An Updated Look into Florence and Astro Guidelines for APBI
(accelerated partial-breast irradiation)

Kevin Manestar, CMD

June 10, 2026







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Disclosures

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- This presentation reflects my own personal opinions and not necessarily those of Northside Hospital
- No Conflicts of interest to report

- <u>Equipment/Version</u>
  - Eclipse Treatment Planning 16.1.0
  - Aria
  - Velocity advanced imaging
  - EZFluence
  - AutoContour v2.0.10 by Radformation, Inc.

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Email from Dr. Icro Meattini April 2022

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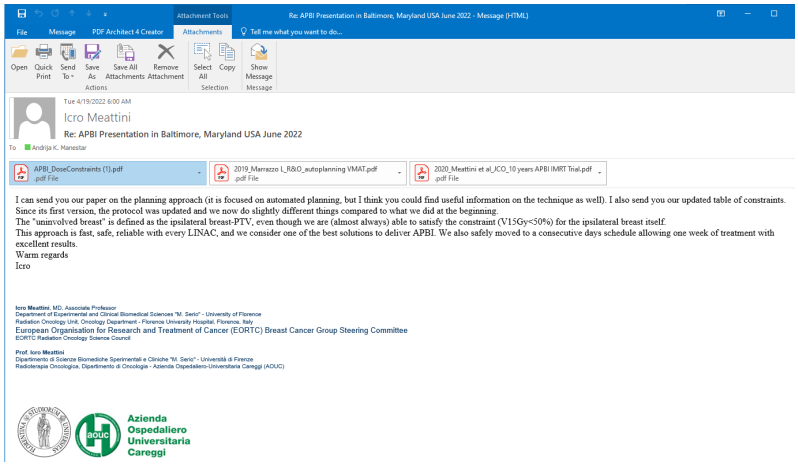

Re: APBI Presentation in Baltimore, Maryland USA June 2022 - Message (HTML)

Tue 4/19/2022 6:00 AM

Icro Meattini

Re: APBI Presentation in Baltimore, Maryland USA June 2022

To Andrija K. Manestar

APBI_DoseConstraints (1).pdf .pdf File

2019_Marrazzo L_R&O_autoplanning VMAT.pdf .pdf File

2020_Meattini et al_JCO_10 years APBI IMRT Trial.pdf .pdf File

I can send you our paper on the planning approach (it is focused on automated planning, but I think you could find useful information on the technique as well). I also send you our updated table of constraints.
Since its first version, the protocol was updated and we now do slightly different things compared to what we did at the beginning.
The "uninvolved breast" is defined as the ipsilateral breast-PTV, even though we are (almost always) able to satisfy the constraint (V15Gy<50%) for the ipsilateral breast itself.
This approach is fast, safe, reliable with every LINAC, and we consider one of the best solutions to deliver APBI. We also safely moved to a consecutive days schedule allowing one week of treatment with excellent results.
Warm regards
Icro

Icro Meattini, MD, Associate Professor
Department of Experimental and Clinical Biomedical Sciences "M. Serio" - University of Florence
Radiation Oncology Unit, Oncology Department - Florence University Hospital, Florence, Italy
European Organisation for Research and Treatment of Cancer (EORTC) Breast Cancer Group Steering Committee
EORTC Radiation Oncology Science Council

Prof. Icro Meattini
Dipartimento di Scienze Biomediche Sperimentali e Cliniche "M. Serio" - Università di Firenze
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Permission to use correspondence from

Dr. Icro Meattini

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Andrija K. Manestar

From: Icro Meattini
Sent: Saturday, April 23, 2022 4:20 AM
To: Andrija K. Manestar
Subject: Re: APBI Presentation in Baltimore, Maryland USA June 2022

CAUTION: This Email is from an EXTERNAL source. Ensure you trust this sender before clicking on any links or attachments.

Dear Andrija

Thank you again for your email and your work on this topic.
Please feel free to quote all the references and our discussion.
New APBI-Florence protocol planning guideline and our experience on patients treated consecutively are currently under revision (Apr 2022) in PRO journal, you can quote this as submitted.
Please do not hesitate to further contact me if needed.

Best regards
Icro

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Icro Meattini, MD, Associate Professor
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More than an individual…a Team

Dr. Isabella Zhang

Jessica Caselli, CMD

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Who am I?

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So why are we here?

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- Ultimately, because we simply care
- To give our wholehearted, best effort to help our patients have the best possible outcome with their treatment.
- To discover new ways to attack cancer, while maintaining the best possible quality of life for our patients.

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The Learner Outcomes will be to:

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1. Develop a technique for quickly creating an APBI plan.
2. Explain the criteria for APBI vs whole breast irradiation, and current changes for candidate qualification.
3. Discuss ASTRO guidelines/methods of treatment and associated constraints and structures needed, as well as discuss other available protocols based on the original work.
4. Know how to use templates that can help be more efficient resulting in a decrease of time for planning and output.

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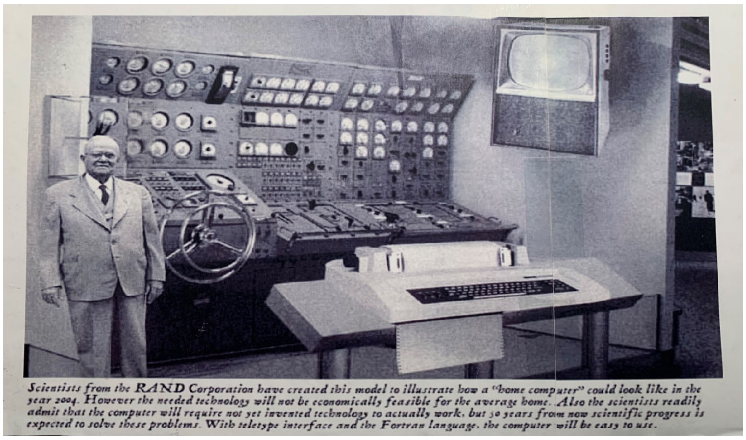
Memory Lane



So where did APBI start, and where are we going?

