# CANCER EDUCATION DAY:

## RADIATION TREATMENT FOR PROSTATE CANCER

ADRIAN COZMA
RADIATION ONCOLOGIST

FRIDAY NOVEMBER 13, 2026



# DISCLOSURES:

- Tolmar Pharmaceuticals Canada for providing full travel, conference and accommodation support for the 2026 ASTRO Conference as part of the 2026 Canadian Ambassador Program. I also received honorarium as part of an invited advisory board for the company.
- AI Disclosure: ChatGPT-4 was used to refine slide text for conciseness and generate select conceptual images. All content was verified by myself.

# PRESENTATION OVERVIEW:

- Introduction to Radiation Therapy
- Prostate Cancer Staging and Treatment
- Modern Radiation Treatment in Practice
  - EBRT, VMAT, IMRT
  - Brachytherapy
- Questions?

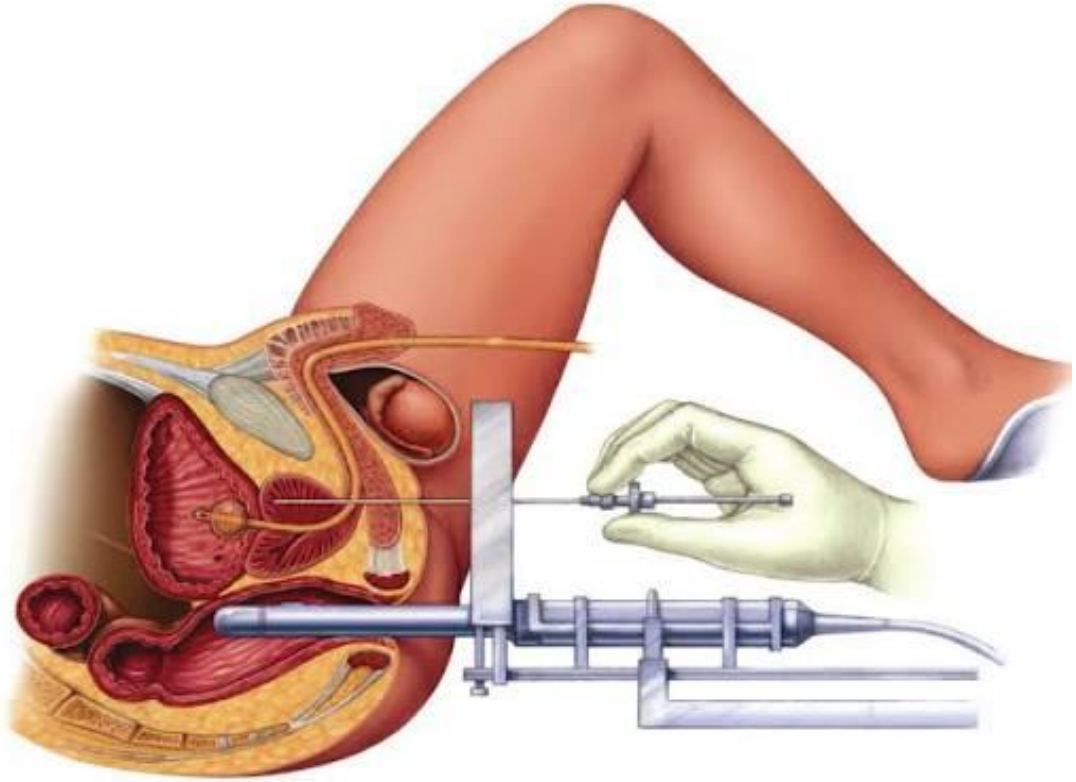
# INTRODUCTION TO RADIATION THERAPY

# TYPES OF RADIATION THERAPY



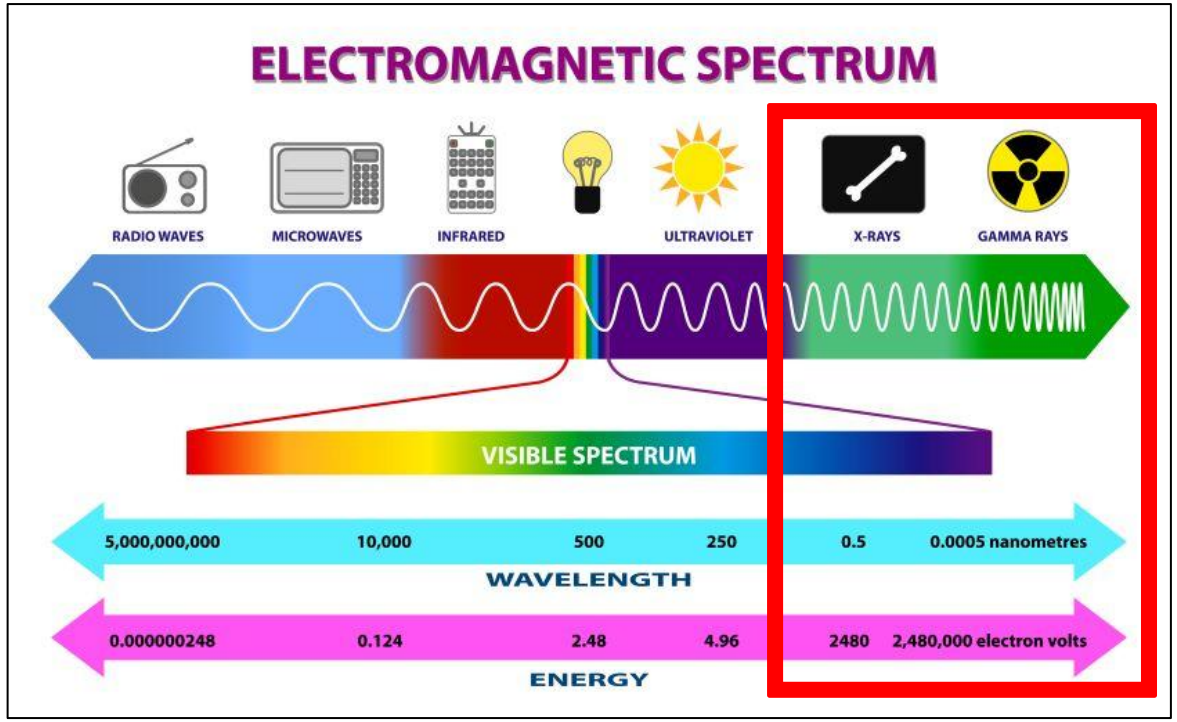
**EXTERNAL BEAM RADIATION THERAPY:**
(EBRT; IMRT, VMAT, SBRT/SABR)

**BRACHYTHERAPY**
(High Dose Rate, Low Dose Rate)



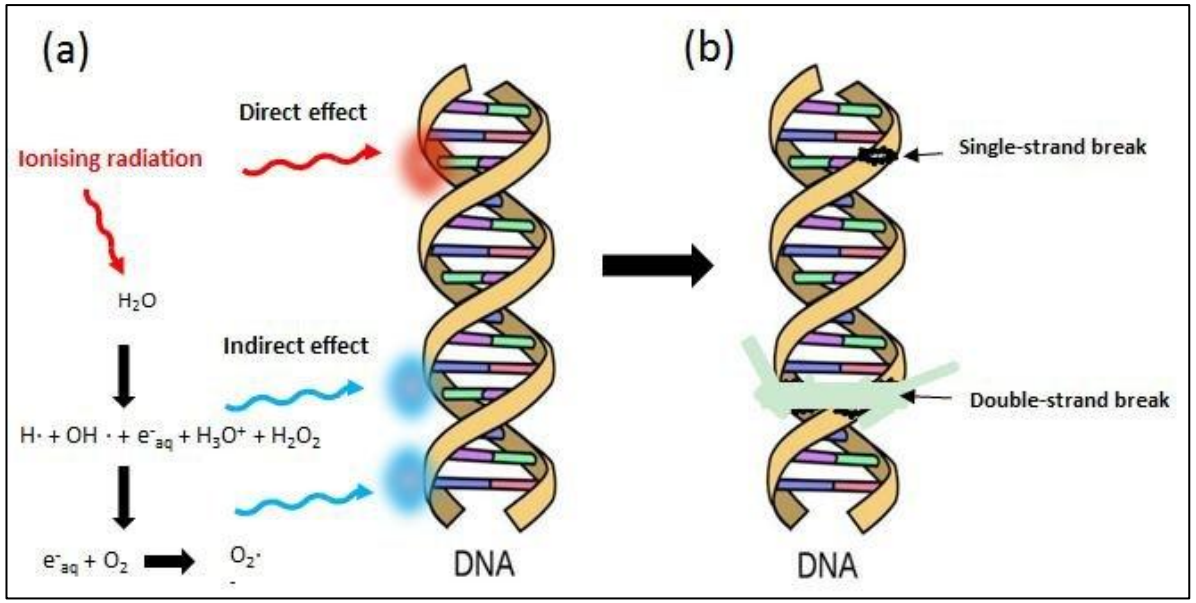
# Radiation Therapy uses **Ionizing** Radiation:

- type of energy that has sufficient strength to cause a chemical and potential biologic effect in the human body
  - Photons: gamma, **x-ray**
  - Particles: **protons**, neutrons, carbon ions and others
- measured in Gray (Gy): energy absorbed [J] / kg of tissue)
  - 1 Gy = 100 cGy i.e. 6000 cGy or 60 Gy of radiation in XX treatments




