Seeds, Beams and Everything in Between

Prostate Cancer Radiation Therapy

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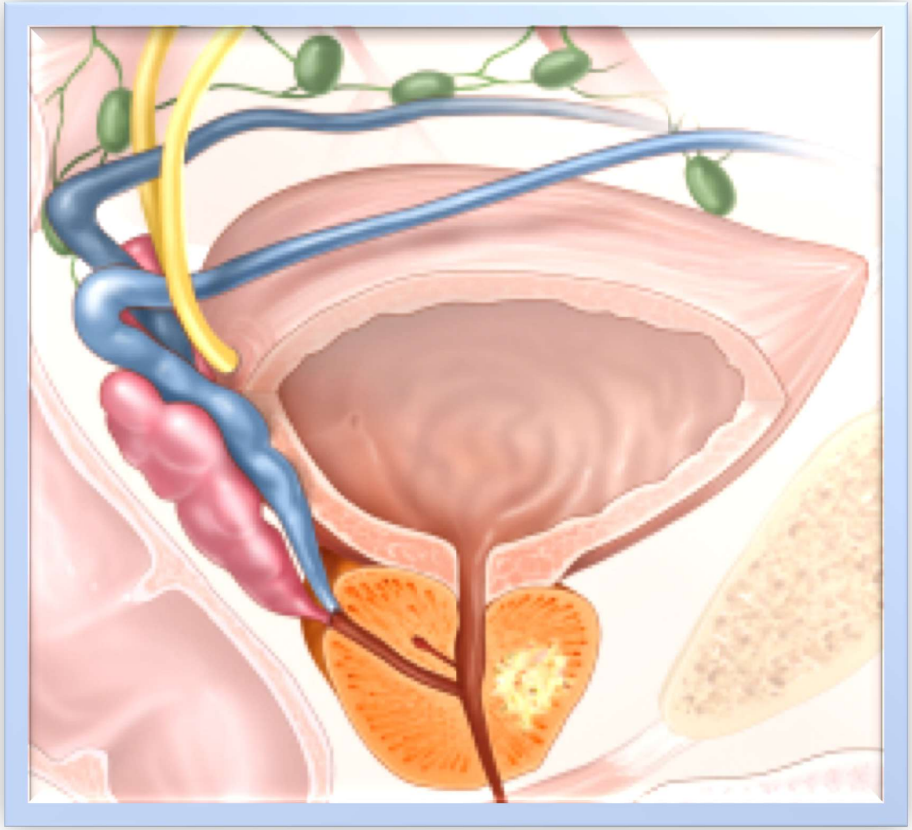

Prostate Cancer Treatment

Objectives

1. Describe the role of radiation therapy in the management of prostate cancer.

2. Differentiate between phases, planning technique and modality for prostate cancer.

3. Identify common radiation treatment regimens and volumes used in prostate cancer.

Prostate Cancer Treatment

Radiation Therapy : Phases

A phase is a set of treatments delivered with a unique combination of:

- Target volume
- Treatment fraction size
- Treatment modality
- Treatment technique

A new phase begins when there is a change in ***any*** of these four parameters.

At beginning of radiation planning process, Radiation Oncologists write:

- RT prescriptions/tx volumes
- Dose per fraction/# of fractions
- Modality
- Planning technique

Can be delivered sequentially or simultaneously (SIB).

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Radiation Therapy: Phases

- First phase commonly referred to as the “initial plan”.
- Subsequent phases may be referred to as “boost” or “cone-down”.
- Adapted plans should not be coded as new phase, unless the radiation oncologist documents it as new phase.

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Radiation Therapy: Phases

Phase Order Rules

- Enter phases in chronological order, if possible.
- If multiple phases start on same date, enter them in order from highest to lowest ‘Total Phase Dose’.
- If multiple phases start on same date and have same Total Phase Dose, any order is acceptable.
- If there are more than three phases, only document the first three. Record actual total number of phases in the text field!