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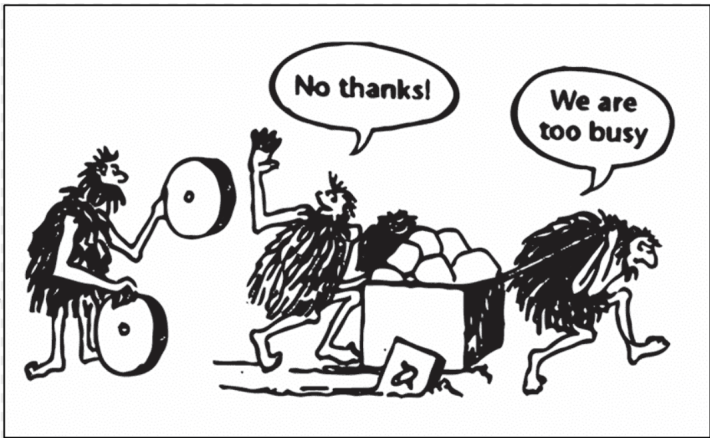
Too busy? At what cost?



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Bilateral Breast Treatment

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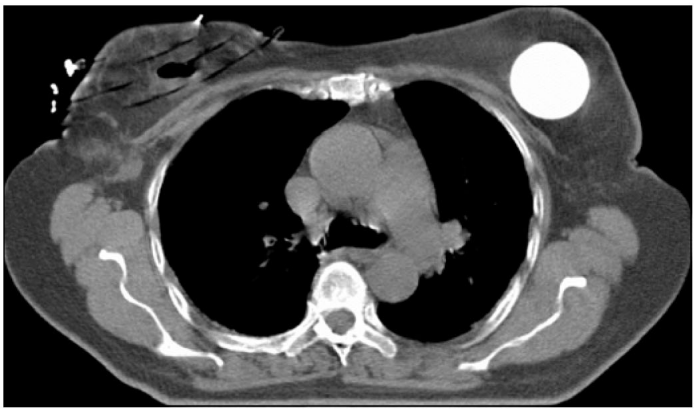

Fig. 1—74-year-old woman with bilateral breast cancer treated with interstitial catheters on right and balloon on left. CT scan shows optimum balloon placement with adequate skin spacing and no surrounding air and catheters in right breast chosen over less-invasive balloon catheter because of anatomic constraints.

American Journal of Roentgenology
https://www.ajronline.org/doi/pdfplus/10.2214/AJR.05.0318

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External Left Breast APBI

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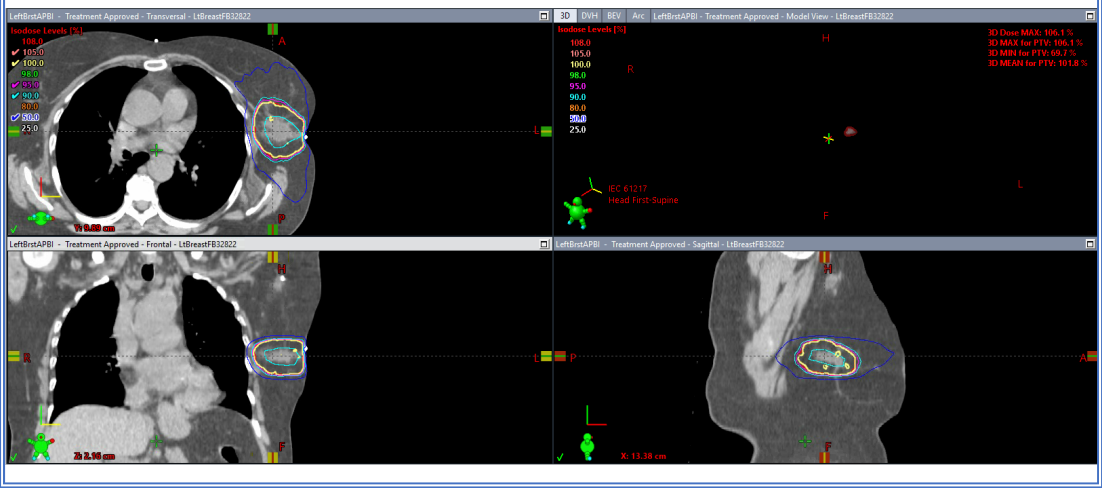

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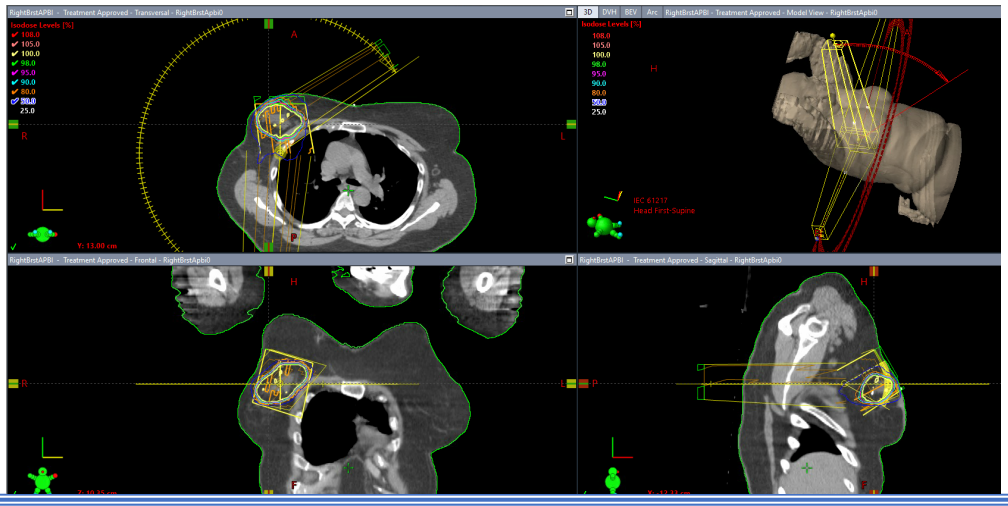
External Right Breast APBI



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Clinical Outcome of Apbi patients:

In selected patients, such as those who meet all of the listed ASTRO/Florence criteria, 5 and 10 year in breast tumor recurrence outcomes are equivalent between partial and whole breast radiation. Furthermore, the late toxicities of the two treatments appears similar, with one study of 15 fraction partial breast treatment (IMPORT-LOW) showing less moderate to marked breast changes after partial breast radiation at 5 years.

