breast Irradiation: Tailoring Care



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Northern Indiana Oncology  
Symposium

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INDIANA UNIVERSITY

SCHOOL OF MEDICINE

# Evolution

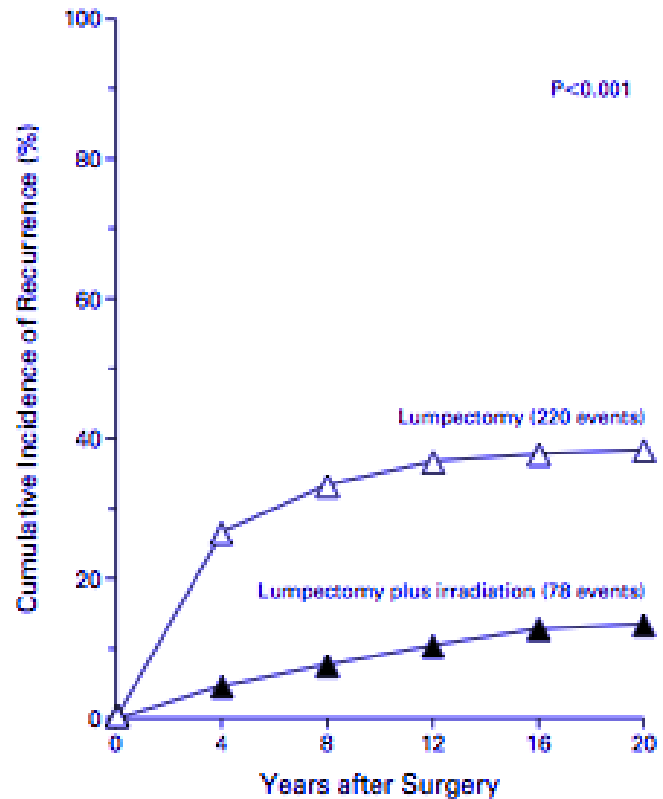
Mastectomy ~~??~~ Lumpectomy + RT ~~??~~ APBI  
(Standard of care)

QuickTime™ and a decompressor are needed to see this picture.



# 20 Year Update of B06

Demonstrated a cumulative local recurrence rate of 14.3 vs. 39.2% for Lumpectomy with and without radiation





# Obstacles to RT

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SEER Registry has shown that adjuvant radiation after breast conservation varies from region to region.

By the late 1990's 20% of women undergoing BCT did not receive adjuvant radiation therapy

Elderly patients are more likely not to receive RT after breast conservation compared to younger patients

APBI may help to alleviate some of these disparities



# Obstacles to Breast Conservation

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Distance or difficulty with transportation

Lack of family support

Economically disadvantaged

6 weeks of WBI can sometimes present obstacles that prevent a patient from choosing breast conservation



# Is it Necessary to Treat the Entire Breast

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75% of ipsilateral breast recurrences occur at or near the tumor bed

Rate of other ipsilateral recurrences was similar to the rate of contralateral second primaries



# Is it Necessary to Treat the Entire Breast

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Studies have shown a 5% true local recurrence at 10 yrs

15 yr local recurrence vs. elsewhere recurrence almost equal

15 yr elsewhere recurrence less than half the rate of contralateral breast cancers

# Where are the Failures?

TABLE 1. Location of Local Recurrence After Breast-Conserving Surgery With or Without Postoperative Radiation

Investigator	Year	Number of Patients	% of Local Recurrences Occurring At or Near Lumpectomy Site*	% of Patients With Elsewhere Local Recurrence <sup>†</sup>
With radiation				
Fourquet et al. <sup>49</sup>	1989	518	46	5.8
Boyages et al. <sup>50</sup>	1990	783	81	2.2
Kurtz et al. <sup>51</sup>	1990	1,593	79	2.4
Fowble et al. <sup>52</sup>	1990	1,093	74	1.7
Clark et al. <sup>53</sup>	1992	416	83	0.9
Gage et al. <sup>54</sup>	1995	974	79	2.8
Liljegren et al. <sup>55</sup>	1999	184	67	5.0 <sup>‡</sup>
Touboul et al. <sup>56</sup>	1999	528	59	4.2
Smith et al. <sup>7</sup>	2000	1,152	44	6.0
Veronesi et al. <sup>57</sup>	2001	299	85	0.6
Huang et al. <sup>8</sup>	2002	1339	62	3.6
Without radiation				
Clark et al. <sup>53</sup>	1992	421	86	3.5
Liljegren et al. <sup>55</sup>	1999	184	67	5.0 <sup>‡</sup>
Veronesi et al. <sup>57</sup>	2001	280	86	2.9
Total		9,764	71	3.3

\*Number of local recurrences at or near prior lumpectomy site/total number of local recurrences.

<sup>†</sup>Number of recurrences outside area of prior lumpectomy site/total number of patients treated.

<sup>‡</sup>Percentages reported represent numbers from total series.



