

**AMERICAN BRACHYTHERAPY SOCIETY
BREAST BRACHYTHERAPY TASK GROUP
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Breast Brachytherapy as a Boost –

Brachytherapy is appropriate to use to deliver additional conformal boost dose to the surgical bed plus margin following standard whole breast radiotherapy. Ideally chosen when the physician believes that boost dose delivery to the target is better accomplished with brachytherapy as opposed to electrons and would be dependent on the size/shape/location of the lumpectomy cavity in relationship to the size/shape of the breast.

Accelerated Partial Breast Irradiation (APBI) –

The American Brachytherapy Society supports protocol enrollment of patients whenever possible and appropriate for the individual patient. In those situations where it is not possible, conservative guidelines should be applied and are detailed below.

General Inclusion Criteria:

Boost

- In any situation where the physician judges that an improvement in dose delivery to the boost target can be achieved with brachytherapy

APBI

- *Age* ≥ 50 y.o.
(age recommendation has been changed to reflect the uncertainty as to the influence of menopausal status and in recognition that most women treated in reported experiences with >5yr follow-up were postmenopausal and had a median age of >60 years)
- *Histology*
 - Infiltrating Ductal Carcinoma
- *Clinical stage*
 - T1, and T2 ≤ 3.0 cm
 - N0
- *No distant metastases*

Exclusion Criteria:

Absolute contraindications

- Patients inappropriate for standard breast conservation therapy
(Multicentric disease, inability to achieve clear margins, etc...)

- Autoimmune disorders, including SLE, Scleroderma, etc...
- Distant metastases

Relative contraindications

- Extensive intraductal carcinoma
- Multifocal disease

Not yet fully evaluated in published studies

- Age <45 yo
- Non-infiltrating ductal histology
- 1-3 positive nodes without extracapsular extension

Physics and Dosimetry:

Treatment Techniques

- intracavitary
- interstitial

Planning Target Volume

- Lumpectomy site with 1-2 cm margin
- CTV = PTV
- Prescription dose must encompass the target volume

Treatment Planning

- To be performed after brachytherapy catheter placement using treatment planning computers, preplanning may be performed for guidance
- AAPM TG-43 based treatment planning system algorithm with commissioning and source model-specific QA documented prior to clinical use
- Image-based
 - Volumetric based (e.g., CT or MRI) using contiguous slice acquisition
 - Slice thickness appropriate to resolution requirements (typically ≤ 3 mm)
- Three-dimensional calculation with DVH-based analysis
- Evaluated breast dose parameters should include V_{100} , V_{150} , and V_{200}
- Evaluated homogeneity parameters should include DHI (other measurements - COIN, etc. – should be considered)
- Evaluated skin dose parameters should include D_{\max}

Treatment planning dosimetry

- Recommended prescriptive dosimetric parameters that should be met or exceeded:
 - Target coverage: $\geq 90\%$ of the dose delivered to $\geq 90\%$ of the target volume
 - V_{150} : interstitial < 70 cm³, balloon catheter < 50 cm³
 - V_{200} : interstitial < 20 cm³, balloon catheter < 10 cm³
 - $DHI \geq 0.75$ where $DHI = (1 - V_{150}/V_{100})$
 - Maximum skin isodose: balloon catheter $< 145\%$, typically a limited area
interstitial catheters $\leq 100\%$, typically a larger area

Intraoperative Procedure:

- Interstitial multicatheter brachytherapy procedure *includes open placement at the time of lumpectomy or delayed placement/ use of template or freehand*
- Intracavitary balloon catheter brachytherapy procedure *includes open placement at the time of lumpectomy or delayed placement*
- **All placement techniques should include** some form of image-guidance - CT, fluoroscopic and/or ultrasonography may be used, preplanning may be used.

Delivery System

- HDR- remote afterloader, outpatient setting
- LDR- manually loaded, inpatient setting

Radionuclides and Recommended Prescription Criteria

HDR Iridium-192

- Primary treatment 34 Gy in 10 fractions over 5 treatment days
- Boost treatment 10 Gy in 2 fractions over 1-2 treatment days

LDR Iridium-192

- Primary treatment 45-50 Gy / 0.50 Gy per hour
- Boost treatment 15-20 Gy / 0.50 Gy per hour

Timing:

- Interstitial implants – clear lumpectomy cavity target definition is required, delivery can be either before or after (if persistent cavity or surgical clips placed) chemotherapy.
- Intracavitary balloon implants – placed within 1-4 weeks following lumpectomy and prior to chemotherapy.
- If chemotherapy is indicated - recommendation is to wait >2weeks after completion of APBI before initiating

Post-Treatment Evaluation

- *Mammographic assessment:*
 - Serial Mammography baseline at 4-6 months and then as per institutional protocol
- *Physical examination:*
 - Cosmetic evaluation
 - Examination for recurrence
 - Examination for complications
- *Quality of Life:*
 - Patient satisfaction should be assessed
- *Post-Treatment Biopsy:*
 - As needed to rule out recurrence versus fat necrosis

References

APBI Book

- Accelerated Partial Breast Irradiation: Techniques and Clinical Implementation.
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APBI Overview

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Brachytherapy Dosimetry

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The American Brachytherapy Society (ABS) low dose rate prostate cancer task group has developed generalized criteria for the use of brachytherapy in the management of prostate cancer. These criteria are intended to guide radiation oncologists, urologists and physicists in making decisions regarding therapy. The complexity and severity of a patient's clinical condition should dictate the selection of appropriate

treatment. The availability of equipment and/or personnel may influence therapy. Approaches classified as investigational by the U.S. Food and Drug Administration (FDA) has not been considered in developing these criteria. The ultimate decision regarding the appropriateness of any treatment must be made by the attending physician.