# DNA Damage:

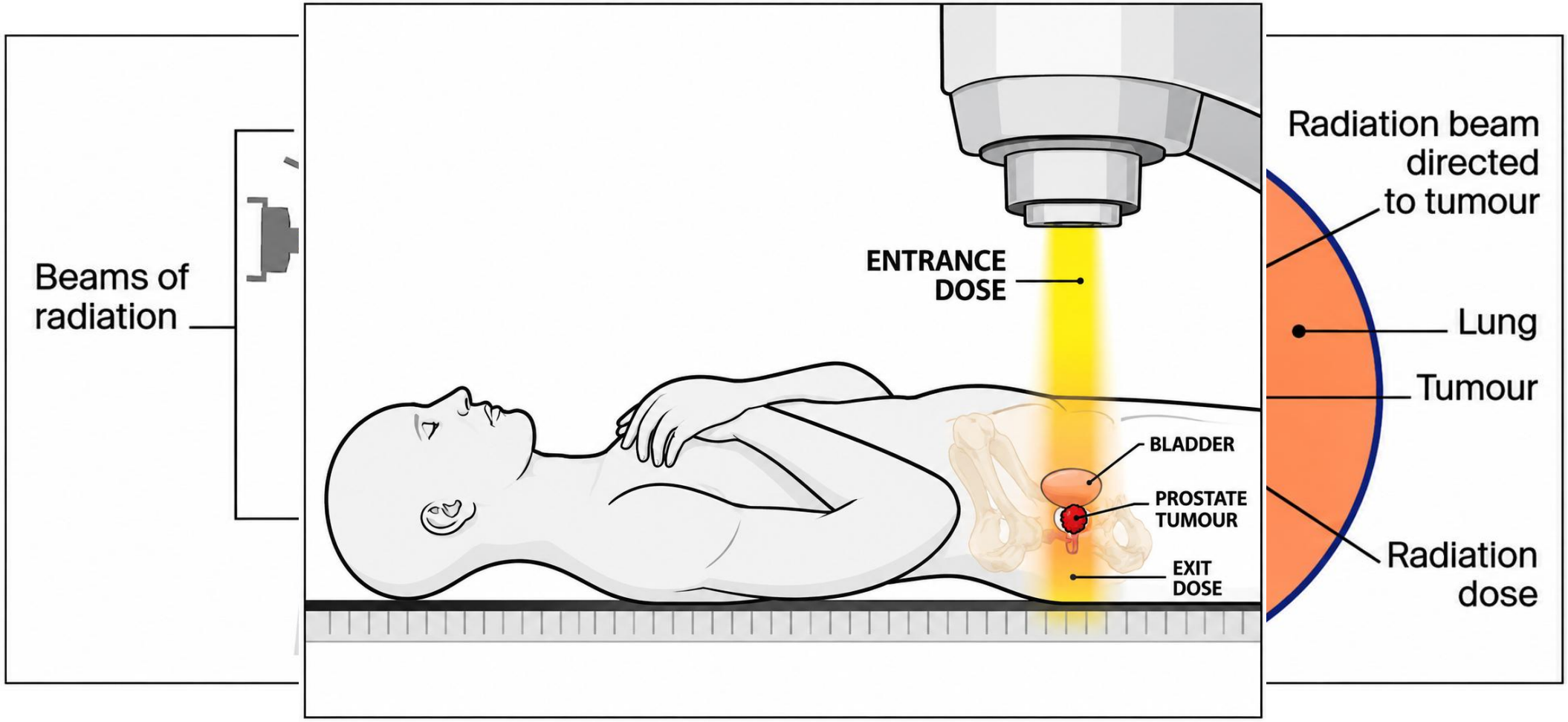
- Directly interacting with DNA
- Indirectly via water molecules and causing unstable molecules




Cancers are disproportionally impacted by RT:

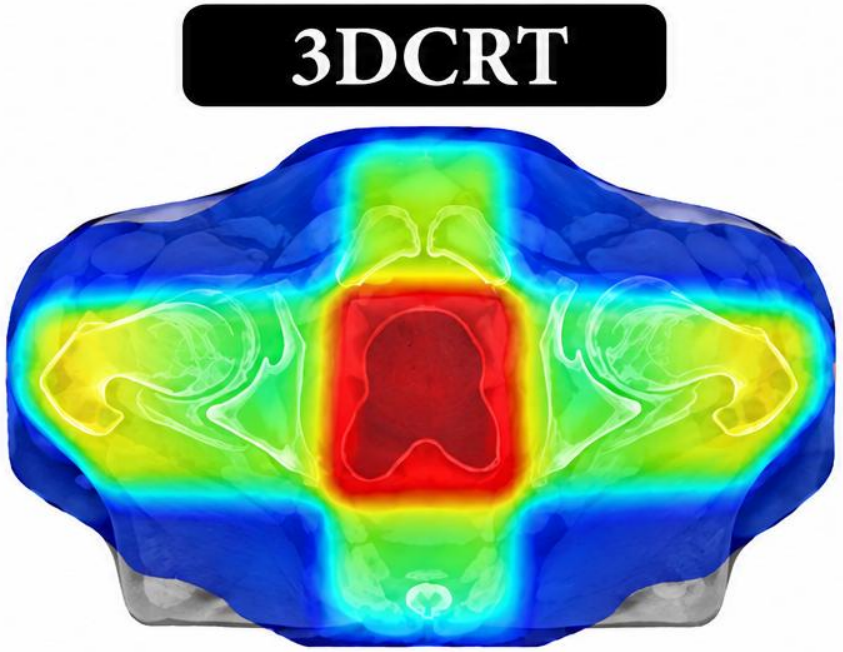
1. Impaired repair capacity from becoming cancerous.
2. Rapid growth enhances the impact of DNA damage.

