

STORE 2018 RT Items and Guidelines for Implementation

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WHA Consulting

CAROLINAS REGIONAL EDUCATIONAL CONFERENCE

WEBINAR-Part I

September 18, 2019

WHA Consulting

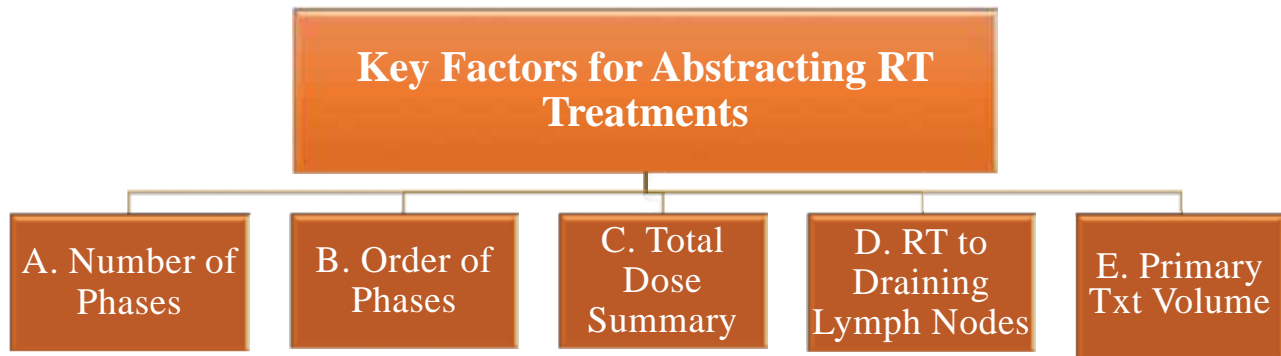
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Objectives

- Number of Phases,
- Order of Phases,
- Total Dose Summary,
- RT to Draining Lymph Nodes,
- Primary Treatment Volume,
- Implementing the 2018 STORE Manual rules on Radiation Therapy to 5 clinical scenarios.

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Clinical Scenario 1a: Breast Tangents



- 65 y/o female w/ clinical stage IA: T1c, N1, M0, infiltrating ductal carcinoma of left breast. Pt underwent a LT breast SAVI Scout reflector localized lumpectomy. ER/PR+. HER2 IHC= 1+, neg. G1
- Lt breast tangents with 10X beam, 25 fractions to 50 Gy from 7/23/18 to 8/24/18. The left SCV/axilla treated with 10X, to 3850 in 22 fractions from 7/23/18 to 8/21/19. Both plans were 3D conformal.
- Lt breast boosted using enface/mini tangents technique with 15E/15MV, to 10 Gy in 5 fractions from 8/27/18 to 8/31/18. Plan was also conformal.



Clinical Scenario 1a: Breast Tangents

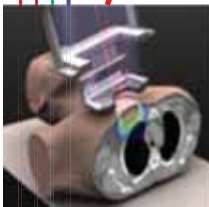
- 65 y/o female w/ clinical stage IA: T1c, **N1**, M0, infiltrating ductal carcinoma of left breast. Pt underwent a LT breast **SAVI Scout reflector** localized **lumpectomy**. ER/PR+. HER2 IHC= 1+, neg. G1
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- Lt breast **boosted** using **enface/mini tangents** technique with **15E/15MV, to 10 Gy** in 5 fractions from 8/27/18 to 8/31/18. Plan was also **conformal**.



Clinical Scenario 1a

- Step 1: Extract treatment information in a format that can be readily interpreted:

Treatment Site	Dose (cGy)	Energy /Technique	Fx	Start date	End date
LT breast tangents	5,000	10MV conformal	25	7/23/18	8/24/18
LT SCV/Axilla	3,850	10X conformal	22	7/23/18	8/21/18
LT breast boost, enface/mini tangents	1,000	15E/15MV	5	8/27/18	8/31/18



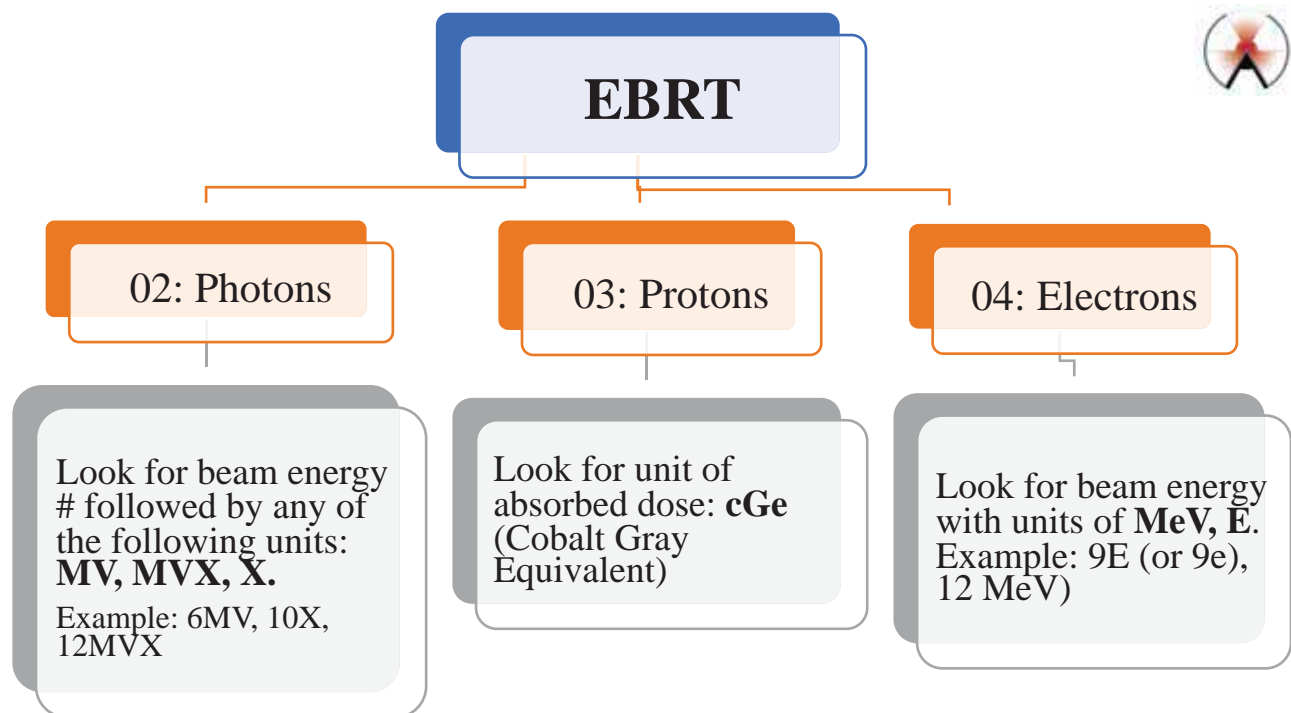
- # of phases
- Order of phases,
- Primary Volume