Prostate Cancer Treatment

Radiation Therapy: Radiation External Beam Planning Technique

Code	Label	Description
0	No radiation treatment	Radiation therapy was not administered or diagnosed at autopsy
1	External beam, NOS	Treatment known to be external beam, but insufficient info to determine specific planning technique
2	Low energy x-ray/photon therapy	External beam therapy administered using equipment with a maximum, energy of <1MV. Energies are typically expressed in units of kilovolts (kV). These type of treatments are sometimes referred to as electronic brachytherapy or orthovoltage or superficial therapy. Clinical notes may refer to the brand names of low energy x-ray delivery devices, e.g., Axxent ®, INTRABEAM ®, or, Esteya ®
3	2-D therapy	External beam planning technique using 2-D imaging, such as plain film x-rays or fluoroscopic images to define location and size of treatment beams. Should be clearly described as 2-D therapy. Typically for pall treatment
4	Conformal or 3-D conformal therapy	External beam planning technique using multiple fixed beams shaped to conform to defined target volume. Should be clearly described as conformal or 3-D therapy

Determination of external beam planning technique may require assistance from Radiation oncologist or dosimetrist to ensure consistent coding.

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Radiation Therapy: Radiation External Beam Planning Technique

Code	Label	Description
5	Intensity modulated therapy	External beam planning technique where shape or energy of beams is optimized using software algorithms. Any external beam modality can be modulated but these generally refer to photon or proton beams. Can be described as intensity modulated radiation therapy (IMRT), intensity modulated x-ray or proton therapy (IMXT/IMPT), volumetric arc therapy (VMAT) and, other ways. If treatment is described as IMRT with online re-optimization/re-planning, should be categorized as online re-optimization or re-planning
6	Stereotactic radiotherapy or radiosurgery, NOS	Treatment planning using stereotactic radiotherapy/radiosurgery techniques, but not described as CyberKnife® or Gamma, Knife ®. Ssometimes described as SBRT, (stereotactic body radiation), SABR (stereotactic ablative radiation), SRS (stereotactic radiosurgery) or SRT (stereotactic radiotherapy). If treatment is described as robotic radiotherapy (e.g., CyberKnife ®) or Gamma Knife ®, use stereotactic radiotherapy subcodes below. If described as stereotactic radiotherapy or radiosurgery with online re-optimization/re-planning, categorize as online re-optimization or re-planning
7	Stereotactic radiotherapy or radiosurgery, robotic	Treatment planning using stereotactic radiotherapy/radiosurgery techniques specifically described as robotic (e.g., CyberKnife ®)
8	Stereotactic radiotherapy or radiosurgery, Gamma Knife®	Treatment planning using stereotactic radiotherapy/radiosurgery, techniques using Cobalt-60 gamma ray source and specifically described as Gamma Knife® . Most commonly used for brain

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Radiation Therapy: Radiation External Beam Planning Technique

Code	Label	Description
9	CT-guided online adaptive therapy	External beam technique in which treatment plan is adapted over course of radiation to reflect changes in patient's tumor or normal anatomy radiation using CT scan obtained at treatment machine (online). Sometimes described as CT-guided online re-optimization or online re-planning. If described as both CT-guided online adaptive therapy as well as another external beam technique (IMRT, SBRT, etc.) then categorize as CT-guided online adaptive therapy. If described as "adaptive" but does not include the descriptor "online" this code should not be used
10	MR-guided online adaptive therapy	An external beam technique in which treatment plan is adapted over course of radiation to reflect changes in patient's tumor or normal anatomy radiation using an MRI scan obtained at treatment machine (online). Sometimes described as MR-guided online re-optimization or online re-planning. If treatment technique is described as both MR-guided online adaptive therapy as well as another external beam technique (IMRT, SBRT, etc.) categorize as MR-guided online adaptive therapy. If treatment is described as "adaptive" but does not include descriptor "online" this code should not be used
88	Not Applicable	Treatment not by external beam

If treatment is described as both MR or CT-Guided on-line adaptive, as well as another external beam planning technique, code as online adaptive therapy.