# THE CHALLENGE IN RADIATION ONCOLOGY:




**Maximizing the Therapeutic Ratio!**

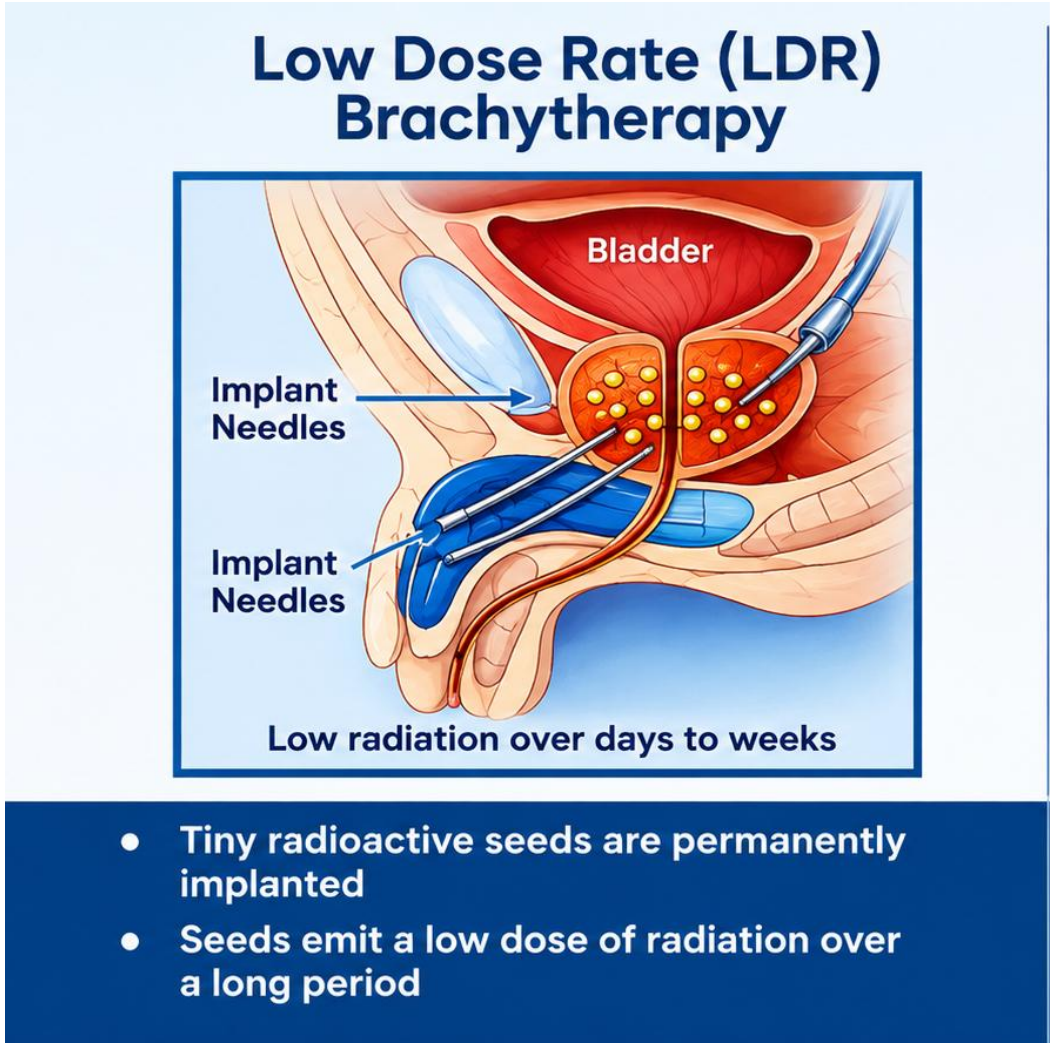
# THE BENEFITS OF MODERN TECHNOLOGY: EBRT



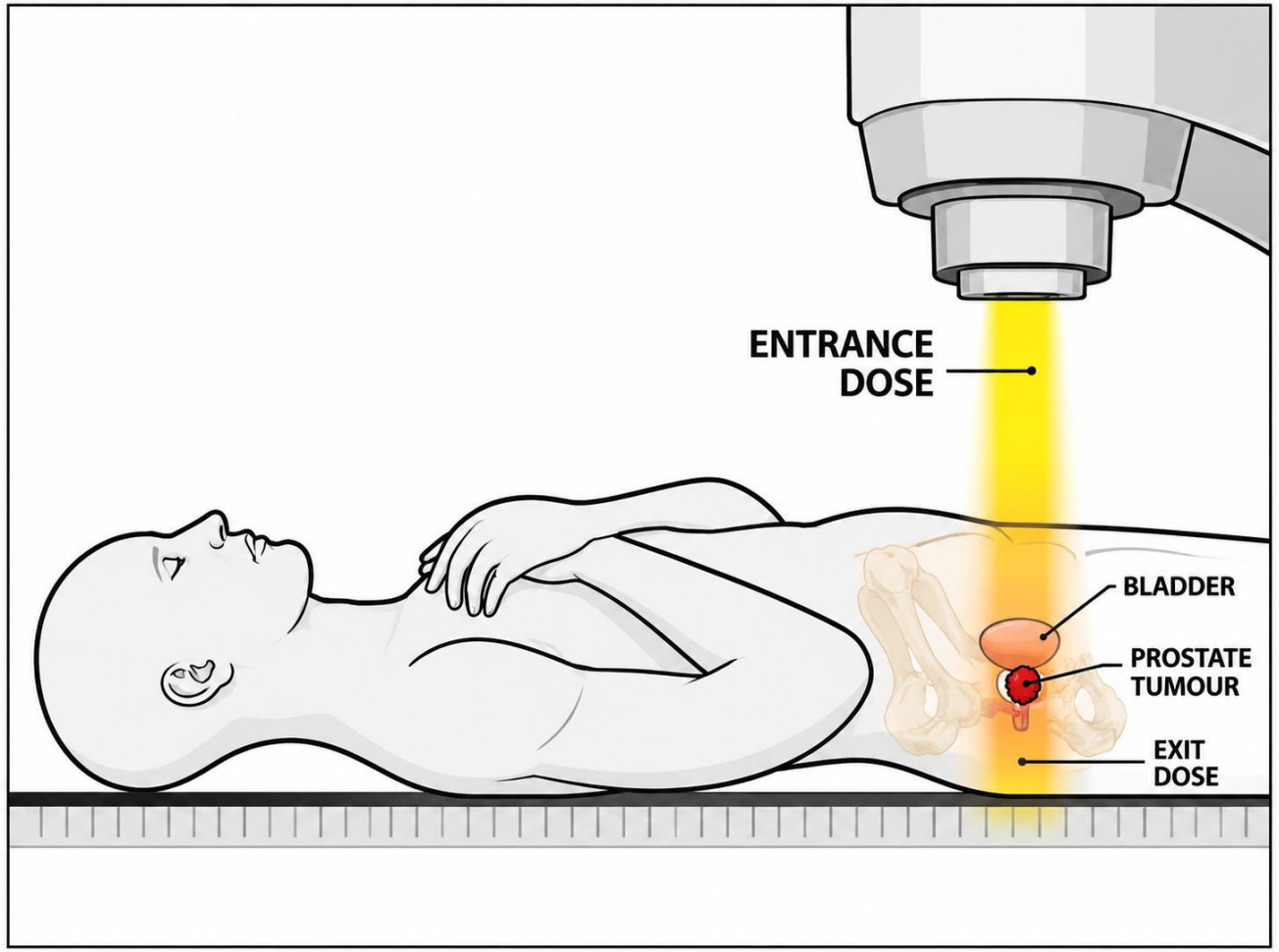

**3D Conformal Radiation Therapy**

(1990 – Early 2000s)

# THE BENEFITS OF MODERN TECHNOLOGY: BRACHYTHERAPY

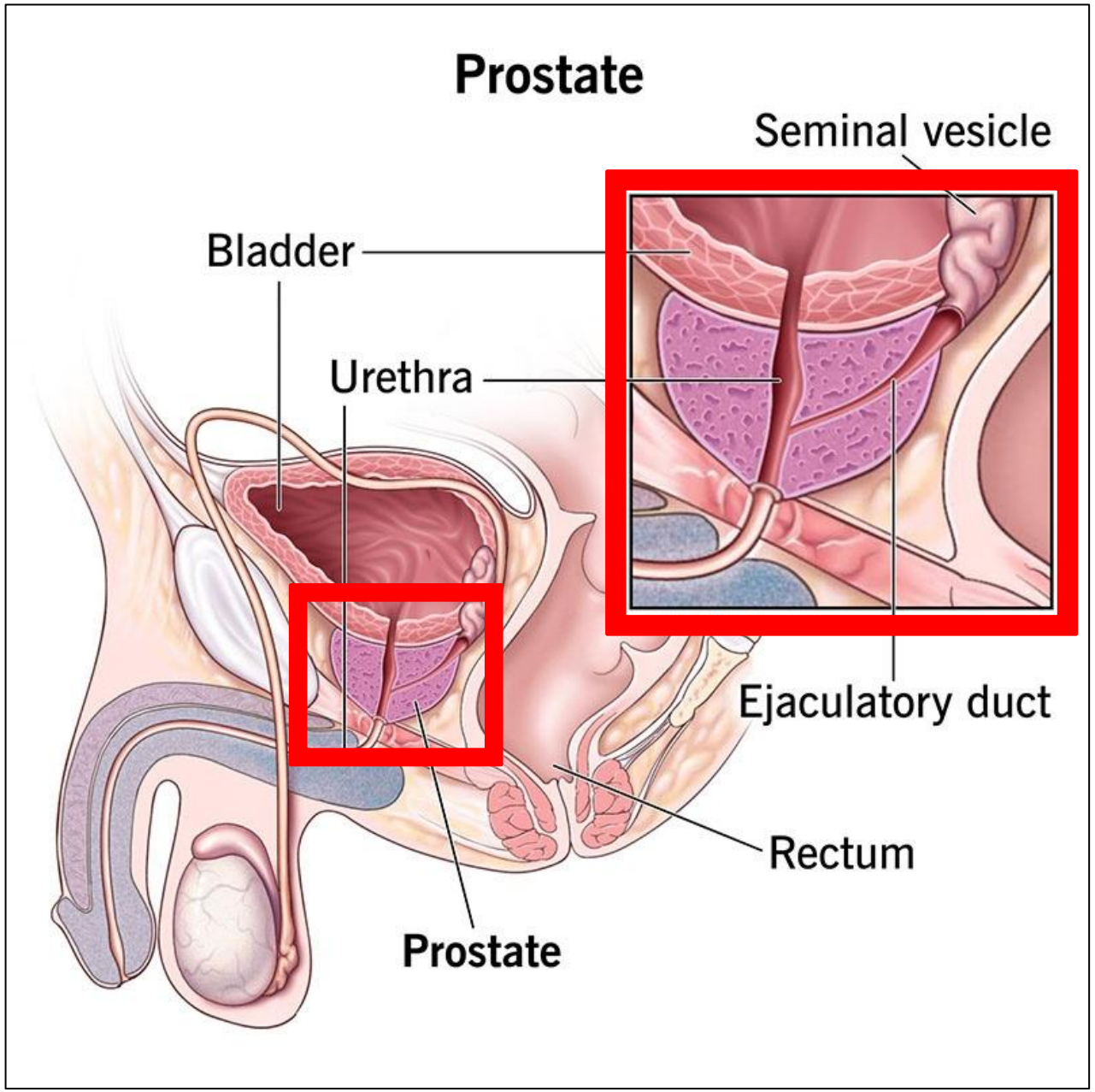


# NUMBER OF TREATMENTS = HIGHEST SAFE DOSE




A certain amount of Gy / cGy over XX treatments!
(e.g. 6800 cGy in 25, 6000 cGy in 20, 3625 cGy in 5)