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Florence Trial - Treatment Margins:

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CTV: The clinical target volume was drawn with a uniform 1-cm margin around the surgical clips.

The CTV was limited to 3 mm from the skin surface and 3 mm from the lung-chest wall interface.

PTV: A 1-cm margin was added to the CTV to obtain the planning target volume (PTV). The PTV was allowed to extend 4 mm inside the ipsilateral lung and was limited to 3 mm from the skin.

The ipsilateral and contralateral breast, ipsilateral and contralateral lung, heart, and spinal cord were contoured as organs at risk.

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ASTRO - Treatment Margins:

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Tumor bed: volume is drawn around the clips and any change in the surrounding tissue architecture. Target volume expansions should take into consideration both margin status and imaging strategy.

CTV: 1-1.5 cm expansion from the tumor bed cropped 3-5 mm inside patient surface and limited posteriorly by the pectoralis muscle. For patients with closer margins, a 1.5 cm expansion should be considered.

PTV: 1 cm margin around CTV. **For patients undergoing daily imaging, tighter margins may be considered depending on accuracy of patient set-up.**

PTV_EVAL: PTV cropped 3-5 mm inside patient surface and limited posteriorly by the pectoralis muscle.

Daily imaging is advised when using 5 fx to deliver PBI and when using PTV margins <1 cm.

Taken from PRO March/April 2024 **Table 6PBI target volumes and planning parameters***

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APBI Dosing

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❖ ***Dosing according to Meattini (JCO 2020)***

- ❖ 30Gy in 5 fractions (6Gy/fx) over non-consecutive days
- ❖ Treat every other day, limiting 3 fx's a week, so the patient was treated Wednesday, Friday, Monday, Wednesday, Friday

➢ Updated 2022 Treat consecutive days (Dr. preference).

❖ ***NSABP B-39/RTOG 0413***

- ❖ A total of 38.5 Gy will be prescribed
- ❖ Two fractions per day
- ❖ each of 3.85 Gy (7.7Gy total dose daily)
- ❖ separated by at least 6 hours
- ❖ given on 5 treatment days (over a period of 5 to 10 days)
- ❖ sum to 10 fractions and 38.5 Gy.

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PTV/CTV

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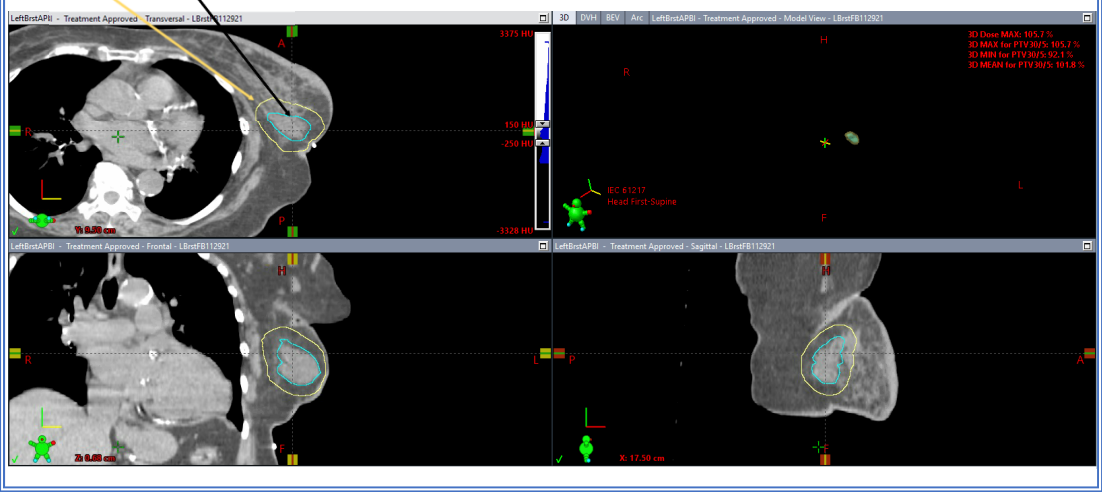

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Learner Objective 1:

Develop a technique for quickly creating an APBI plan

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I have almost always used the following method to get consistent treatment plan results which do meet the constraint criteria 95% plus of the time in just one or two runs, Static or Vmat Imrt.

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Dosimetry Tips and Tricks
The "Practical Approach"

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When we have our dosimetry meetings, we often share tips and tricks that help us along in our treatment planning. I will share the same with you here today.

For planning our APBI's:

The use of two dose rings (each separated by 2mm) and a 2cm normal tissue structure are created from the PTV as follows:

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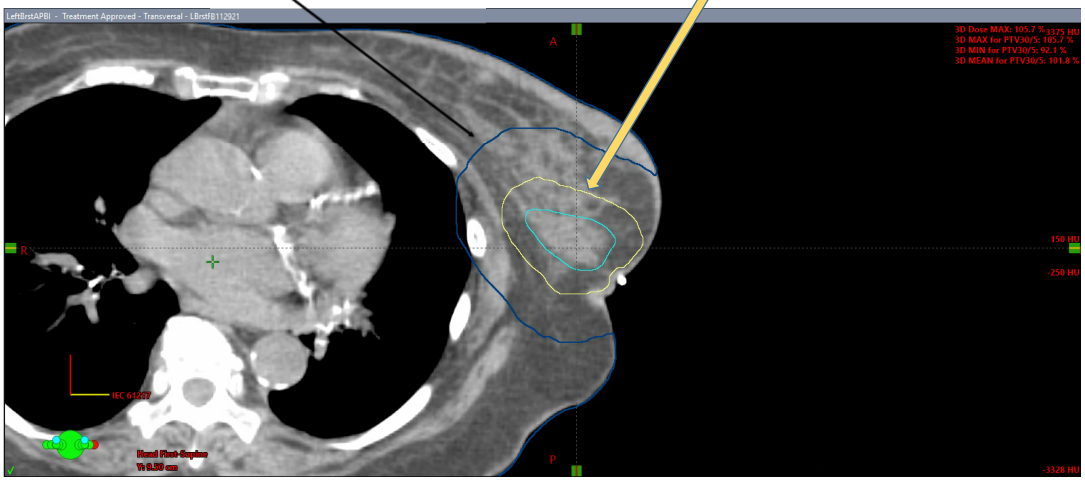
2cm Margin from External/Skin from PTV