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Radiation Therapy: Treatment Modality

Code	Description
00	No radiation treatment
01	External beam, NOS
02	External beam, photons
03	External beam, protons
04	External beam, electrons
05	External beam, neutrons
06	External beam, carbon ions
07	Brachytherapy, NOS
08	Brachytherapy, intracavitary, LDR
09	Brachytherapy, intracavitary, HDR
10	Brachytherapy, interstitial, LDR
11	Brachytherapy, interstitial, HDR
12	Brachytherapy, electronic
13	Radioisotopes, NOS
14	Radioisotopes, radium-232
15	Radioisotopes, strontium-89
16	Radioisotopes, strontium-90
98	Radiation therapy administered, but treatment modality is not specified or unknown
99	Unknown if radiation treatment administered

Radiation modality reflects whether a treatment was external beam, brachytherapy or radioisotope, as well as their major subtypes, or a combination of modalities.

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Radiation Therapy: Brachytherapy

Modality

07	Brachytherapy, NOS
08	Brachytherapy, intracavitary, LDR
09	Brachytherapy, intracavitary, HDR
10	Brachytherapy, interstitial, LDR
11	Brachytherapy, interstitial, HDR
12	Brachytherapy, electronic

Brachytherapy involves placing radioactive seeds or wires directly into prostate gland to deliver radiation to cancerous tissue.

Do NOT add external beam dose and brachytherapy doses together for the total course dose. Code 999998, instead.

Prostate Cancer Treatment

Radiation Therapy: Brachytherapy

External Beam Radiation Planning Technique

10	MR-guided online adaptive therapy*	An external beam technique in which treatment plan is adapted over course of radiation to reflect changes in patient's tumor or normal anatomy radiation using an MRI scan obtained at treatment machine (online). Sometimes described as MR-guided online re-optimization or online re-planning. If treatment technique is described as both MR-guided online adaptive therapy as well as another external beam technique (IMRT, SBRT, etc.) categorize as MR-guided online adaptive therapy. If treatment is described as "adaptive" but does not include descriptor "online" this code should not be used
88	Not Applicable	Treatment not by external beam
98	Other, NOS	Other radiation, NOS; Radiation therapy administered but the treatment modality is not specified or is unknown
99	Unknown	Unknown whether radiation therapy was administered

Record 88 as the Phase I External Beam Radiation Planning Technique
for any phase that uses radioisotopes or brachytherapy.

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Radiation Therapy: Brachytherapy

Isotopes and Coding Modality

- Most brachytherapy (modality codes 07-11) delivered with radioactive isotopes (except electronic brachytherapy – modality code 12)
  - Radium and cobalt historically
  - Now more commonly cesium and iridium

- Modality codes 13-16 indicate radioisotopes used, but not as brachytherapy.

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Radiation Therapy: Brachytherapy

Isotopes and Coding Modality

Don’t use code 13 – Radioisotopes, NOS – instead of brachytherapy when chart indicates intracavitary treatment.

- Even though technically radioisotopes were used, use appropriate brachytherapy codes
- High dose rate (HDR), if iridium
- Low dose rate (LDR), if cesium or iodine