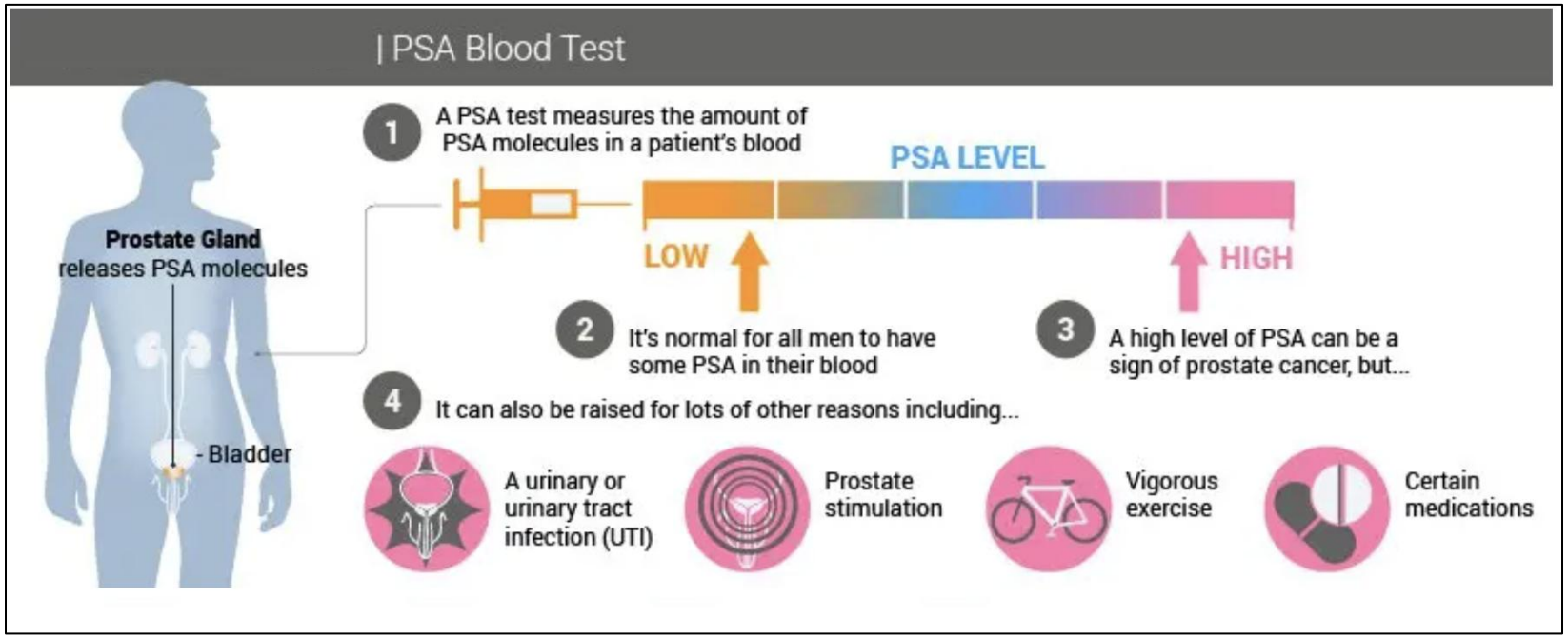
# PROSTATE CANCER STAGING AND TREATMENT




**Benign Prostatic Hypertrophy (BPH)**
(urinary symptoms)

**Prostatitis**
(infectious urinary symptoms)

**Prostate Cancer**




## Digital Rectal Exam (DRE)

- Clinical Stage

## Imaging

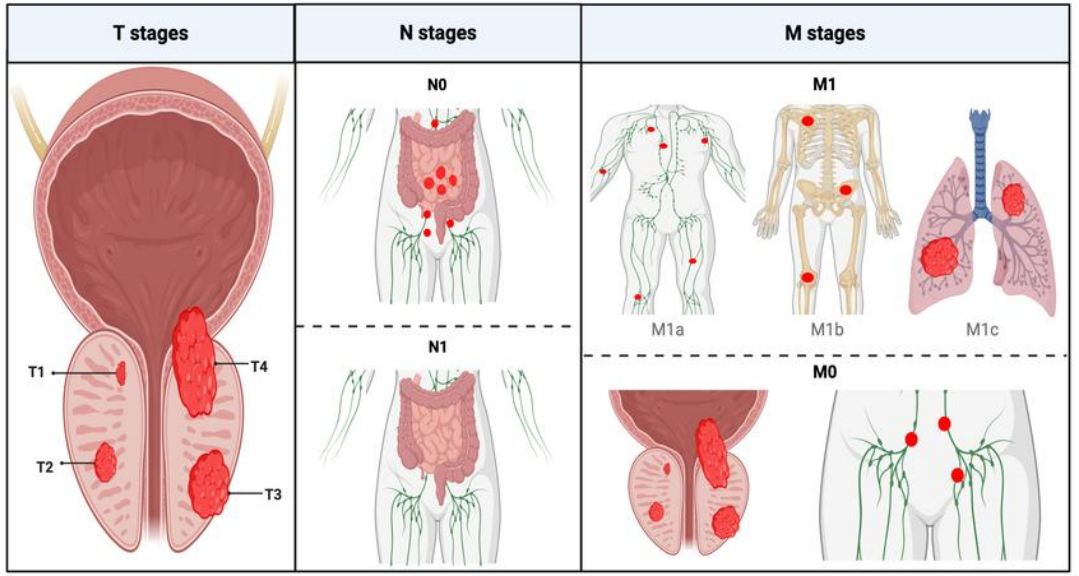
- Pre-Biopsy (e.g. MRI)

## Prostate Biopsy

- Gleason Score (e.g. 3+4=7; Grade Group 2)

## Imaging

- CT Abdomen / Pelvis, Bone Scan, PET-CT *



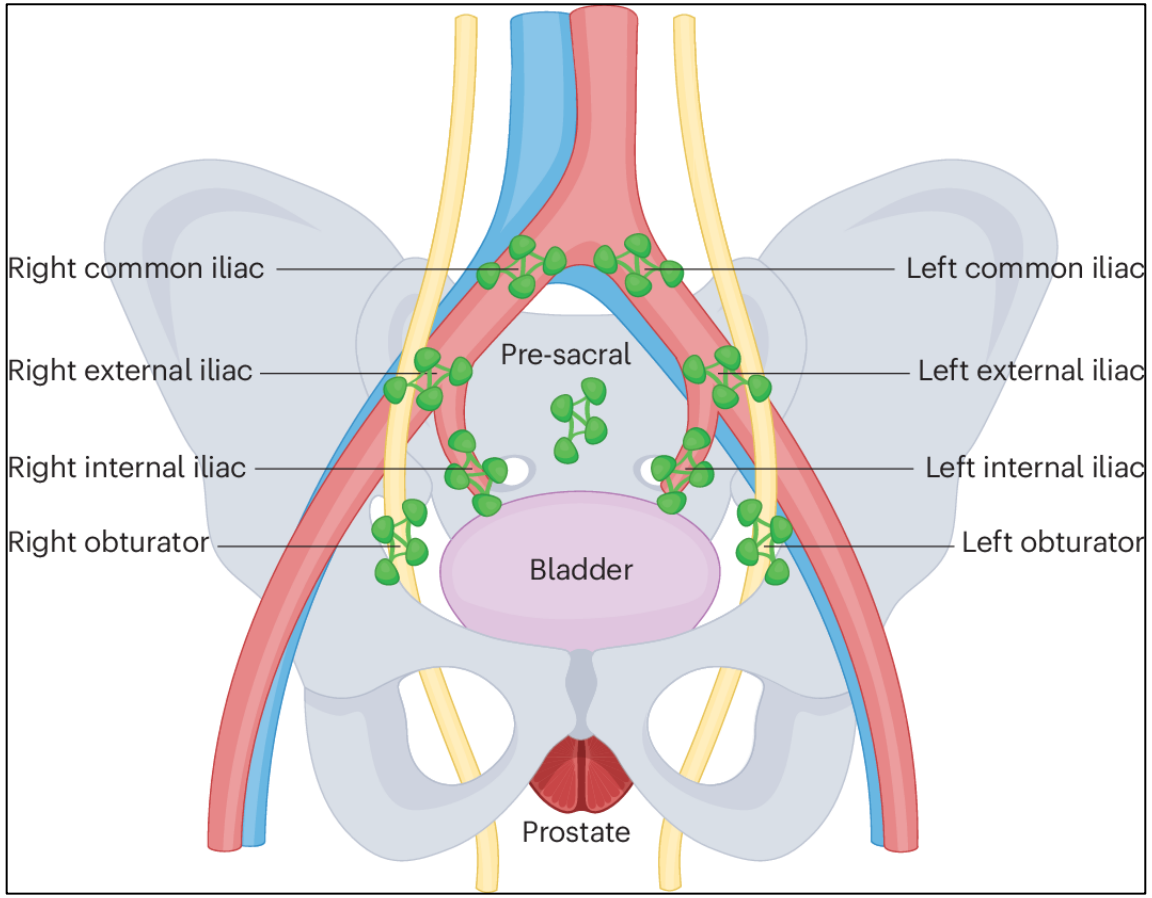
National Comprehensive Cancer Network®

# NCCN Guidelines Version 1.2027
# Prostate Cancer

## INITIAL RISK STRATIFICATION AND STAGING WORKUP FOR CLINICALLY LOCALIZED DISEASE[h, i]

| Risk Group | Clinical/Pathologic Features | | | |
|---|---|---|---|---|
| **Low** | Has all of the following:<br>• cT1–T2a<br>• Grade Group 1<br>• PSA <10 ng/mL | | | Radiation |
| **Intermediate** | Has all of the following:<br>• No high-risk group features<br>• Has one or more intermediate risk factors (IRFs): | **Favorable intermediate** | Has all of the following:<br>• 1 IRF<br>• Grade Group 1 or 2<br>• <50% biopsy cores positive (eg, <6 of 12 cores) | Radiation |
| | ▸ cT2b–cT2c<br>▸ Grade Group 2 or 3<br>▸ PSA 10–20 ng/mL | **Unfavorable intermediate** | Has one or more of the following:<br>• 2 or 3 IRFs<br>• Grade Group 3<br>• ≥50% biopsy cores positive (eg, ≥6 of 12 cores) | + ADT |
| **High** | Has one or more high-risk features, but does not meet criteria for very high risk:<br>• cT3–cT4<br>• Grade Group 4 or Grade Group 5<br>• PSA >20 ng/mL | | | Radiation ± Brachy + ADT + ARPI |
| **Very high** | Has at least two of the following:<br>• cT3–cT4<br>• Grade Group 4 or 5<br>• PSA ≥40 ng/mL | | | |