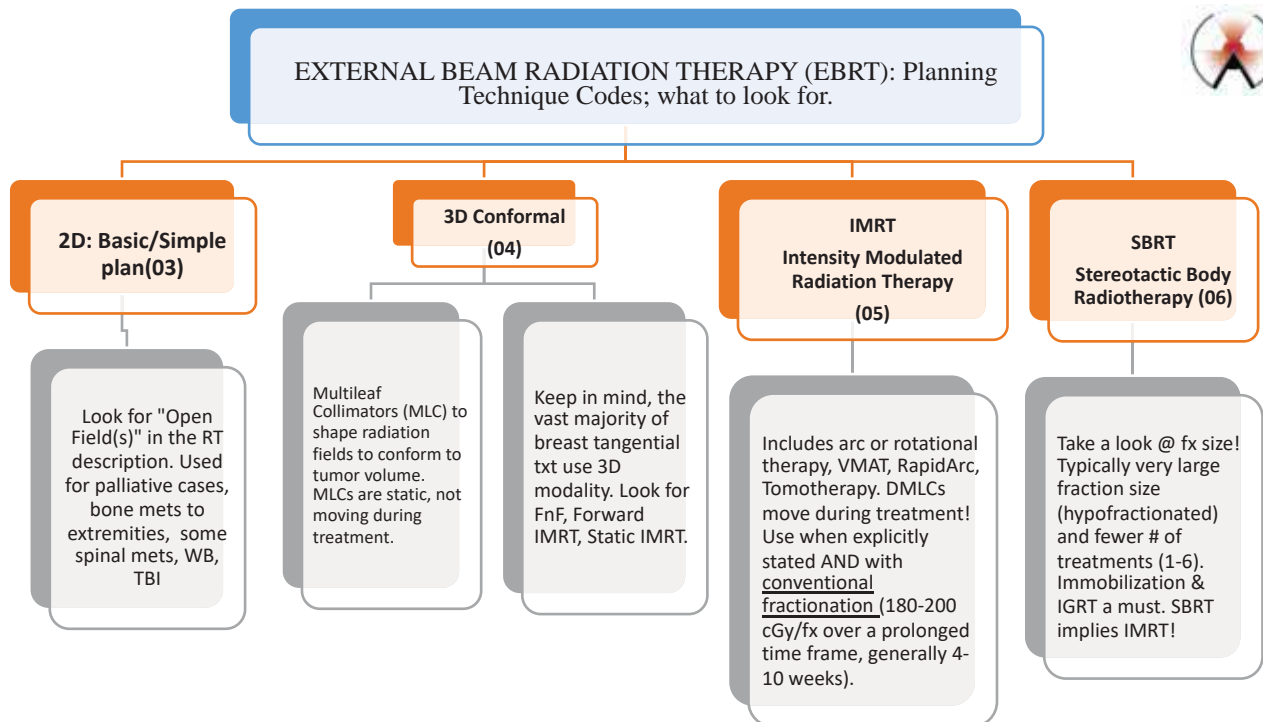
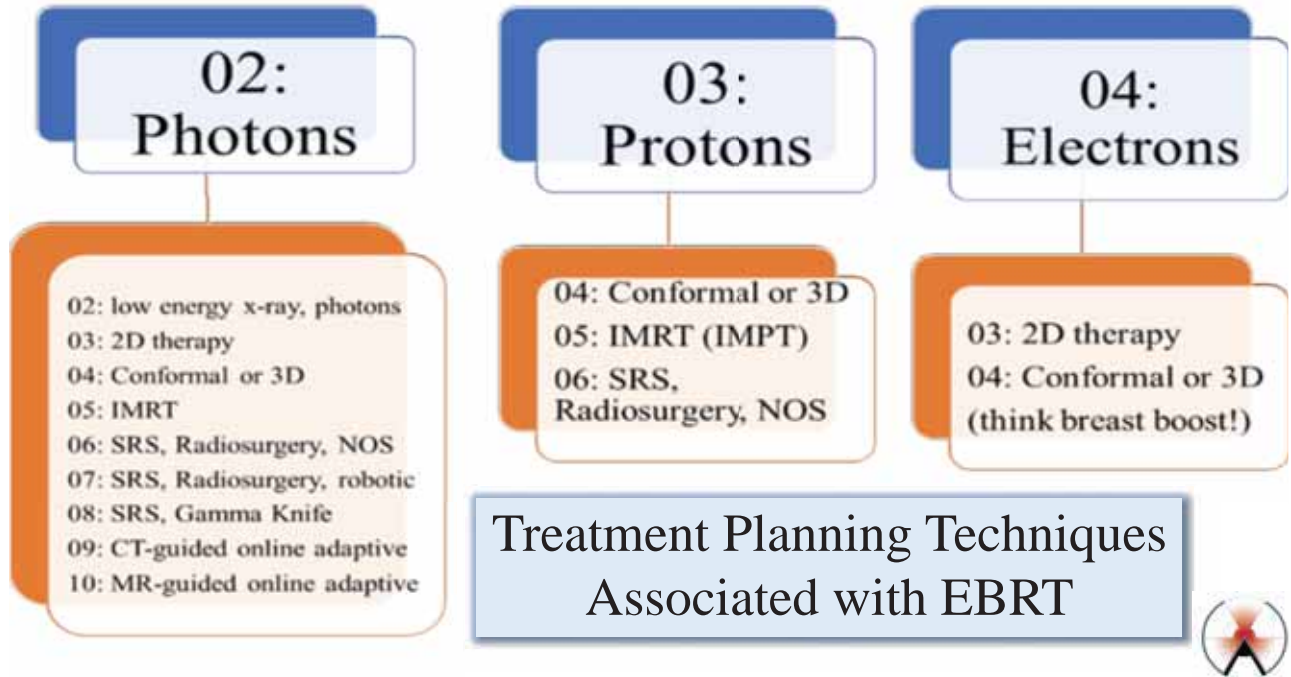