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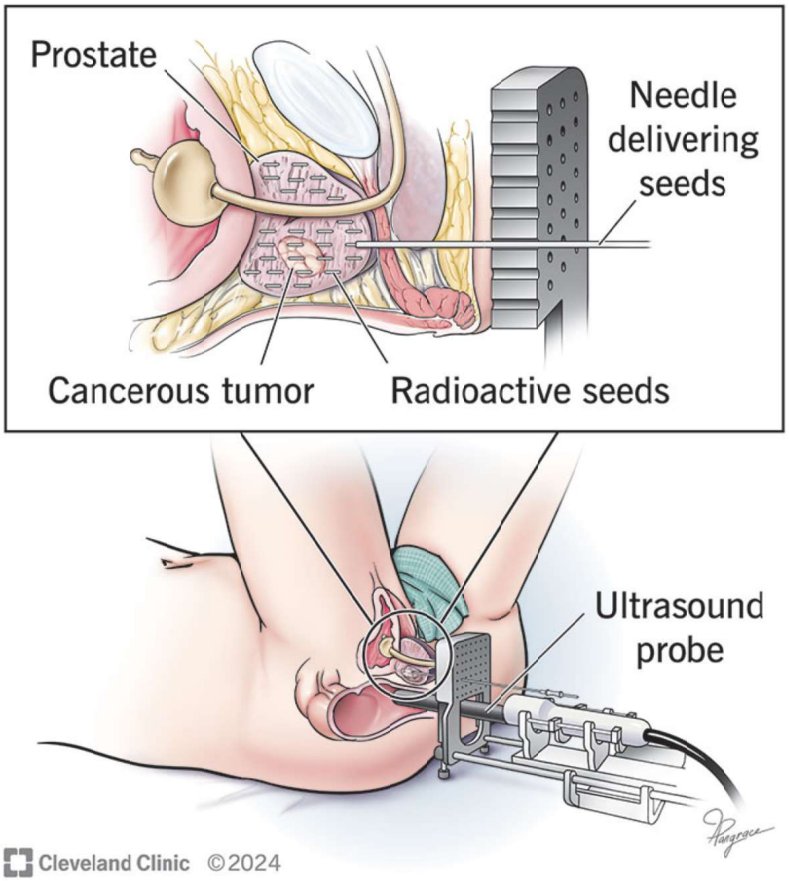
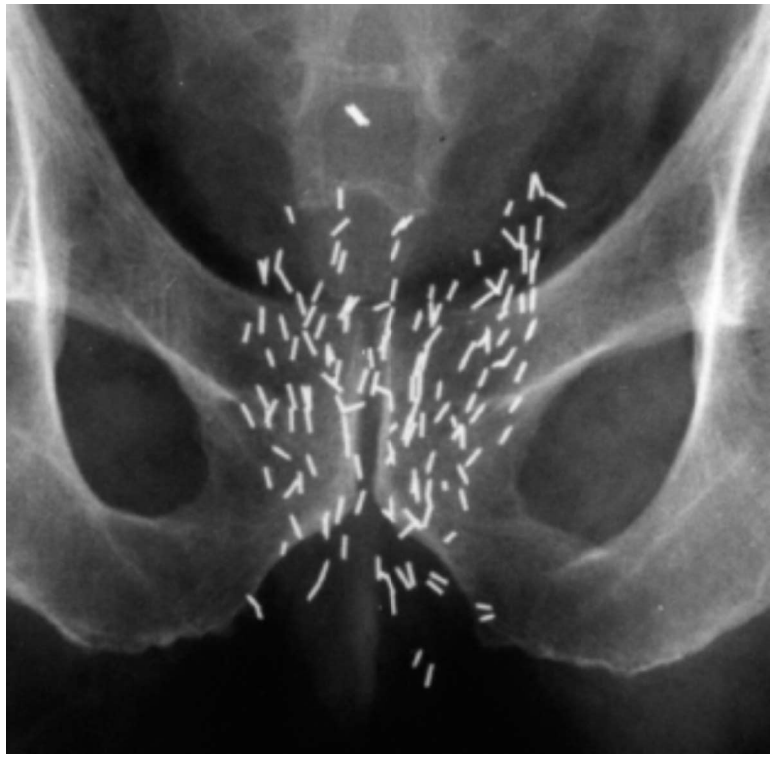
Low Dose Rate





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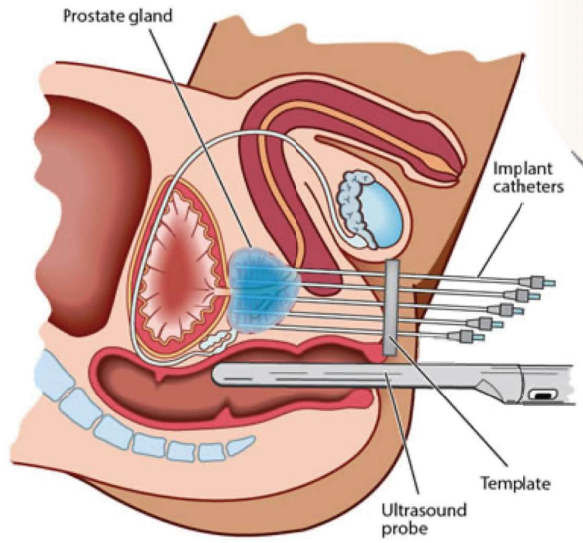
High Dose Rate