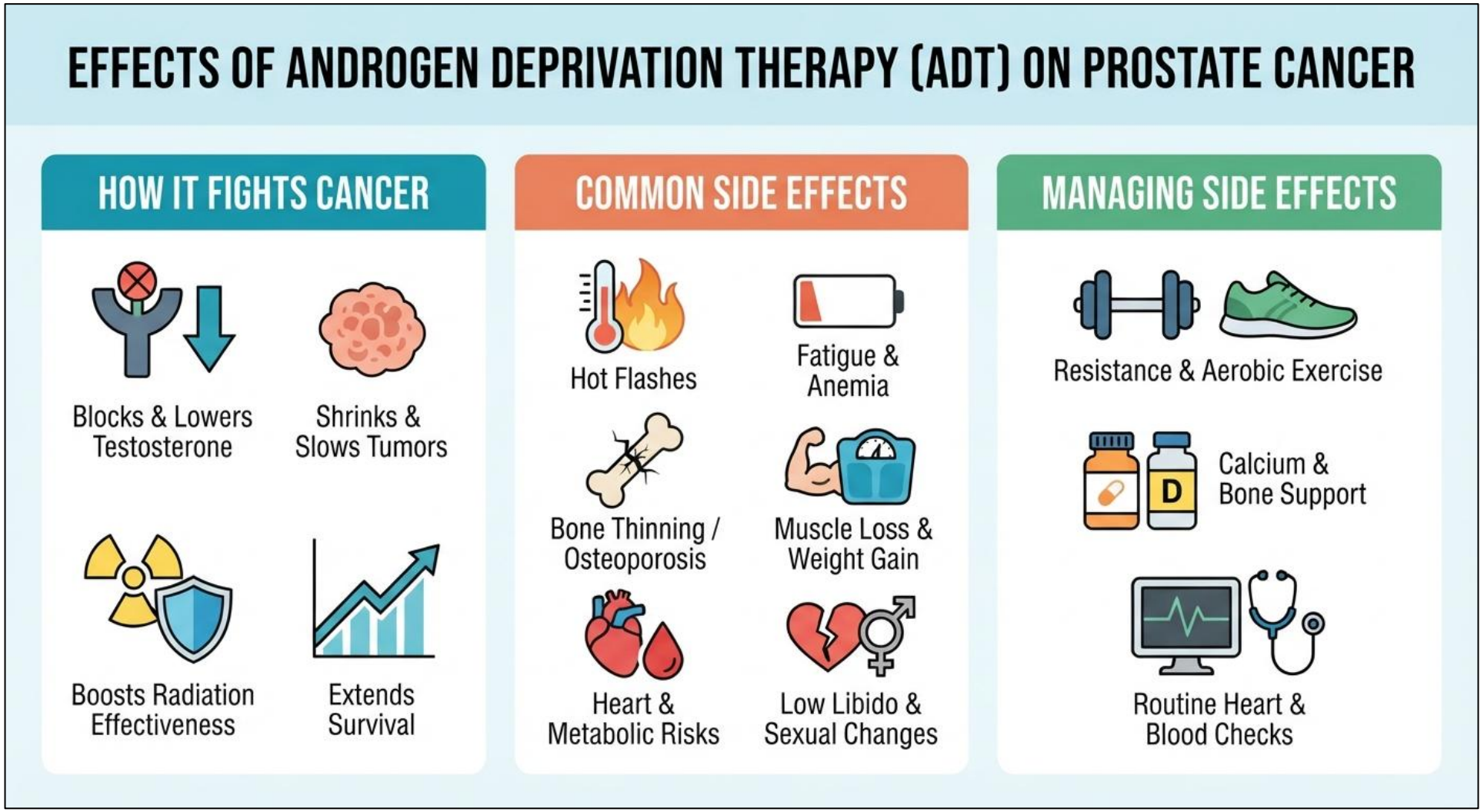
# RADIATION DOSE, ADT DURATION AND VOLUME INCREASE WITH RISK




High Risk Prostate Cancer:

(e.g. 6800 cGy in 25, 18-36 months of ADT, elective LNs $\pm$ Brachytherapy $\pm$ ARPI)

# ANDROGEN DEPRIVATION THERAPY (ADT)

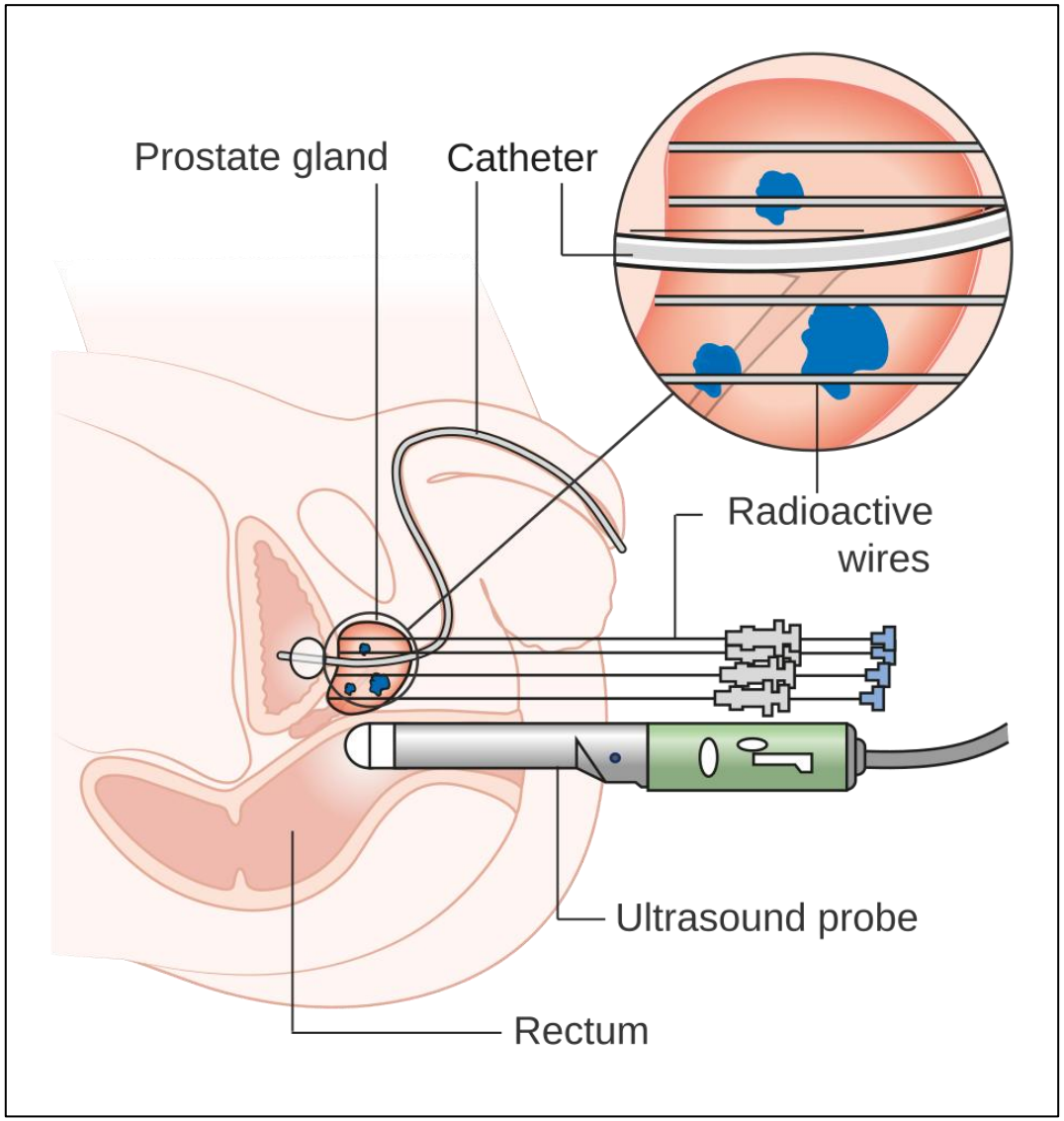



(4-6 months up to 18-36 months)

# BRACHYTHERAPY TREATMENTS

**Brachytherapy Alone**

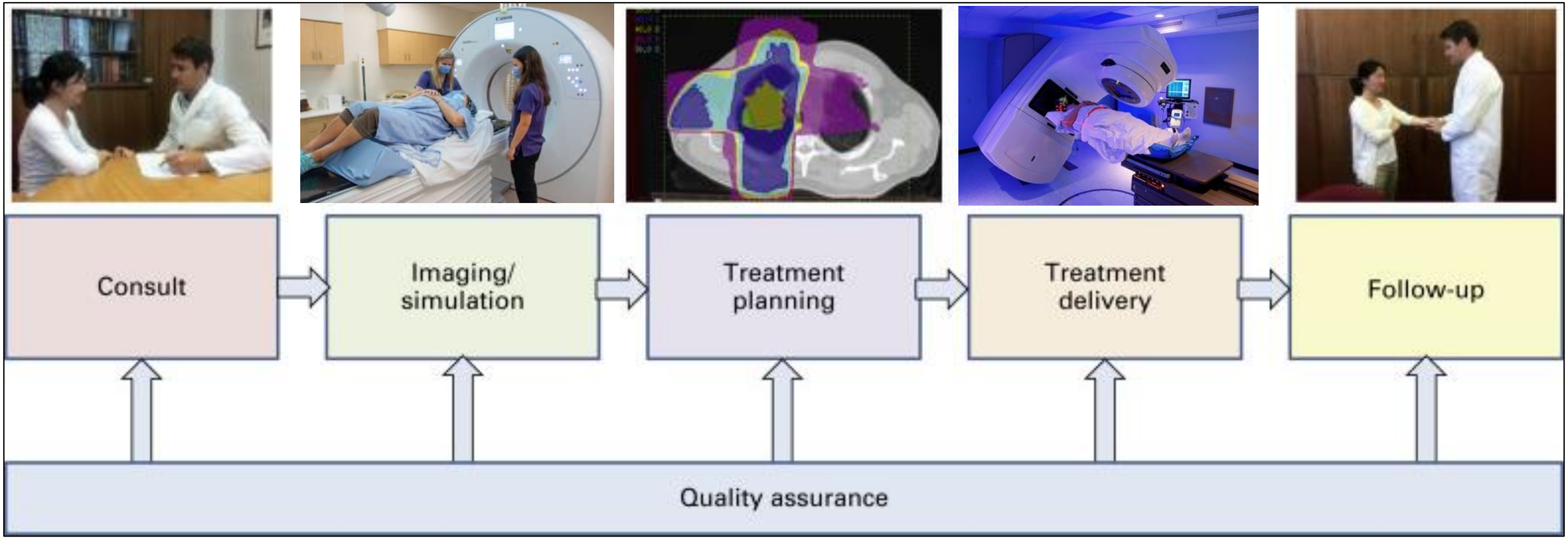
- Select Low Risk
- Favourable Intermediate Risk