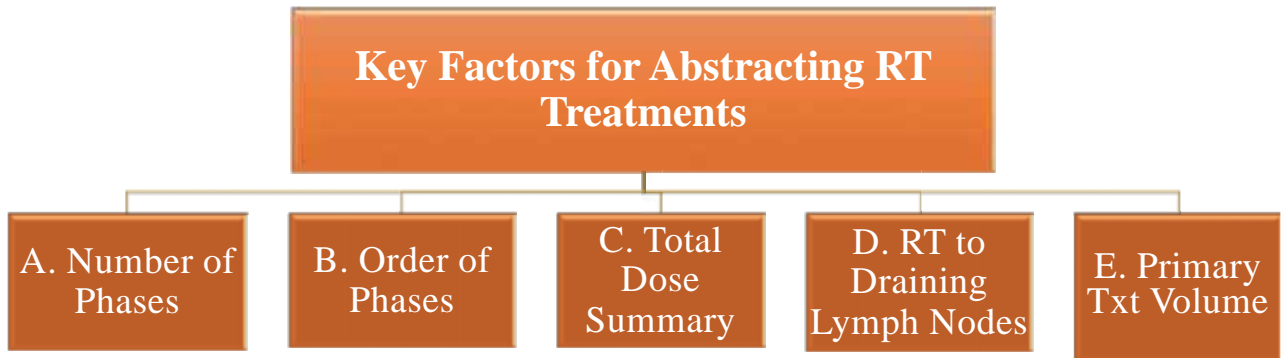
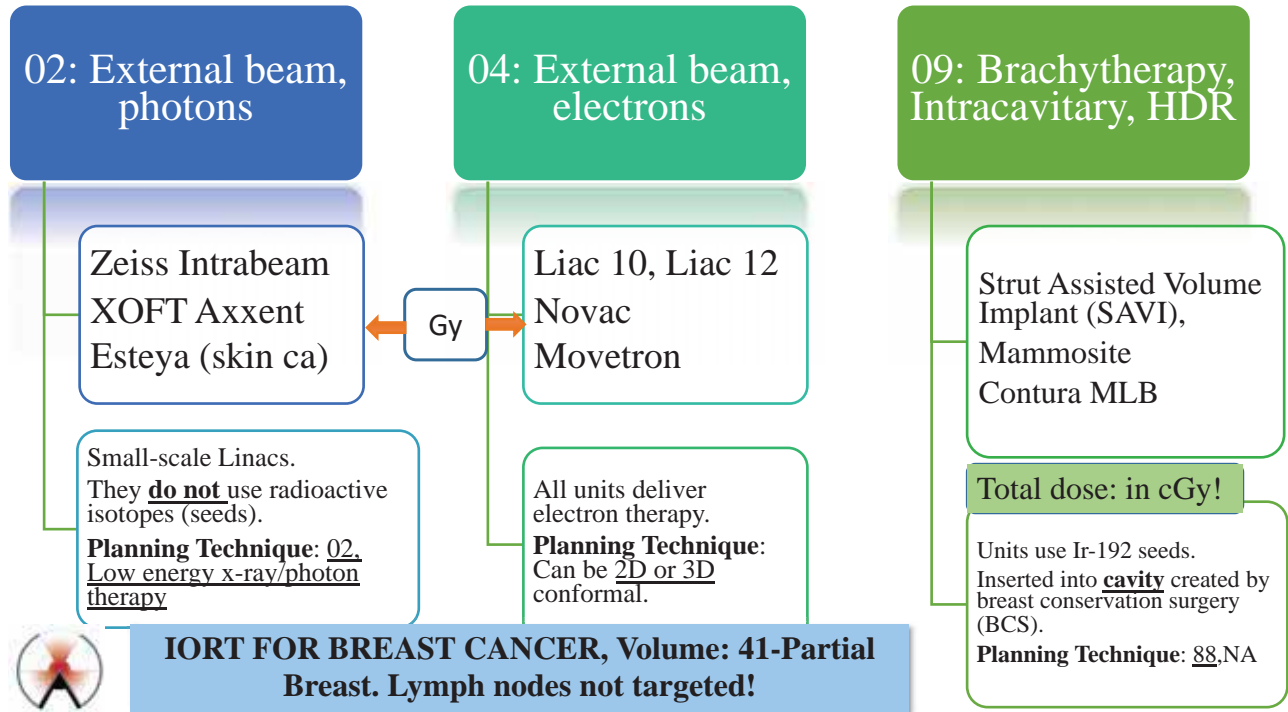
- Treatment Modality,
- Planning Technique

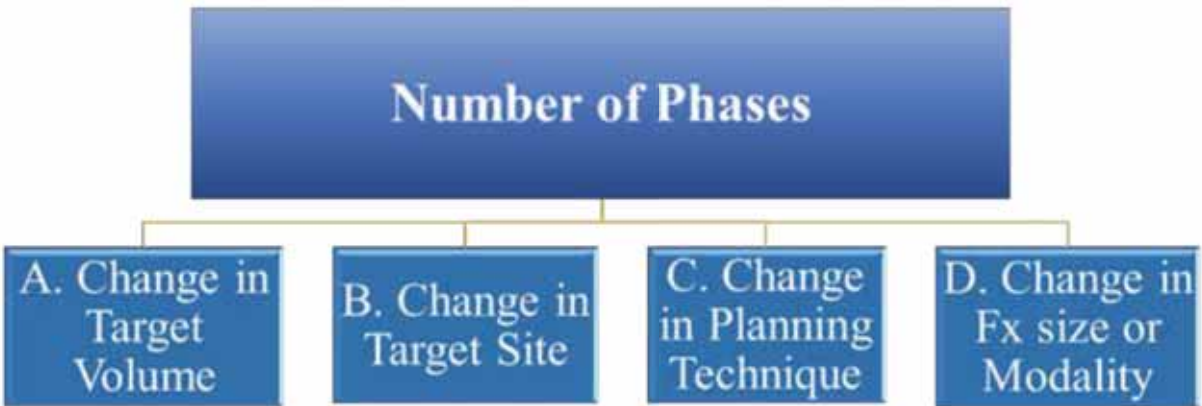


Let's Start with the Basics!