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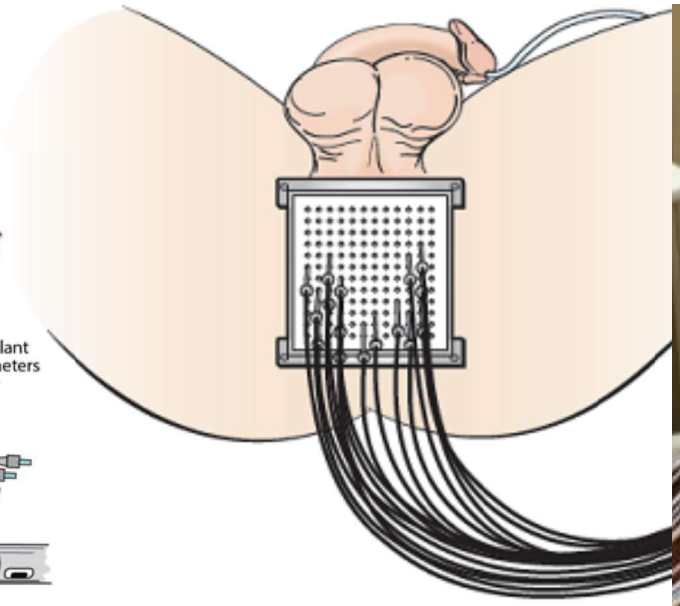

Prostate Cancer Treatment

Radiation Therapy: Heavy Equipment Table

Modality	Modality	App Planning Technique(s)
Varian TrueBeam, Halcyon or Ethos	02	03,04,05, 06, 09
ViewRay MRIdian MR-Linac	02	10
Elekta Unity MR-Linac	02	10
Elekta VersaHD, Infinity, Synergy	02	03,04,05, 06, 09
GammaKnife	02	08
GammaPod	02	06
Cyberknife	02	07
Tomotherapy	02	05, 06, 09
VMAT, RapidArc, Hyperarc	02	05, 06
Zeiss, Xoft, Esteya	02	02
Accuboost	02	02
LIAC, NOVAC	04	03, 04
MammoSite, SAVI, Contura	09	88

Located on page 389 of STORE Manual

Question

"When it says that the prostate and seminal vesicles were treated, do you code the primary volume to prostate and the draining lymph nodes to pelvic lymph nodes?

Do the seminal vesicles count as the draining lymph nodes or is that just part of the primary treatment volume field?"

Answer

Seminal vesicles do not count as the draining lymph nodes.

They are just part of the primary treatment volume field.

Question

What if the primary tumor was removed before radiation?

Answer

Code to the primary site.

Prostate Cancer Treatment

Treatment Exercise 1: Brachytherapy

46 yo male with stage III prostate CA receives 5400 cGy to prostate, seminal vesicles and pelvic nodes over 23 fractions with IMRT, with subsequent boost of 11500 cGy LDR brachytherapy implant.

How many phases?	
Phase I Total Dose code?	
Phase II Total Dose code?	
Radiation Course Total Dose code?	
Phase I Rad External Beam Planning Technique?	
Phase II Rad External Beam Planning Technique?	

Prostate Cancer Treatment

Treatment Exercise 1: Brachytherapy

46 yo male with stage III prostate CA receives 5400 cGy to prostate, seminal vesicles and pelvic nodes over 23 fractions with IMRT, with subsequent boost of 11500 cGy LDR brachytherapy implant.

How many phases?	2
Phase I Total Dose code?	005400
Phase II Total Dose code?	011500
Radiation Course Total Dose code?	999998
Phase I Rad External Beam Planning Technique?	05
Phase II Rad External Beam Planning Technique?	88

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Treatment Exercise 2: EBRT

63 yo male with prostate adenocarcinoma receives 4200 cGy to whole pelvis using a four-field approach, with all fields shaped conformally. He is subsequently treated with 4800 cGy IMRT boost.

How many phases?	
Phase I Total Dose code?	
Phase II Total Dose code?	
Radiation Course Total Dose code?	
Phase I Rad External Beam Planning Technique?	
Phase II Rad External Beam Planning Technique?	