**Brachytherapy Boost**

- Unfavorable Intermediate Risk
- High Risk
- Very High Risk

# MODERN RADIATION TREATMENT IN PRACTICE



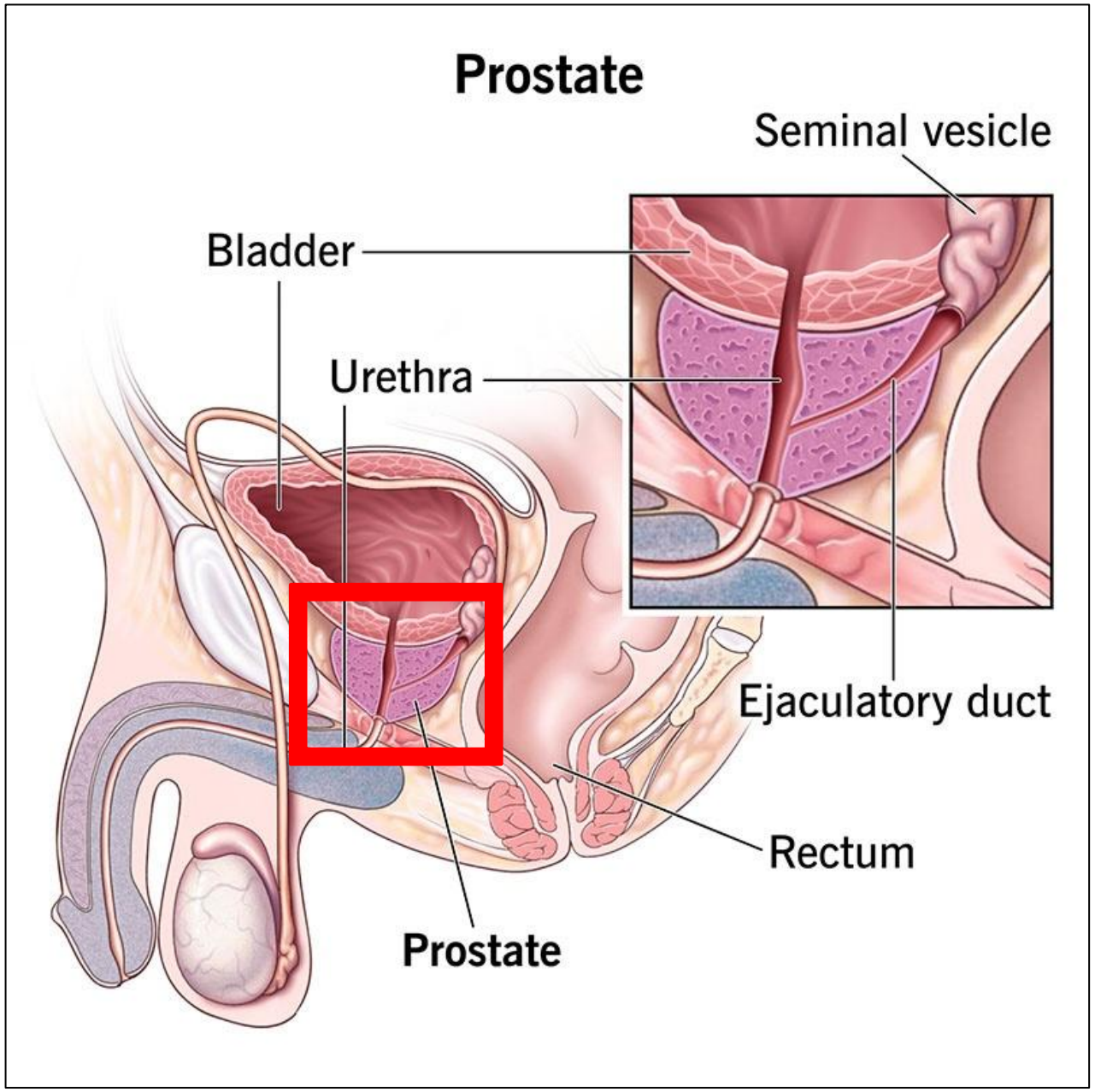

## Typical Timelines:

- Simulation (next available)
- Contouring (24-72h+)
- Plan Design and Evaluation (24-72h+)
- Physics Evaluation (minimum 24h)
- Quality Assurance Rounds (once weekly)

---------- **<u>minimum</u> 7-14 days post simulation to treatment start!**

## Emergency:

- Same day (very basic treatment plan)
- Ideally 1-2 business days for IMRT




# CONSULTATION AND TEACHING:

**Prostate Cancer:**

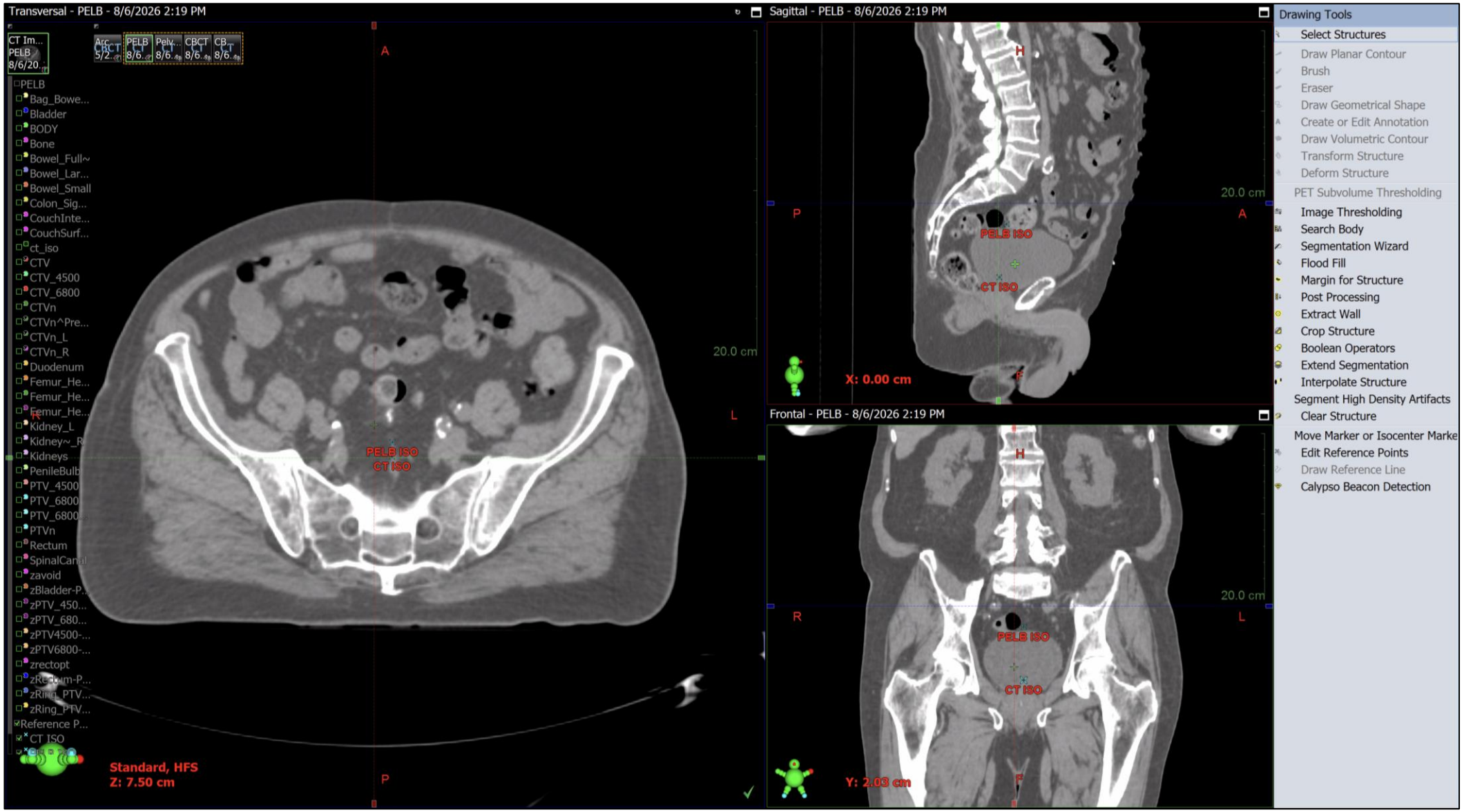
- **Comfortably Full Bladder**
- **Empty Rectum**