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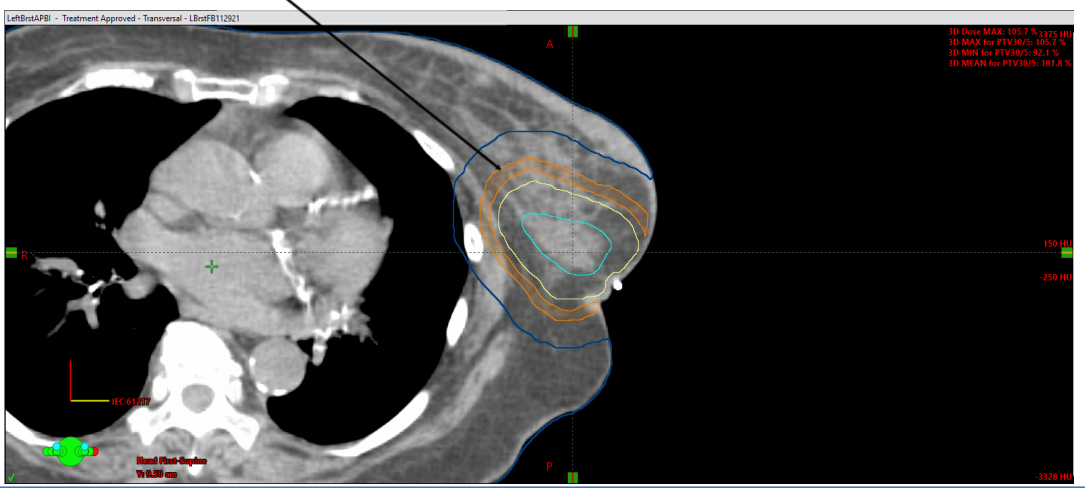
Dose Ring1 - 3mm from PTV and 5mm wide



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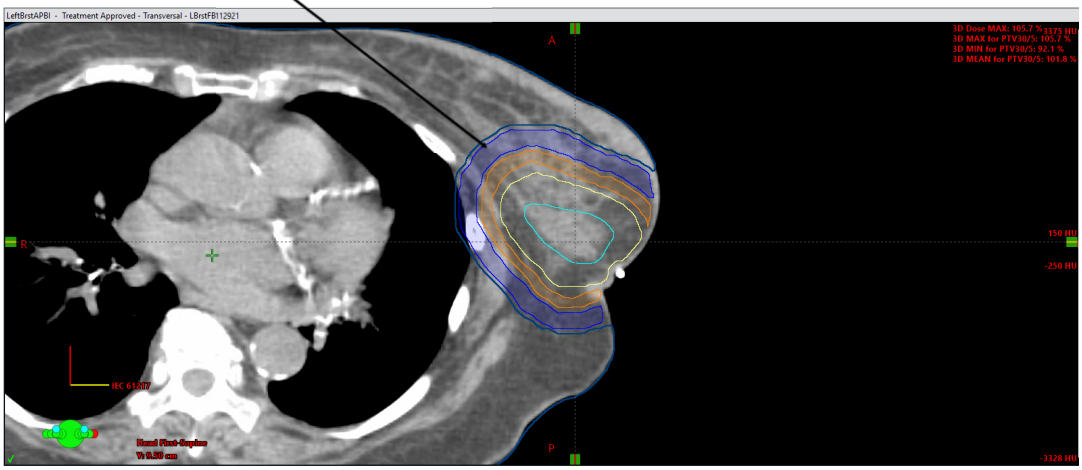
Dose Ring2 - 10mm from PTV and 8mm wide



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What other methods?

- Now with so many of us here, I know there are other options other than using dose rings, such as using NTO settings instead.
- Let us say this is each of our "professional license" in our stylistic planning process!
- The idea is to share ideas and enhance planning possibilities, and that is why I am here today. I am very open and happy to hear other methods and willing to try them, and I hope you find this particular method helpful in your APBI treatment planning.

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Confirm OARs and Structures

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- Breast: ipsilateral and contralateral
- From Dr. Meattini email, the "uninvolved breast" is defined as the ipsilateral breast-PTV
- Lung: ipsilateral and contralateral
- Heart
- spinal cord
- If autocontouring is used, I suggest a time out from it for every few patients to keep us sharp on drawing our own structures!!

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Beam Arrangement

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- Per Florence Trial: Five (6 MV) step-and-shoot IMRT coplanar fields
- Email from Dr. Meattini April 19, 2022 states:

  Dear Andrija

  We moved from a multibeam step&shoot IMRT to a partial arc VMAT. Start and stop angles are patient specific and depend on target location and patient anatomy.
- Our facilities have only treated APBI with Vmat, however, we have met criteria making use of DCA (dynamic conformal arcs), EZ Fluence, or static Imrt. Vmat did turn out to be the treatment delivery of choice at our centers, requiring only two or three partial arcs.

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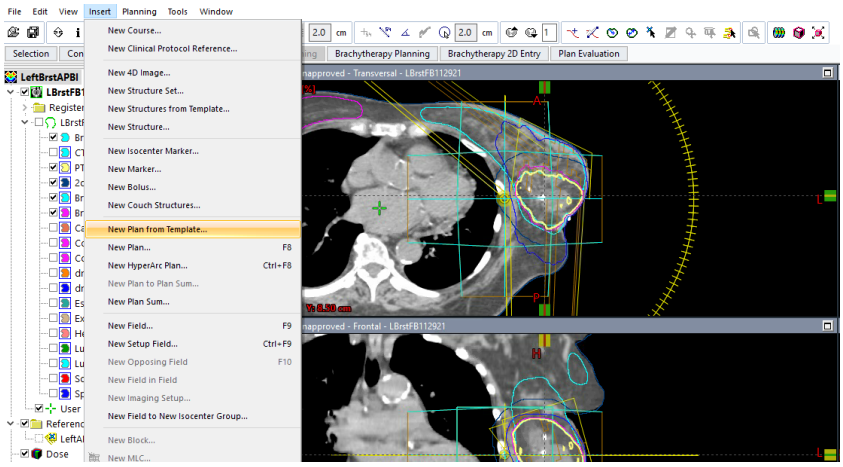
Beam Arrangement