Prostate Cancer Treatment

Treatment Exercise 2: EBRT

63 yo male with prostate adenocarcinoma receives 4200 cGy to whole pelvis using a four-field approach, with all fields shaped conformally. He is subsequently treated with 4800 cGy IMRT boost.

How many phases?	2
Phase I Total Dose code?	004200
Phase II Total Dose code?	004800
Radiation Course Total Dose code?	009000
Phase I Rad External Beam Planning Technique?	04
Phase II Rad External Beam Planning Technique?	05

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Treatment Exercise 3: EBRT

58 yo male with prostate adenocarcinoma with mets to ilium is treated twice a day for 3 days with open rectangular photon fields, 200 cGy per treatment.

Phase I Total Dose?	
Radiation Course Total Dose code?	
Phase I Rad External Beam Planning Technique?	

Prostate Cancer Treatment

Treatment Exercise 3: EBRT

58 yo male with prostate adenocarcinoma with mets to ilium is treated twice a day for 3 days with open rectangular photon fields, 200 cGy per treatment.

Phase I Total Dose?	001200
Radiation Course Total Dose code?	001200
Phase I Rad External Beam Planning Technique?	03

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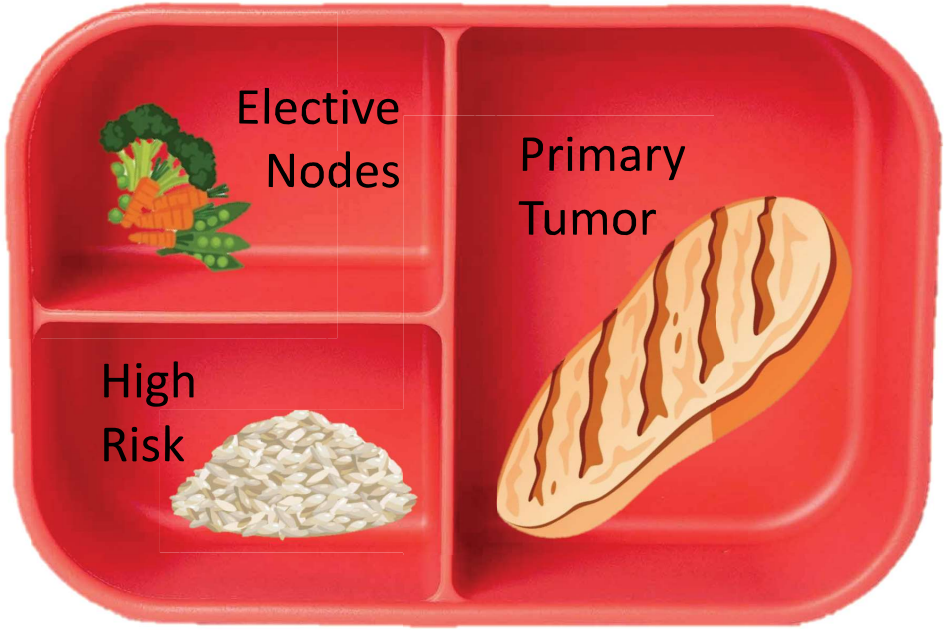
Simultaneous Integrated Boost

- Protein = highest dose
  - PTV 7000 cGy (prostate)
- Rice = intermediate dose
  - PTV 5600 cGy (seminal vesicles)
- Veggies = lower dose
  - PTV 4500 cGy (lymph nodes)



One lunch, three portions, served at the same time.

For total course dose, highest dose wins, do not add them together.

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Up and Coming

1. SBRT + Ultra hypofractionation – 5 treatments instead of 40+
2. Dominant Lesion Boosting – current clinical trial in New York
3. Image-guided + Adaptive radiation – adjustments made in real time
4. PSMA Radioligand therapy – systemic radiation
5. Radiopharmaceuticals – used more in metastatic disease
6. Genomics – tumor biology to guide dose, need and target areas

Thank you!

Questions regarding this presentation?

 CTRadHotline@gmail.com

For all other radiation questions, please submit questions to the CAnswer Forum.