Note: Any one of these changes can result in a new phase



Number of Phases- Example 1

A. Change in Target Volume (SIB: Simultaneous Integrated Boost):

Txt Site	Energy	Dose/fx	Total dose	Start date	End date
PTV70, LT tonsils/LNs	6MVX	200	7000	9/11/18	10/30/18
PTV63, high risk region	6MVX	180	6300	9/11/18	10/30/18
PTV54, neck nodes	6MVX	154	5390	9/11/18	10/30/18

• Number of Phases? **3 Phases**



Number of Phases- Example 2

B. Change in Target Site:

*Txt Site	Energy	Dose/fx	Total dose	Start date	End date
T12-L3 spine	6X	250 cGy	2500 cGy	3/4/19	3/15/19
Whole brain (WB)	6MV	300 cGy	3000 cGy	3/4/19	3/15/19

• Number of Phases? **2 Phases**

* *Assuming metastatic sites are from same primary.*

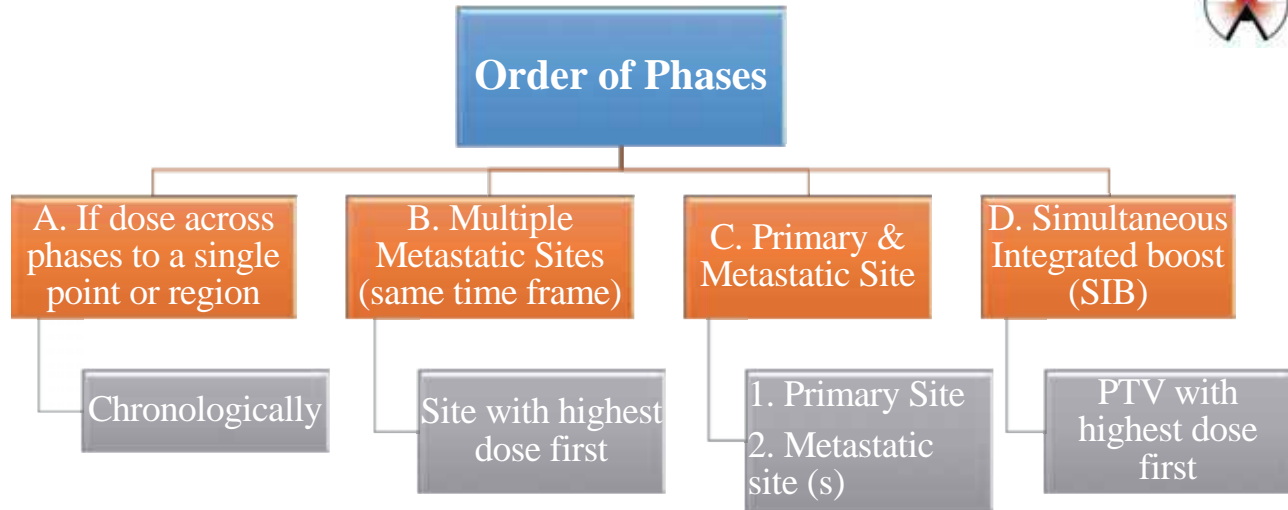


Number of Phases- Example 3

C. Change in Planning Technique:

Txt Site	Energy, Technique	Dose/fx	Total dose	Treatment Modality	Planning Technique
Prostate	6X/IMRT	180 cGy	4500 cGy	02	05: IMRT
Prostate	I-125 Seed Implant		10,000 cGy	10: LDR, interstitial	88: NA

• Number of Phases? **2 Phases**

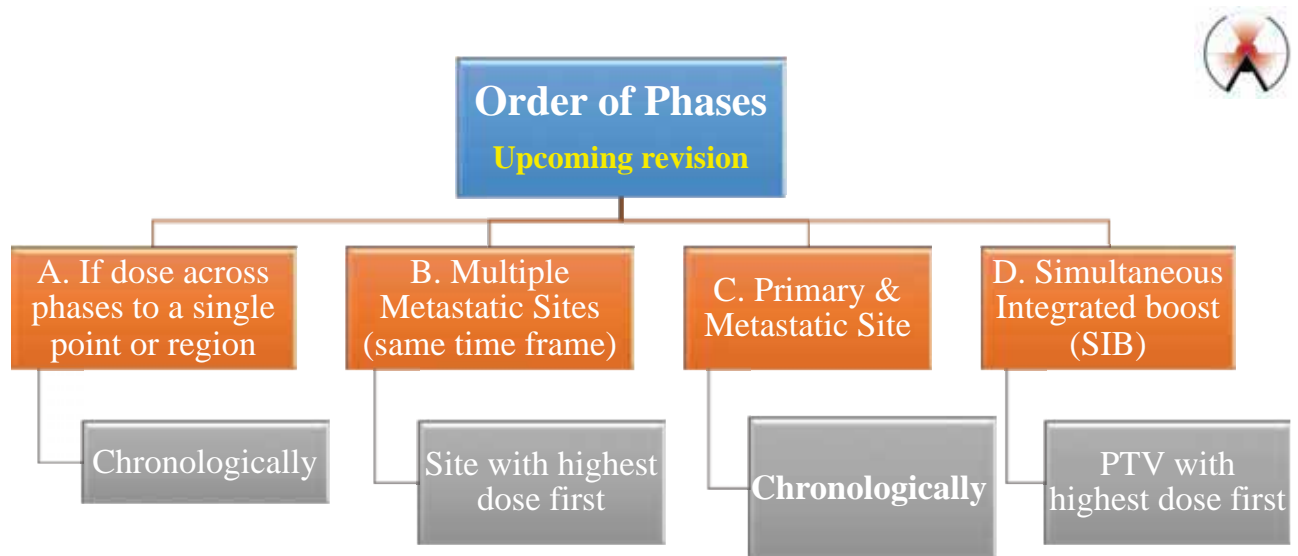


B. If multiple metastatic sites are treated at different time frames (1st course treatment), capture phases chronologically.

C. Metastatic sites chronologically, if at different time frame. Site with highest dose first if metastatic sites treated @ same time frame. See “B”.

ALERT!

- Upcoming revision/addition to Order of Phases to the CRT Guide and STORE Manual.
- Look for update in the “Brief”.



B. If multiple metastatic sites are treated at different time frames (1st course treatment), capture phases chronologically.

C. For sake of simplicity, it was determined that it is best to capture phases in chronological order, even if primary site is omitted due to the 3-phase limit (which is expected to be a rare occurrence).

Order of Phases- Example 1

A. If dose across phases to a single point or region >
Chronologically.

Txt Site	Energy	Dose/fx	Total dose	Start date	End date
Prostate/SV/ Nodes	10X/IMRT	180 cGy	4500 cGy	5/1/18	6/5/18
Prostate	I-125, LDR interstitial		10,999 cGy	6/10/18	6/10/18

- **Phase 1:** Prostate/SV/Nodes
- **Phase 2:** Prostate.