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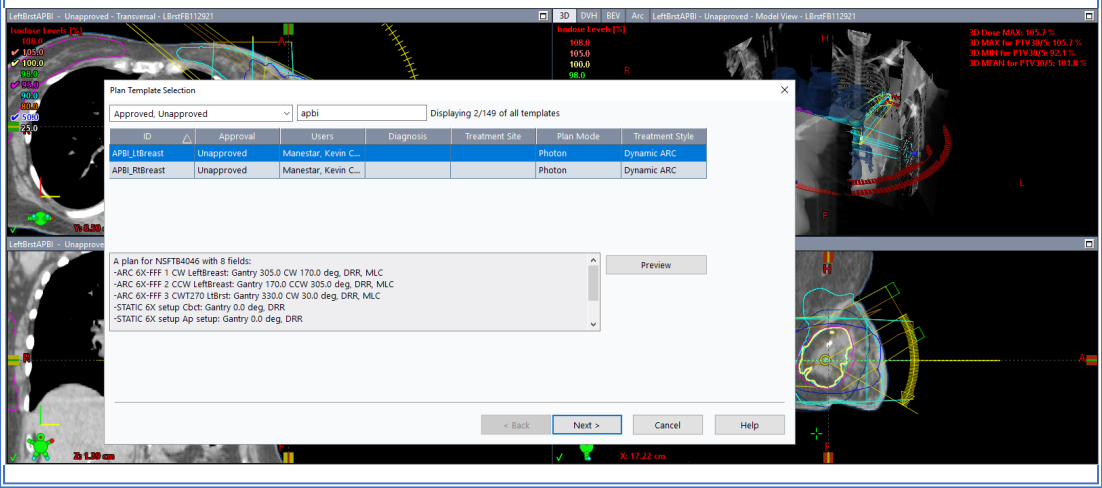
Beam Arrangement – Left Breast



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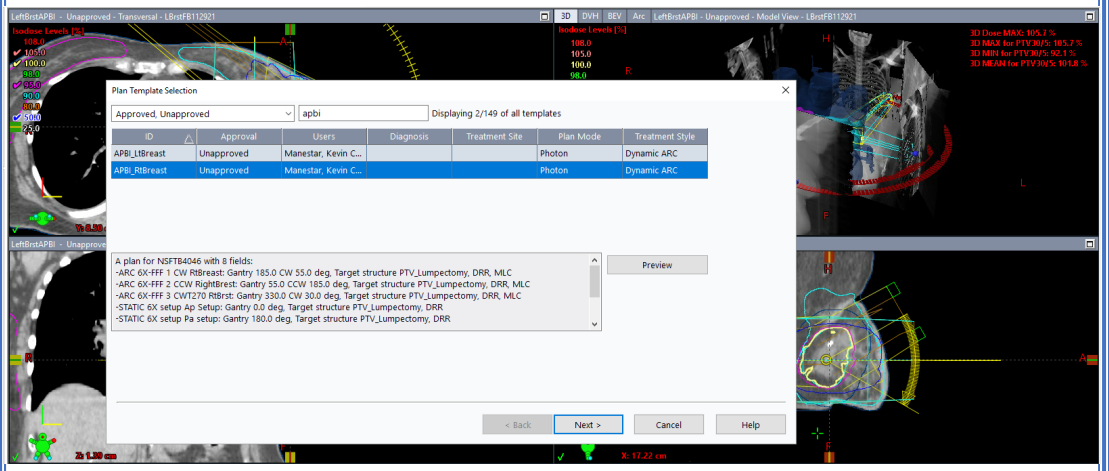
Beam Arrangement – Right Breast



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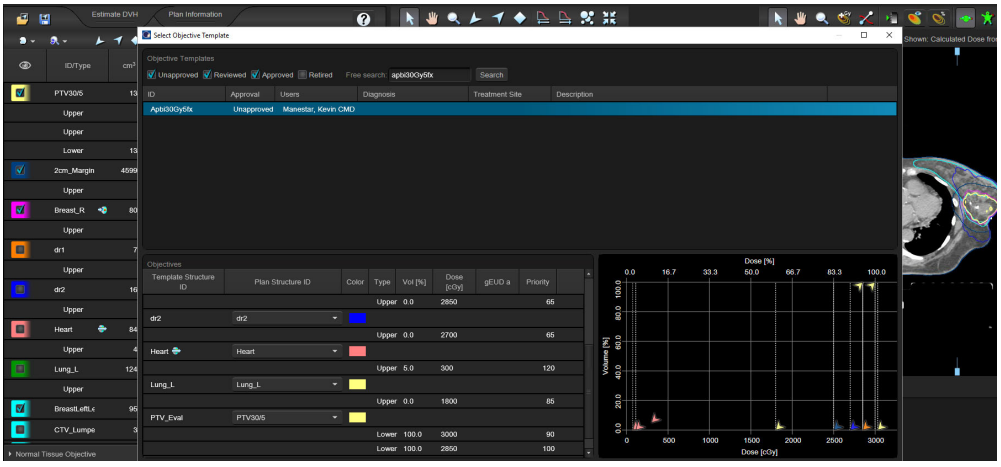
Plan Objectives - Eclipse



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Clinical Goals - Eclipse

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❖Clinical Goals (introduced in V16) are templates that you can attach to a plan in order to easily determine whether dose constraints have been met. Once attached, a "met/not met" status can be viewed in the Info window as well as during Optimization.

- Be aware of your eclipse version, some versions cannot use 0.03cc as a value, some versions are limited by the software to one decimal position, like 0.1 for example. Therefore, if you are looking at values to be at 0.03cc, the clinical goal at Dmax would be used instead. This results in a stricter criteria which may not meet goals. Latest eclipse version updates will accommodate the use of 0.03cc criteria. Double check the DVH manually for 0.03 criteria.