# Accelerated Partial Breast Irradiation

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APBI with external beam (3D CRT)

Intraoperative APBI (IORT)

Interstitial APBI- multiple afterloading catheters

Intracavitary APBI- Mammosite, Contoura dual or multilumen balloon catheter

Most important point: Careful patient selection



# APBI

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# ASTRO APBI Consensus Guidelines



Suitable Group

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Cautionary

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# ASTRO APBI Consensus Guidelines



## Cautionary Group

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# ASTRO APBI Consensus Guidelines



## Unsuitable Group

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# Potential Benefits

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5 days twice a day may be an easier time frame to accomplish

For the appropriate patients, distance may be less of an issue if only need lodging or transportation for 1 week

Smaller volume of normal tissue can be treated

Potential cost advantage



# Potential Benefits; Jain et al. 2009

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Significant decrease in lung receiving  
20Gy with PBI

Mean lung dose less for PBI vs. Whole  
Breast

3.46Gy vs. 4.57Gy  $p=0.005$

PBI did expose more lung volume to 2.5Gy and  
5Gy

PBI planned with 5 noncoplanar beams

Whole breast planned with field in field



# Potential Toxicity

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75 Women Stage I/II Breast CA

Tx delivered with Ir-192 HDR Interstitial  
3.4cGy twice daily to 2cm margin

Supoptimal outcome associated with

V150, V200, Multiple Dwell Positions  
and inversely with DHI (dose homogeneity  
index)

Adriamycin chemotherapy associated with higher  
grade skin toxicity, suboptimal cosmetic  
outcome, fat necrosis



# Potential Toxicity

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Wazer et al. found a 27% crude incidence of clinically evident fat necrosis post interstitial implant

Presentation of pain and swelling in the treated volume

Associated with V150, V200

To decrease risk of necrosis patients are stratified by  $<V150$ ,  $V151-200$ ,  $>V200$  to doses of 34Gy, 32Gy, 30Gy

Polgar et al. found an equivalent rate of necrosis between APBI and WB of ~20%



# **RTOG 9517 SCHEMA**

## **Assess Multicatheter Brachytherapy**

**Phase/II**

**100 patients**



**HDR**  
**34Gy/ 10 fx**

**LDR**  
**45Gy/ 3.5-6 days**

- Eligibility:**
- Tumors <3cm**
  - Ductal Carcinoma**
  - 0-3 nodes positive with no extracapsular extension**
  - Negative surgical margins**
  - No EIC**



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RTOG 9517

Phase/II trial  
enrolled 100  
patients

3% local and nodal  
actuarial 4 yr  
recurrence rate

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# Single Institution Data

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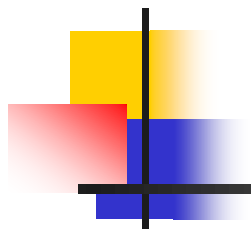
## William Beaumont 10 year Matched Pair Analysis

199 APBI pts matched with 199 WB pts

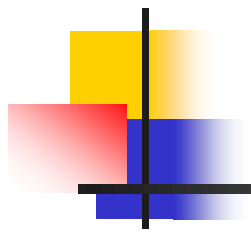
Median F/u 9.6 years

IBTR at 10 yrs was 5% APBI vs 4% WB

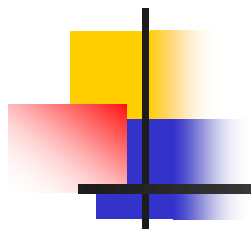
Lack of adjuvant tamoxifen, ER- status, and decreasing age statistically significant associated with IBTR



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# Current Trial

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Another potential use is re-irradiation

Salvage mastectomy is the standard of care for local recurrence due to elevated risk of IBTR

Studies have shown that a second local chest wall recurrence can occur in 2-32% of patients



■ Salvadori et al. 134 pts s/p SM vs. SBC

■ Retrospective series, Milan Italy

134 Salvage Mastectomy

57 SBCS

5 year survival 70%

85%

Second local relapse 4%

19%

Median f/u 73 months

No difference in disease free survival

Mastectomy does not completely eliminate the risk of a second local recurrence



# Haffty et al.

Retrospective study of 146 patients

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116 pts s/p SM

30 pts s/p SBCS

Overall survival @ 10 yrs

65.7%

58%

p=ns

CSS @ 10 yrs

73.1%

61.1%

p=ns

Distant Metastasis

31.8%

23.9%

2 patients in the SBCS developed a second IBTR at the initial tumor site and were salvaged with mastectomy

Median f/u 13.8 years



# Re-irradiation with APBI

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Potential for serious tissue damage

Very small prospective study out of  
Vienna University

8 pts treated with repeat whole breast RT to  
30Gy + 12.5Gy interstitial boost to the  
tumor bed

5 yr f/u 4 pts had developed LR

- Median time to recurrence was 8 mos

Side effects limited to Grade 1 or 2 fibrosis

# Proposed Study Phase II Study



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## Eligibility criteria

IDC or DCIS <2cm

No multicentricity on  
MMG or MRI

≥3yrs between initial  
radiation and  
recurrence

No clinical LAD



# Future

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## Addressing IMRT APBI with Free Breathing (FB) vs. Deep Inspiration Breath Hold (DIBH)

DIBH showed a marked reduction in normal tissue dose

Max planning target volume dose reduced from 116% to 108% of prescription dose

Max Heart Dose >30Gy for WB vs. 8.2Gy with FB vs. <5.0Gy with DIBH