Order of Phases- Example 2

B. Multiple metastatic sites (same time frame) > Site with highest dose first.

Txt Site	Energy	Dose/fx	Total dose	Start date	End date
T12-L3 spine	6X	250 cGy	2500 cGy	3/4/19	3/15/19
Whole brain (WB)	6MV	300 cGy	3000 cGy	3/4/19	3/15/19

- **Phase 1:** Whole brain
- **Phase 2:** T12-L3 spine.



Order of Phases- Example 3

C. Primary & metastatic site (s): Chronological

Txt Site	Energy	Dose/fx	Total dose	Start date	End date
Brain mets	Gamma Knife	2000	2000	3/5/19	3/5/19
RLL primary	6MV	500	3000	3/6/19	3/15/19

- **Phase 1:** Brain mets
- **Phase 2:** RLL primary



Order of Phases- Example 4

D. Simultaneous integrated boost (SIB): PTV with highest dose first.

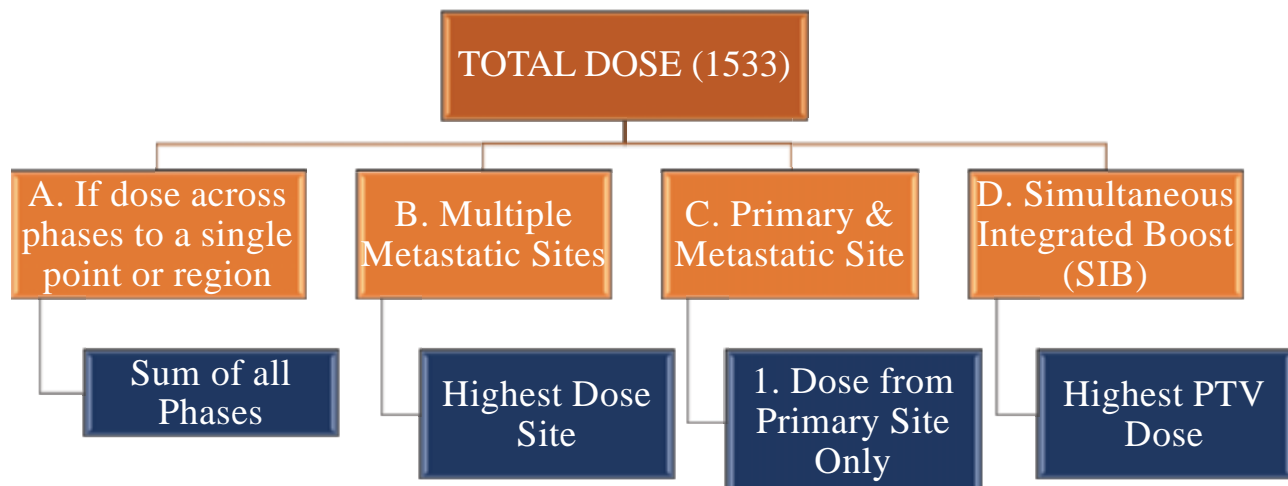
Base of Tongue (BOT) cancer

Txt Site	Energy	Dose/fx	# of fx	Total dose	Start	End
PTV_56	6X	160	35	5600	5/3/18	6/21/18
PTV_70	6X	200	35	7000	5/3/18	6/21/18
PTV_63	6X	180	35	6300	5/3/18	6/21/18

• **Phase 1= PTV_70**

Phase 2= PTV_63

Phase 3= PTV_56

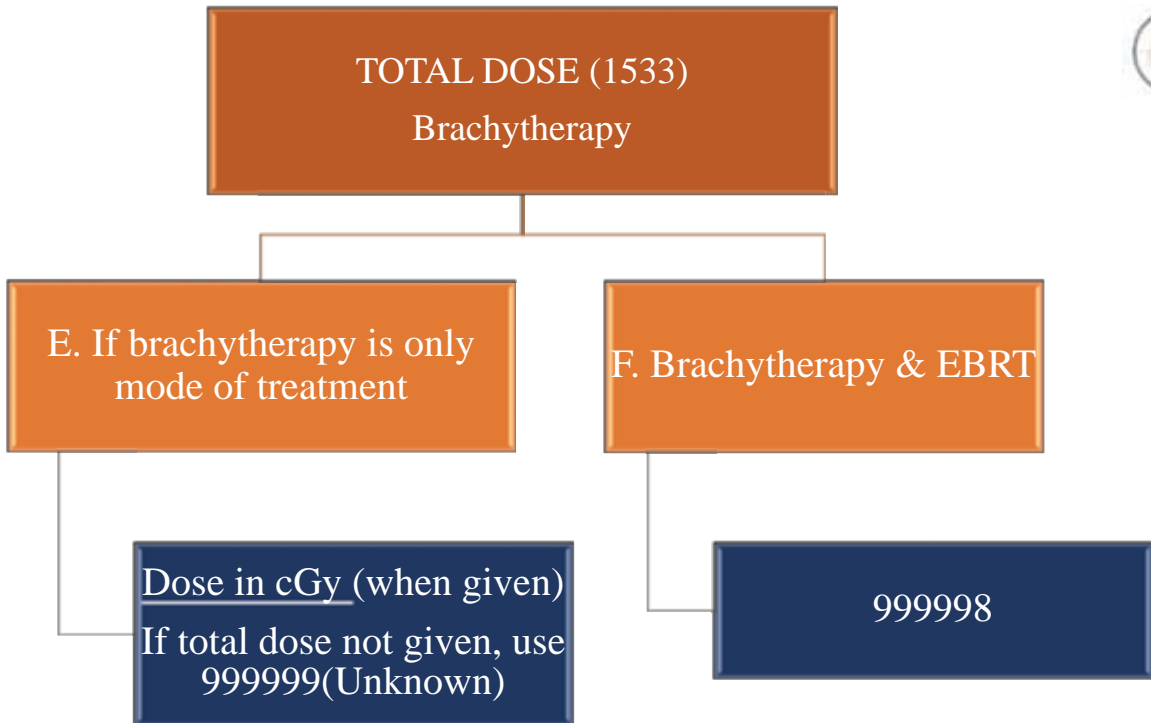


ALERT!