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Adding Clinical Goals

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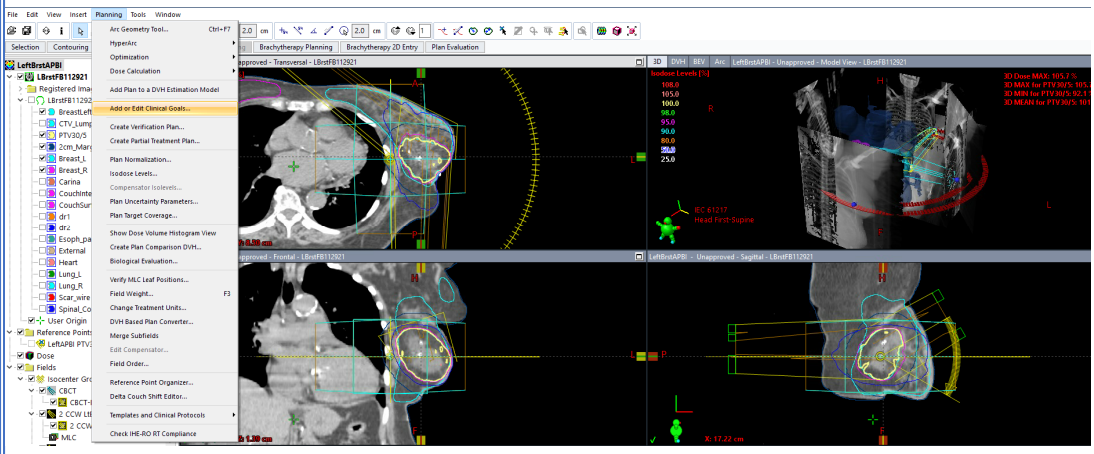

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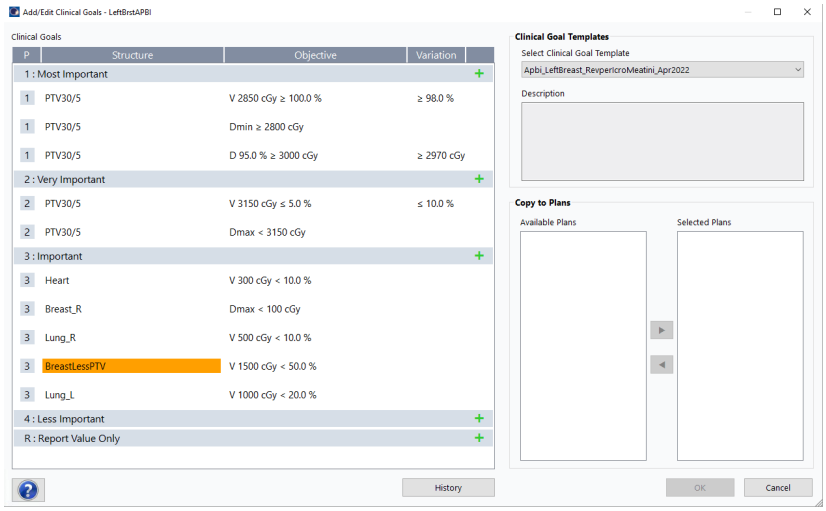
Adding Clinical Goals



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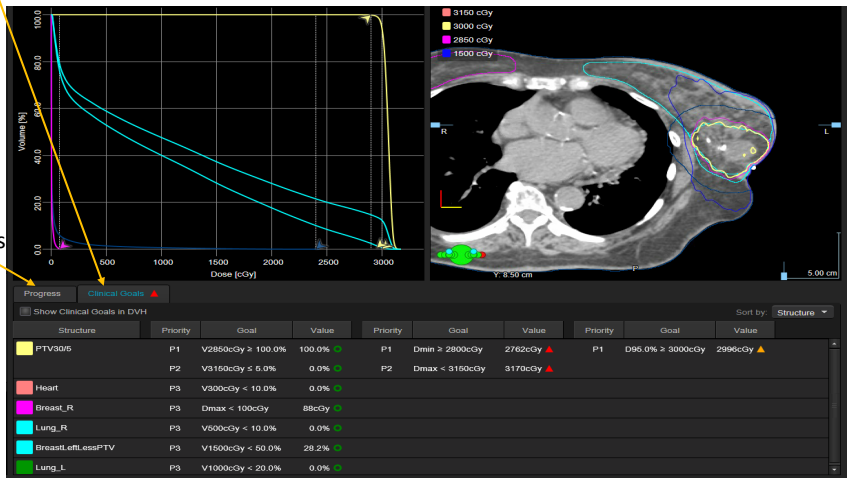
Clinical Goals

Progress tab



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Optimization

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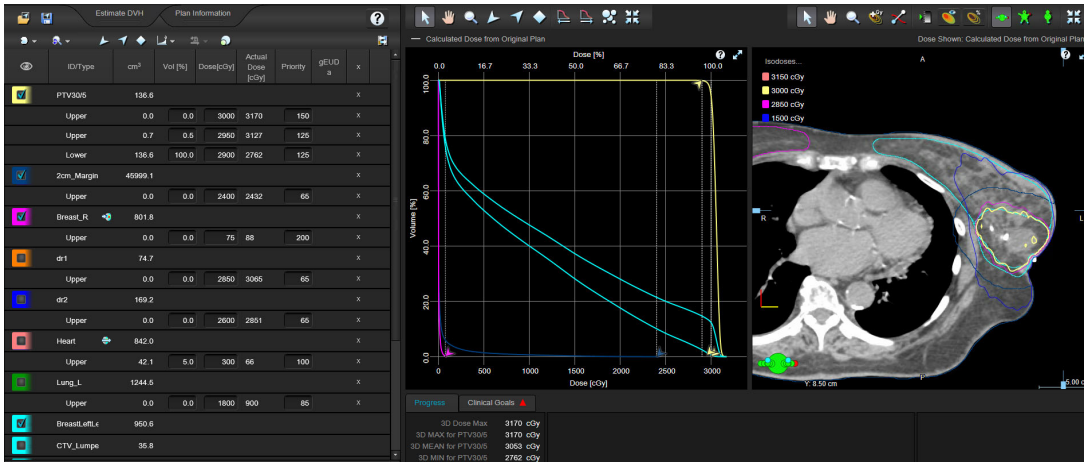