*** for CT SIM AND for all treatments!**

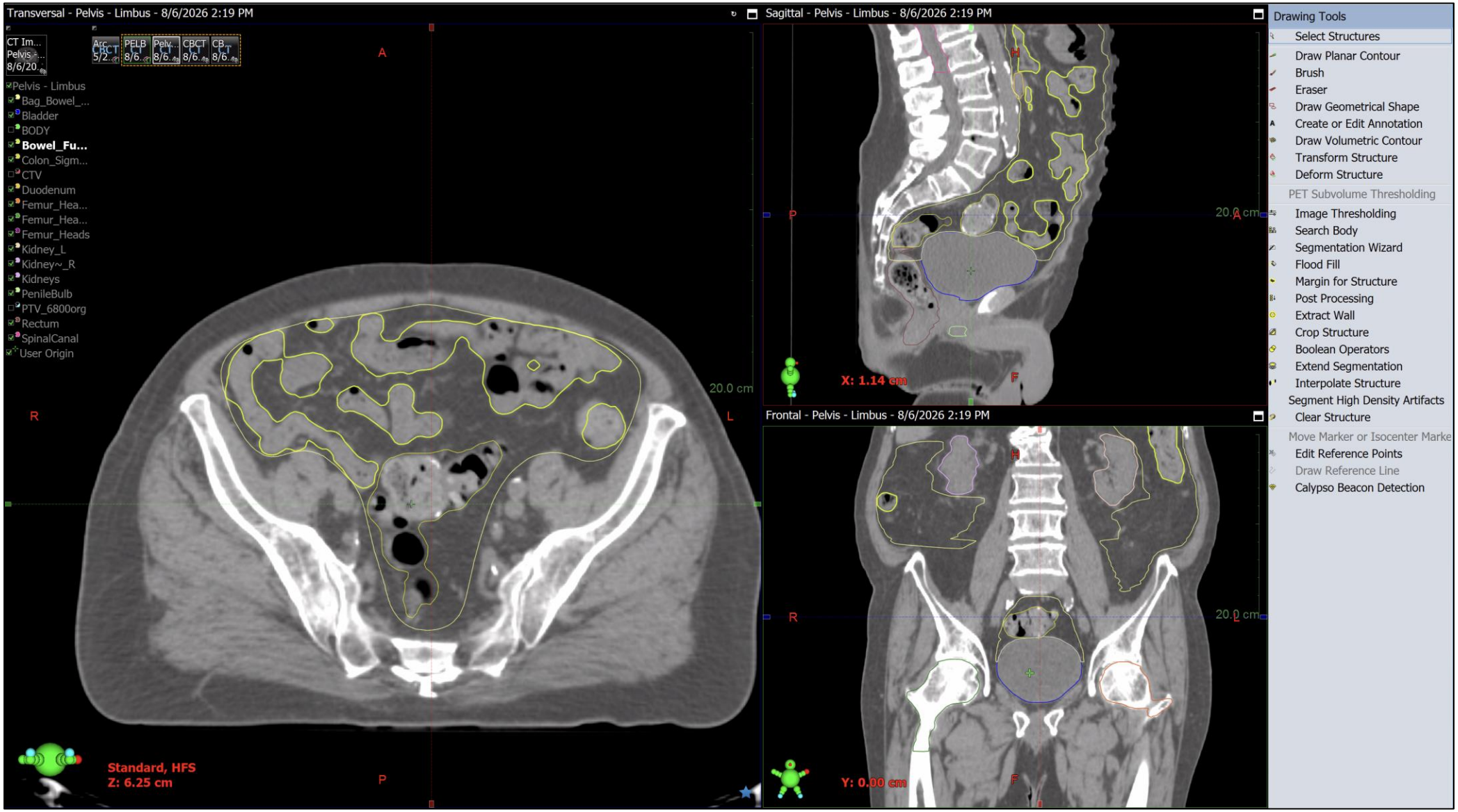
# RADIATION TREATMENT: PATIENT SIMULATION (CT± MRI)