- Upcoming revision/addition to Dose/fx and Total Dose for brachytherapy procedures!
- Look for upcoming update in the Brief.
- Will also be added to the revised CRT Guide and STORE manual

ALERT!

- If dose/fraction and total dose is provided in Gy or cGy units for any brachytherapy procedure, capture this information in your abstract. Do not use codes 99998 or 999998 if this information is found in treatment summary!
- If brachytherapy is only mode of treatment and dose is not provided in cGy, code to 999999 for total dose.
- You **cannot**, however, add dose from EBRT phase to that of brachytherapy phase to get total dose!



Total Dose A: Example 1

A. If dose across phases to a single point or region >>>*Sum of all Phases.*

Example 1 Treatment Summary:

Patient opted for EBRT over prostatectomy. Plan is IMRT.

Plan ID	Energy	Fractions	Dose per Fraction (cGy)	Total Dose Delivered (cGy)	Start Date	End Date
Prostate CD	10X	18 / 18	180	3,240	3/4/19	3/27/19
ProstSVNodes	10X	25 / 25	180	4,500	1/28/19	3/1/19

Number of Phases of Rad Tre...	(02) 2 phases
Radiation Treatment Discontin...	(01) Radiation treatment completed as prescribed
Total Dose	(007740)

Total Dose A: Example 2



A. If dose across phases to a single point or region >>>> *Sum of all Phases.*

Example 2 Treatment Summary:

Patient treated for bladder cancer with TURBT, EBRT & Gemcitabine for Stage II disease. EBRT plan is 3D conformal.

Plan ID	Energy	Fractions	Dose per Fraction (cGy)	Total Dose Delivered (cGy)	Start Date	End Date
Bladder	15MV	25/25	180	4,500	1/31/19	3/6/19
Bladder Boost	15MV	9/9	180	1620	3/7/19	3/19/19

Number of Phases of Rad Tre...		(02) 2 phases
Radiation Treatment Discontin...		(01) Radiation treatment completed as prescribed
Total Dose		(006120)

Total Dose A: Example 3



A. If dose across phases to a single point or region >>> *Sum of all Phases.*

Example 3 Treatment Summary:

67 y/o female with Stage I: T1c, N0, M0, ER/PR+, HER2 negative, G3, invasive ductal carcinoma of RT breast, s/p lumpectomy, underwent EBRT/3D treatment as detailed below:

Plan ID	Energy	Fractions	Dose per Fraction (cGy)	Total Dose Delivered (cGy)	Start Date	End Date
Breast eBoost	12MeV	5	200	1,000	2/11/19	2/15/19
RT Breast/IMN	10MV	25	200	5,000	1/7/19	2/8/19

Number of Phases of Rad Tre...		(02) 2 phases
Radiation Treatment Discontin...		(01) Radiation treatment completed as prescribed
Total Dose		(006000)



Total Dose B: Example 1

B. Multiple Metastatic Sites >>>Highest Dose Site

Example 1 Radiation Treatment Summary:

79 y/o male presented with metastatic adenocarcinoma of the lung to bones in multiple sites. Palliative EBRT was administered as follows. All treatments delivered via 2D plans.

Plan ID	Energy	Fractions	Dose per Fraction (cGy)	Total Dose Delivered (cGy)	Start Date	End Date
LT Skull	6MVX	5/5	400	2,000	3/22/19	3/28/19
RT Humerus	6MVX	5/5	500	2,500	3/22/19	3/28/19
L1-L3 Spine	6MVX	10/10	300	3,000	4/1/19	4/12/19

Number of Phases of Rad Tre...	(03) 3 phases
Radiation Treatment Discontin...	(01) Radiation treatment completed as prescribed
Total Dose	(003000)



Total Dose B: Example 2

B. Multiple Metastatic Sites >>>Highest Dose Site

Example 2 Radiation Treatment Summary:

68 y/o female who presented with LT lung primary metastatic to multiple bone sites and treated with palliative EBRT as detailed below:

Plan ID	Energy	Fractions	Dose per Fraction (cGy)	Total Dose Delivered (cGy)	Start Date	End Date
LT Ribs SBRT	15MV	1	800	800	5/16/18	5/16/18
T12 SBRT	10X	1	1,600	1,600	5/15/18	5/15/18

Number of Phases of Rad Tre...	(02) 2 phases
Radiation Treatment Discontin...	(01) Radiation treatment completed as prescribed
Total Dose	(001600)



Total Dose C: Example 1

C. Primary & Metastatic Site(s) >>> Dose from Primary Site Only

Example 1 RT Treatment Summary:

69 y/o male with newly diagnosed oligometastatic prostate adenocarcinoma. Iliac bone and T12 spine were treated with stereotactic ablative radiotherapy.

Plan ID	Energy	Fractions	Dose per Fraction (cGy)	Total Dose Delivered (cGy)	Start Date	End Date
Iliac Bone Mets	10X/SBRT	3/3	800	2,400	1/14/19	1/16/19
Prostate+SV/Nodes	10X/IMRT	30/30	200	6,000	1/21/19	3/5/19
T12 Spine	6X/SBRT	3/3	800	2,400	3/7/19	3/13/19

Number of Phases of Rad Tre...		(03) 3 phases
Radiation Treatment Discontin...		(01) Radiation treatment completed as prescribed
Total Dose		(006000)



Total Dose D: Example 1

D. Simultaneous Integrated Boost (SIB) >>> Highest PTV Dose

Example 1 Radiation Treatment Summary:

78 Y/O W/M who was diagnosed w/ a soft palate early stage cancer (Stage I: T1, N0, M0) and was treated for curative intent with EBRT/VMAT as detailed below:

Plan ID	Energy	Fractions	Dose per Fraction (cGy)	Total Dose Delivered (cGy)	Start Date	End Date
PTV1	6MVX	30	170	5,100	2/5/18	2/23/18
PTV2	6MVX	30	200	6,000	2/5/18	2/23/18
PTV3	6MVX	30	220	6,600	2/5/18	2/23/18

Number of Phases of Rad Tre...		(03) 3 phases
Radiation Treatment Discontin...		(01) Radiation treatment completed as prescribed
Total Dose		(006600)



Total Dose D: Example 2

D. Simultaneous Integrated Boost (SIB) >>> Highest PTV Dose

Example 2 Radiation Treatment Summary:

78 Y/O W/M who was diagnosed w/ SCC of LT tonsil, T4, N1, M0, and was treated for curative intent with EBRT/HT as detailed below:

Plan ID	Energy	Fractions	Dose per Fraction (cGy)	Total Dose Delivered (cGy)	Start Date	End Date
<i>PTV₇₀</i>	6MVX	35	200	7,000	2/14/18	4/4/18
<i>PTV₆₀</i>	6MVX	35	171.4	6,000	2/14/18	4/4/18
<i>PTV₅₆</i>	6MVX	35	160	5,600	2/14/18	4/4/18

Number of Phases of Rad Tre...		(03) 3 phases
Radiation Treatment Discontin...		(01) Radiation treatment completed as prescribed
Total Dose		(007000)



Total Dose E: Example 1

E: If brachytherapy is only mode of txt= Dose in cGy when given.