Final Results

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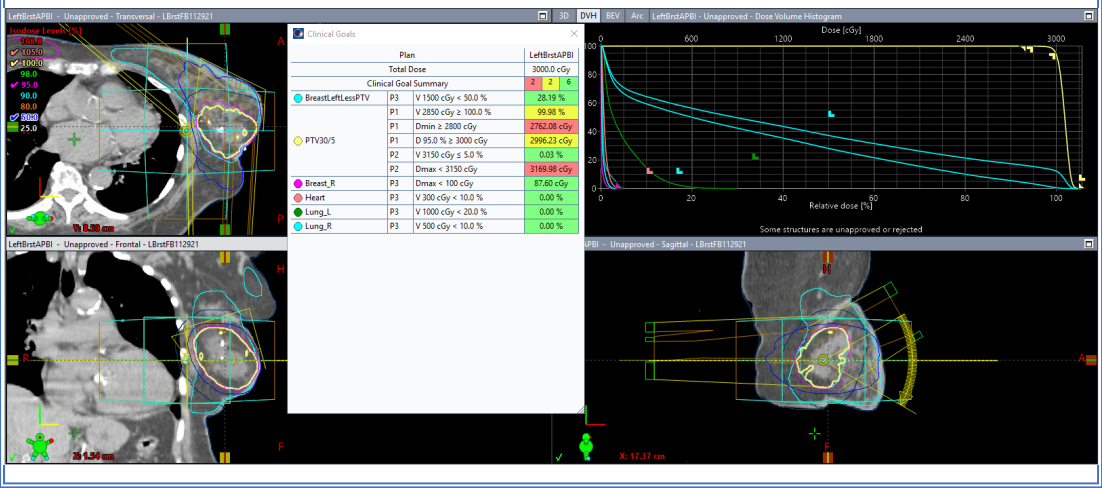

Final Results

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Clinical Goals

Plan			LeftBrstAPBI
Total Dose			3000.0 cGy
Clinical Goal Summary			2 2 6
BreastLeftLessPTV	P3	V 1500 cGy < 50.0 %	28.19 %
PTV30/5	P1	V 2850 cGy ≥ 100.0 %	99.98 %
	P1	Dmin ≥ 2800 cGy	2762.08 cGy
	P1	D 95.0 % ≥ 3000 cGy	2996.23 cGy
	P2	V 3150 cGy ≤ 5.0 %	0.03 %
	P2	Dmax < 3150 cGy	3169.98 cGy
Breast_R	P3	Dmax < 100 cGy	87.60 cGy
Heart	P3	V 300 cGy < 10.0 %	0.00 %
Lung_L	P3	V 1000 cGy < 20.0 %	0.00 %
Lung_R	P3	V 500 cGy < 10.0 %	0.00 %

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Learner Outcome 2:

2.Criteria for APBI vs Whole Breast Irradiation

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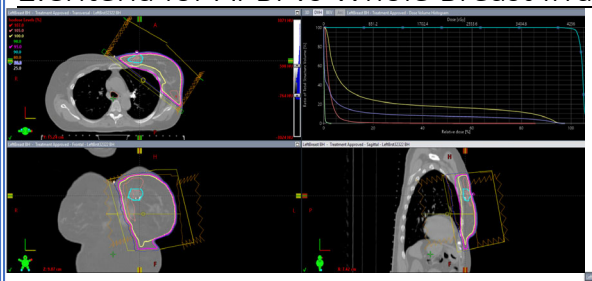
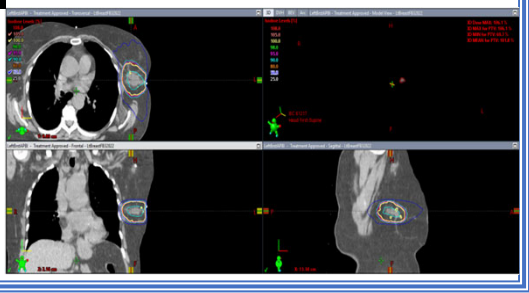


← Whole Breast?

Or Partial Breast? →



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NSABP B-39/RTOG 0413/NRG BR007

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- **National Surgical Adjuvant Breast and Bowel Project (NSABP)**
- **Radiation Therapy Oncology Group (RTOG)**
  - **A Randomized Phase III Study of Conventional Whole Breast Irradiation (WBI) Versus Partial Breast Irradiation (PBI) for Women with Stage 0, I, or II Breast Cancer**
  - **Whole breast vs IORT PBI vs External Beam APBI (sections 11-14)**
  - ***The above criteria eliminates use of beams that may be directed at OAR's***
- **NRG comprises three groups**
  - **(N=**NSABP**, R=**RTOG**, G=** Gynecologic Oncology Group**)**
    - **NRG BR007 Arm 1 incorporates External Beam APBI 30Gy in 5 fx's, every other day.** ***However, IORT, brachytherapy, Protons, regional nodal treatment, and boost (for APBI or PBI), and Bolus are excluded.***

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Patient Selection: ASTRO APBI Guidelines

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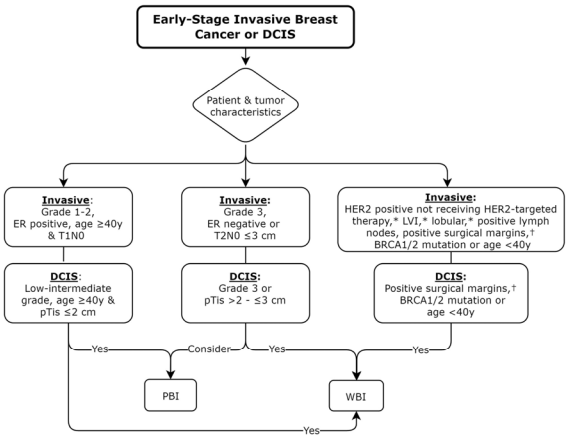

*Taken online from PRO October 20, 2024

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Patient Selection: ASTRO APBI Guidelines

2017

Table 1 Comparison of patient groups in original and updated consensus statements