RT Summary:

Using a 6/1 mini SAVI catheter, RT lumpectomy cavity received 34 Gy in 10 treatments, BID.

Plan ID	Energy	Fx	Dose/fx (cGy)	Total Dose (cGy)	Start Date	End Date
RT breast	SAVI catheters (Ir-192)	10	340	3400		

Number of Phases of Rad Treatments	(01) 1 phase
RT Discontinued Early	(01) RT completes as prescribed
Total Dose	(003400)

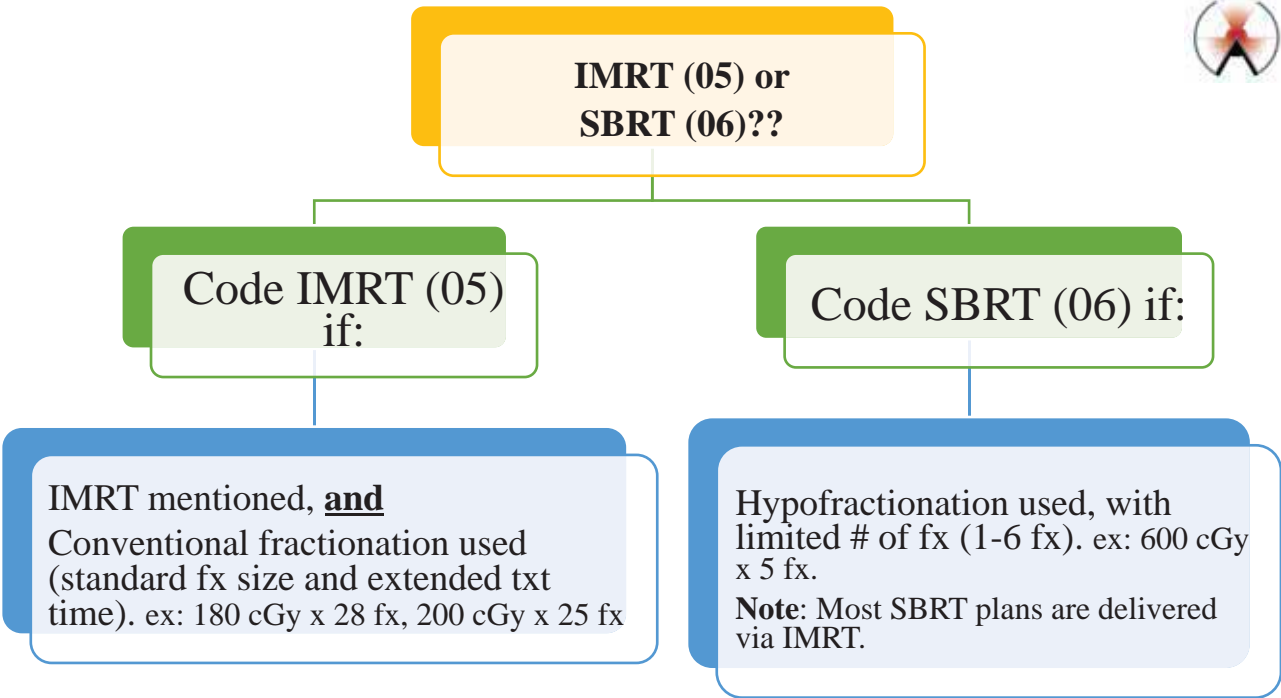


Total Dose F: Example 1

F: Brachytherapy + EBRT: Total dose = 999998.

Plan ID	Energy	Fx	Dose/fx (cGy)	Total Dose (cGy)	Start Date	End Date
Pelvis, Cervix	6MV/VMAT	25	180	4500	5/3/18	7/26/18
Cervix	Ir-192 HDR brachy	6	400	2400	7/11/18	7/26/18

Number of Phases of Rad Treatments	(02) 2 phases
RT Discontinued Early	(01) RT completes as prescribed
Total Dose	(999998)



SBRT or IMRT??



- **Example 1:** *Pt received 200 cGy in 30 fractions for a total prescribed dose of 60 Gy five times a week, for six weeks, using a 6 MV beam and IMRT.*
 - **Example 2:** *Pt received 800 cGy in 5 fractions over two weeks, for a total prescribed dose of 40 Gy, using a 6 MV beam and IMRT*
1. *What is the modality code and treatment planning code for each example?*

SBRT or IMRT??



- **Example 1:** *Pt received 200 cGy in 30 fractions for a total prescribed dose of 60 Gy five times a week, for six weeks, using a 6 MV beam and IMRT.*

Modality= 02

Planning Technique= 05

- **Example 2:** *Pt received 800 cGy in 5 fractions over two weeks, for a total prescribed dose of 40 Gy, using a 6 MV beam and IMRT*

Modality= 02

Planning Technique= 06



Radiation Therapy to Draining Lymph Nodes

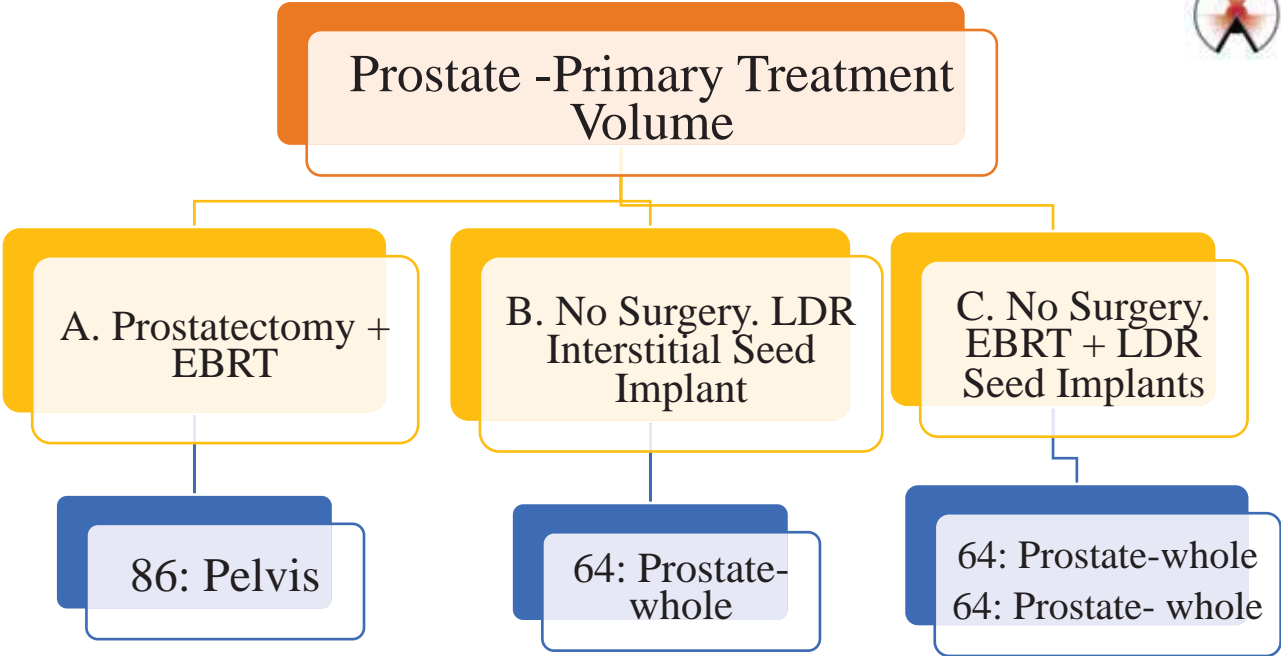
Key Points



1. SBRT does not target lymph nodes; PTV typically limited to 5 cm,
2. IORT for breast cancer does not target lymph nodes,
3. Chest wall or lumpectomy **tumor bed/cavity boost** (either photons or electrons) does not include lymph nodes,
4. For pelvic sites, if pelvic/whole pelvis irradiation is mentioned, assume the regional lymph nodes for that site are included,
5. Interstitial or intracavitary brachytherapy(HDR or LDR) does not target regional lymph nodes,



PRIMARY TREATMENT VOLUME



**Prostate -Primary Treatment Volume
(No Prostatectomy)**



D. EBRT Only (regional & boost dose)

If largest phase described as Pelvis, Whole Pelvis, or Pelvic Radiation:
 Primary Txt Volume= 64:
 Prostate, Whole.
 RT to Draining LNs= 06:
 Pelvic LNs

If boost dose given (smallest):
 Primary Txt Volume= 64:
 Prostate, Whole.
 RT to Draining LNs= 00

Breast -Primary Treatment Volume



A. Lumpectomy or Partial Mastectomy + EBRT

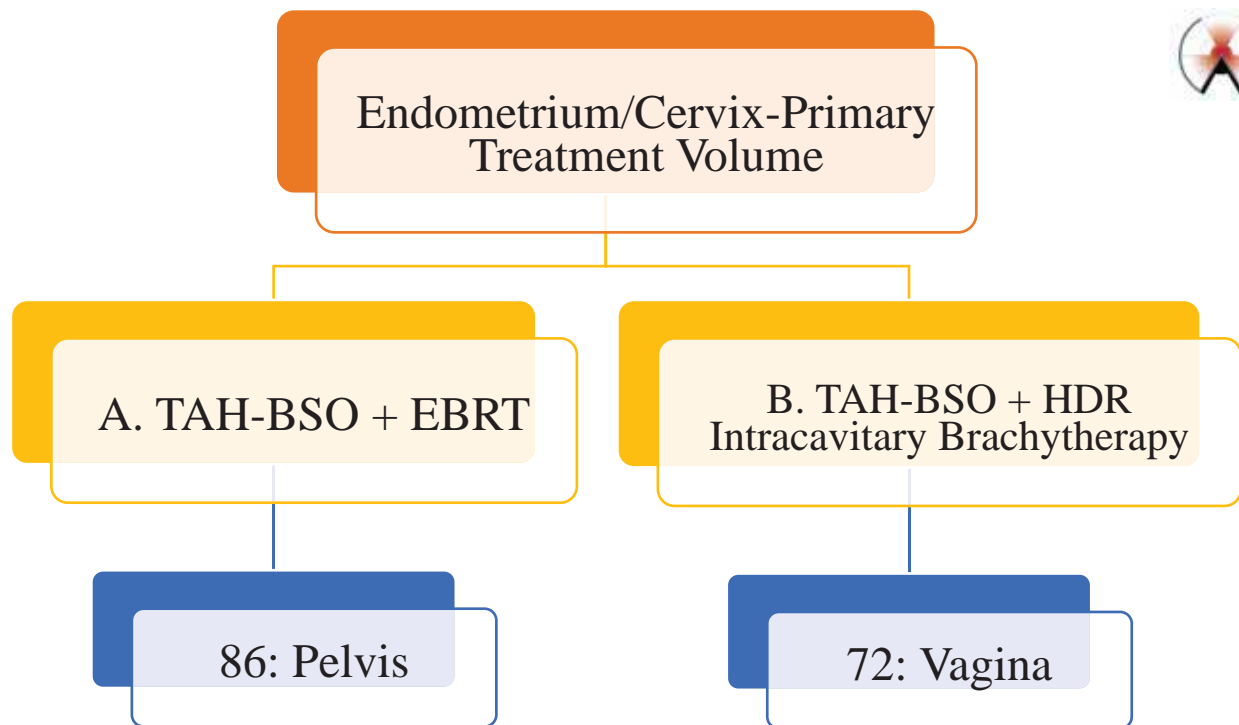
40: Whole breast

B. Simple/Radical Mastectomy, Subcutaneous Mastectomy + EBRT

42: Chest wall

C. Electron or Photon Boost to Lumpectomy Cavity

41: Partial Breast



Resources

- “Handbook of Evidence-Based Radiation Oncology”, 3rd ed. 2018 Edition
- “Principles and Practice of Radiation Therapy” 4th edition,
- <https://www.acr.org/Clinical-Resources/Practice-Parameters-and-Technical-Standards/Practice-Parameters-by-Subspecialty>
- There are a couple of links you will find tremendously useful:
 - Radiation Oncology: General
 - Radiation Oncology: Radiation Therapy



Questions??