Patient group	Risk factor	Original	Update
Suitability	Age	≥60 y	≥50 y
	Margins	Negative by at least 2 mm	No change
	T stage	T1	Tis or T1
	DCIS	Not allowed	If all of the below: • Screen-detected • Low to intermediate nuclear grade • Size ≤2.5 cm • Resected with margins negative at ≥3 mm
Cautionary	Age	50-59 y	• 40-49 y if all other criteria for "suitable" are met • ≥50 y if patient has at least 1 of the pathologic factors below and does not have any "unsuitable" factors *Pathologic factors:* • Size 2.1-3.0 cm [a] • T2 • Close margins (<2 mm) • Limited/focal LVSI • ER(-) • Clinically unifocal with total size 2.1-3.0 cm [b] • Invasive lobular histology • Pure DCIS ≤3 cm if criteria for "suitable" not fully met • EIC ≤3 cm
	Margins	Close (<2 mm)	No change
	DCIS	≤3 cm	≤3 cm and does not meet criteria for "suitable"
Unsuitable	Age	<50 years	• <40 y • 40-49 y and do not meet the criteria for cautionary
	Margins	Positive	No change
	DCIS	>3 cm	No change

[a] The size of the invasive tumor component.
[b] Microscopic multifocality allowed, provided the lesion is clinically unifocal (a single discrete lesion by physical examination and ultrasonography/mammography) and the total lesion size (including foci of multifocality and intervening normal breast parenchyma) falls between 2.1 and 3.0 cm.

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Florence Trial - Criteria for Patient selection:

In a nutshell, participants must be female, patients must be 40 years or older, with early breast cancer and lumpectomy (BCS-Breast conserving surgery), with a maximum tumor size of 2.5cm or less.

Surgical margins - Wide excision or quadrantectomy with clear margins (>5 mm), with clips placed in tumor bed. A minimum of 4 clips is requested to avoid geographic misses.

Exclusion criteria include extensive intraductal carcinoma, multiple foci cancer, and final surgical margins greater than 5mm.

Ratio for treatment at Northside: PTV volume/ipsilateral Breast x 100 ≤ 30%

ASTRO: V95% dose ≤ 25% and v50% dose ≤50%

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Learner Outcome 3:

Discuss ASTRO guidelines/methods of treatment and associated constraints and structures needed, and other protocols based on the original work.

- ❖NRG BR007 is endocrine therapy with or without radiation therapy
- ❖Whole breast or External Beam APBI (not IORT)
- ❖Uses the dosing from the Florence Trial of 30Gy in 5 fx's every other day (original) or Every day (consecutive- updated)

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Updated Constraints Florence Trial

APBI dose constraints

Target and OARs	Original dose constraints for plan optimization	Updated dose constraints for plan optimization	
		Ideal	Minor deviation accepted
PTV	$V_{28.5\ Gy}$=100% D_{max}≤105% D_{min}≥28Gy	$V_{28.5\ Gy}$≥98% $V_{31.5\ Gy}$≤5% D_{max}≤110%	$V_{28.5\ Gy}$≥95% $V_{31.5\ Gy}$≤10% --
Ipsilateral uninvolved breast	$V_{15\ Gy}$≤ 50%	$V_{15\ Gy}$≤ 50%	--
Ipsilateral lung	$V_{10\ Gy}$≤20%	$V_{10\ Gy}$≤20%	--
Contralateral lung	$V_{5\ Gy}$≤ 10%	$V_{5\ Gy}$≤ 10%	--
Contralateral breast	D_{max}≤1Gy	D_{max}≤1Gy	D_{max}≤2Gy
Heart	$V_{3\ Gy}$≤10%	$V_{3\ Gy}$≤10%	--

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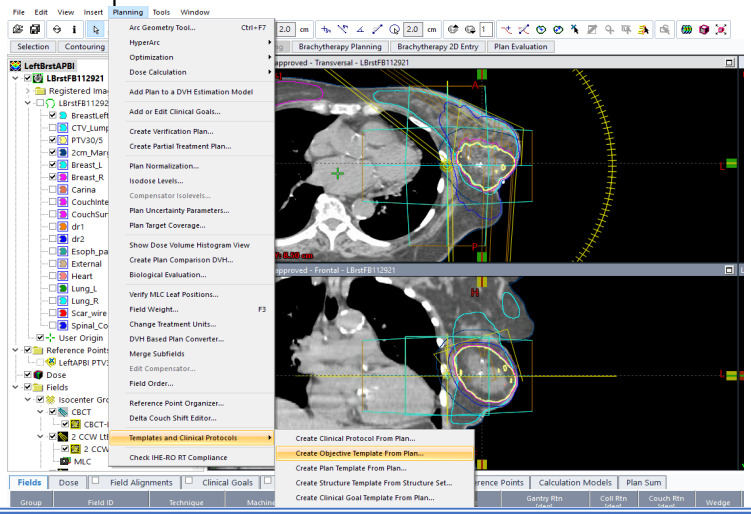
4. Eclipse users will now be able to create objective and plan templates that will decrease amount of time for planning and output



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The Learner Outcomes will be to:

1. Develop a technique for quickly creating an APBI plan.
2. Explain the criteria for APBI vs whole breast irradiation, and current changes for candidate qualification.
3. Discuss ASTRO guidelines/methods of treatment and associated constraints and structures needed, as well as discuss other available protocols based on the original work.
4. Know how to use templates that can help be more efficient resulting in a decrease of time for planning and output.

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Conclusion and Thanks

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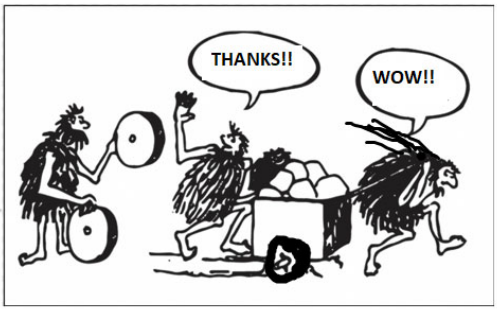
As we all know, our field is continually changing, and as long as all of continue to care, as I know we do, new modalities and improved treatment delivery and care can be given to our patients.

Huh, the wheels aren't square after all!!!



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THANKS FOR HANGING AROUND!

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