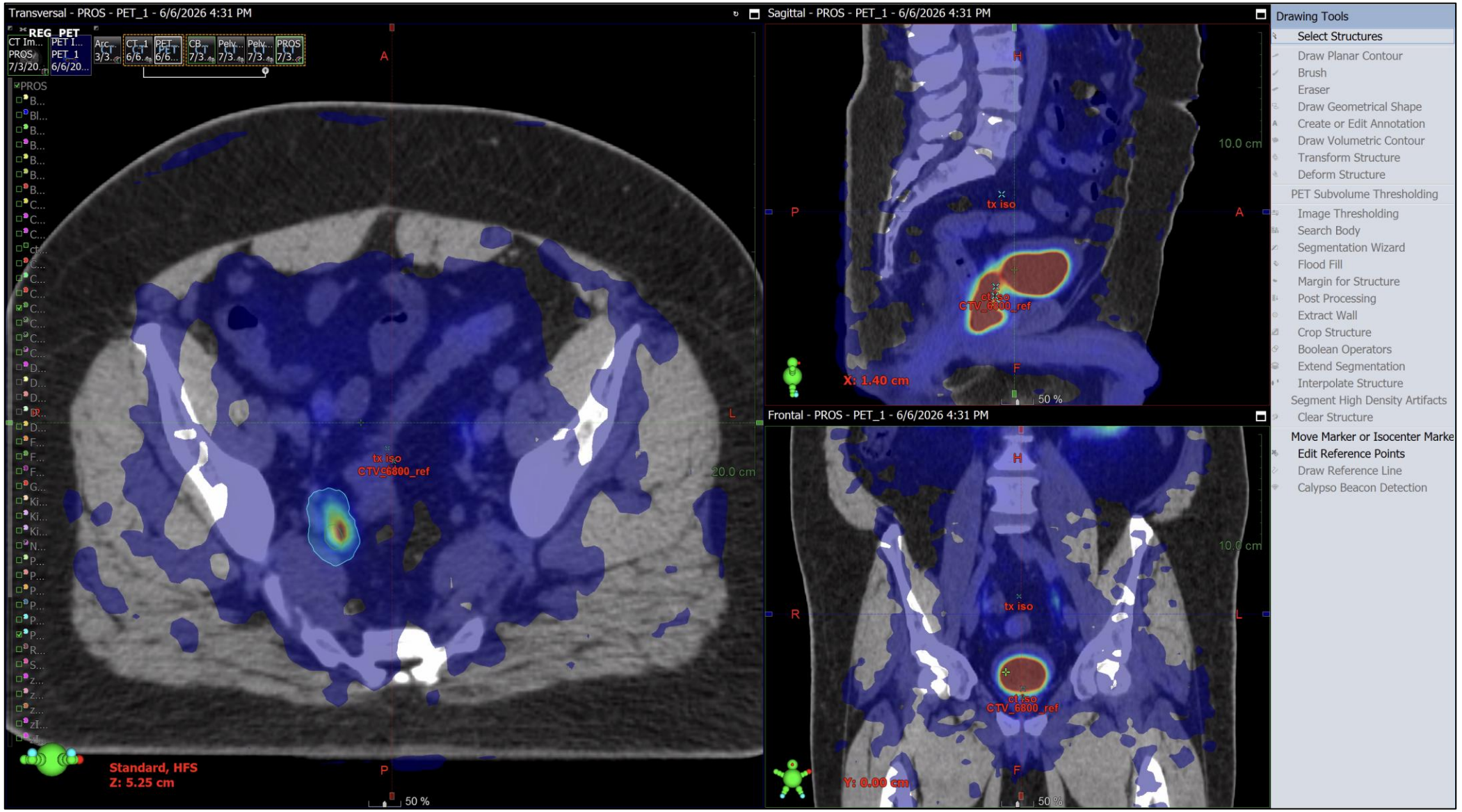
# RADIATION TREATMENT: CONTOURING



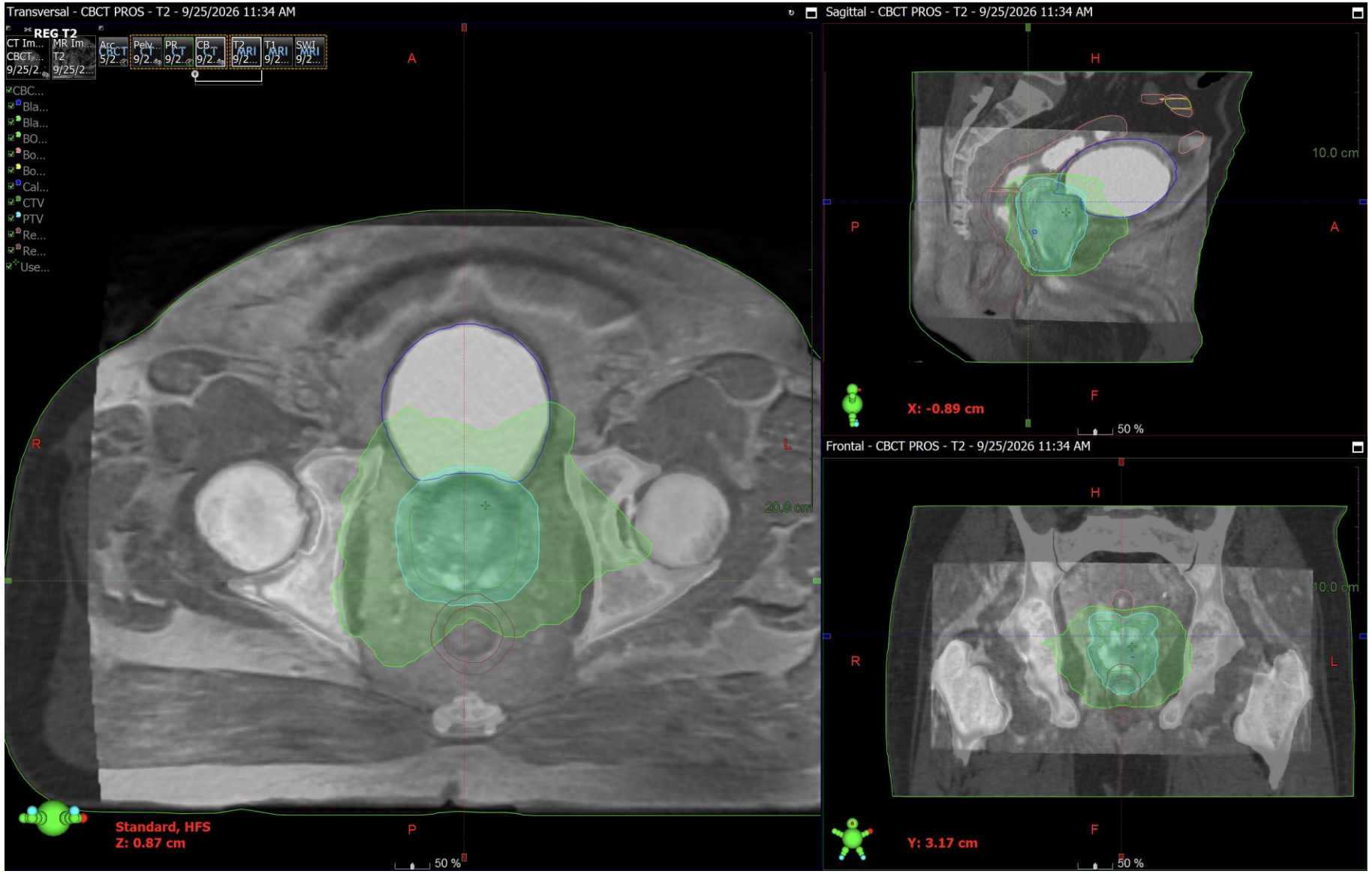
# RADIATION TREATMENT: ORGANS AT RISK



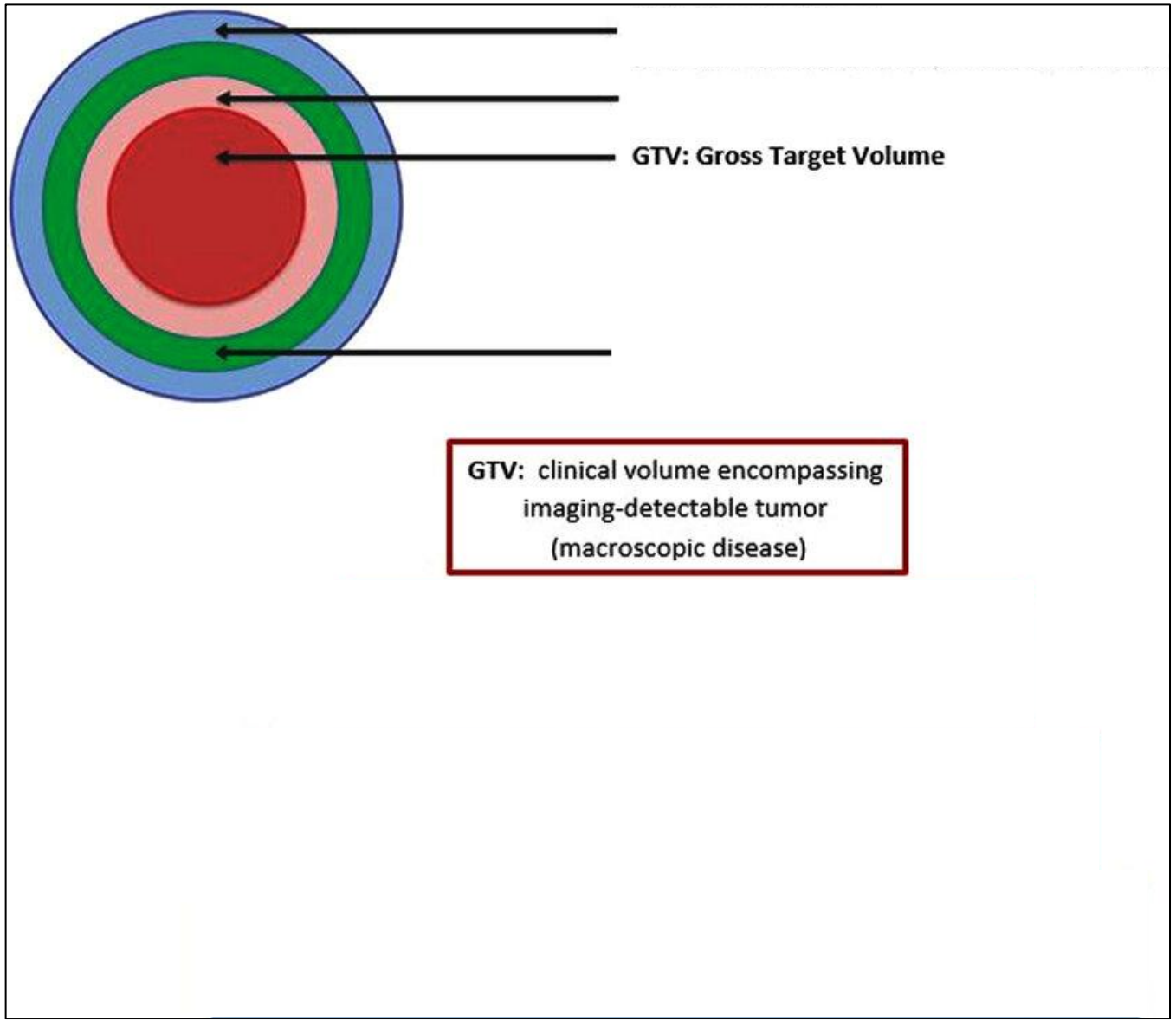
# RADIATION TREATMENT: CONTOURING



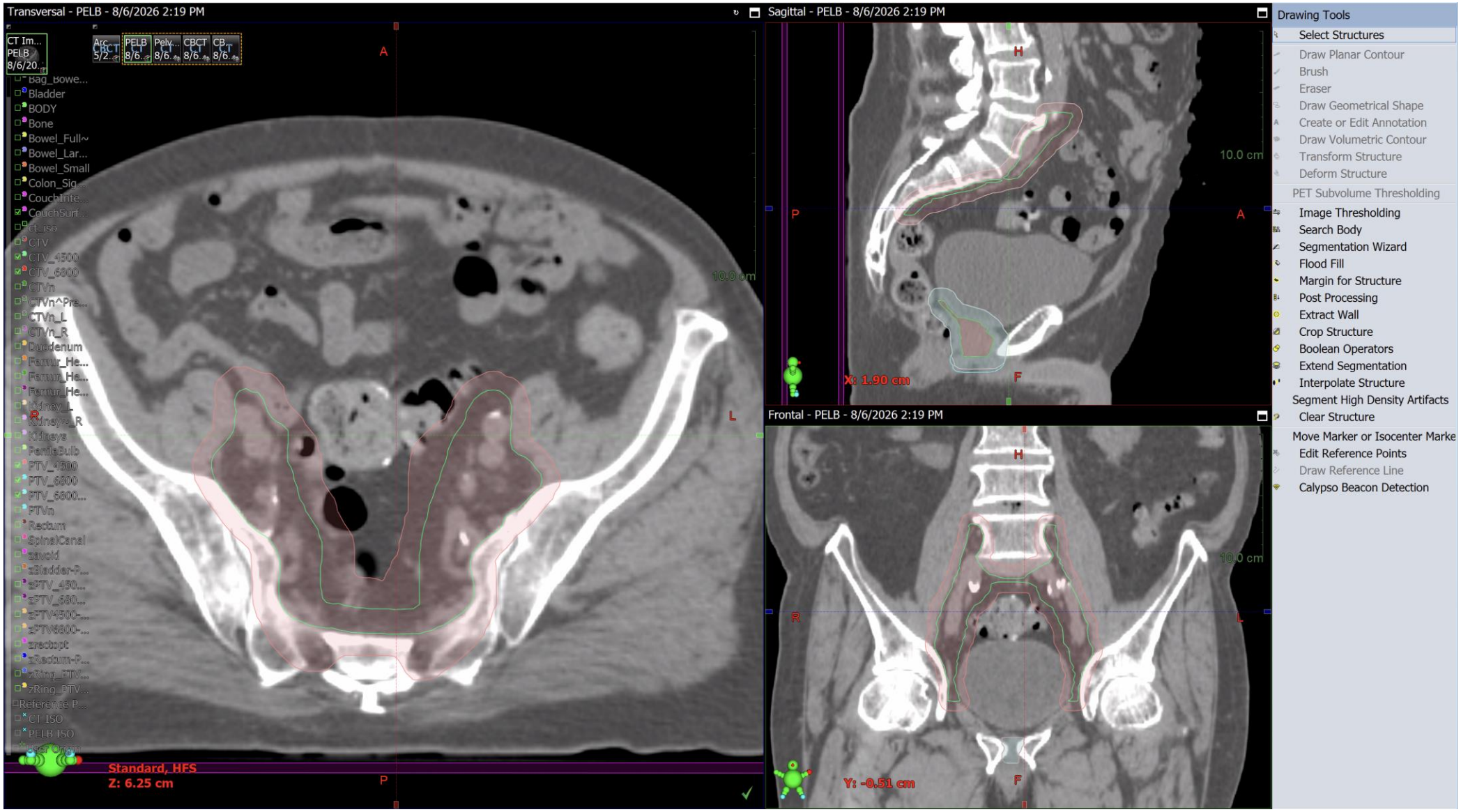
# RADIATION TREATMENT: CONTOURING



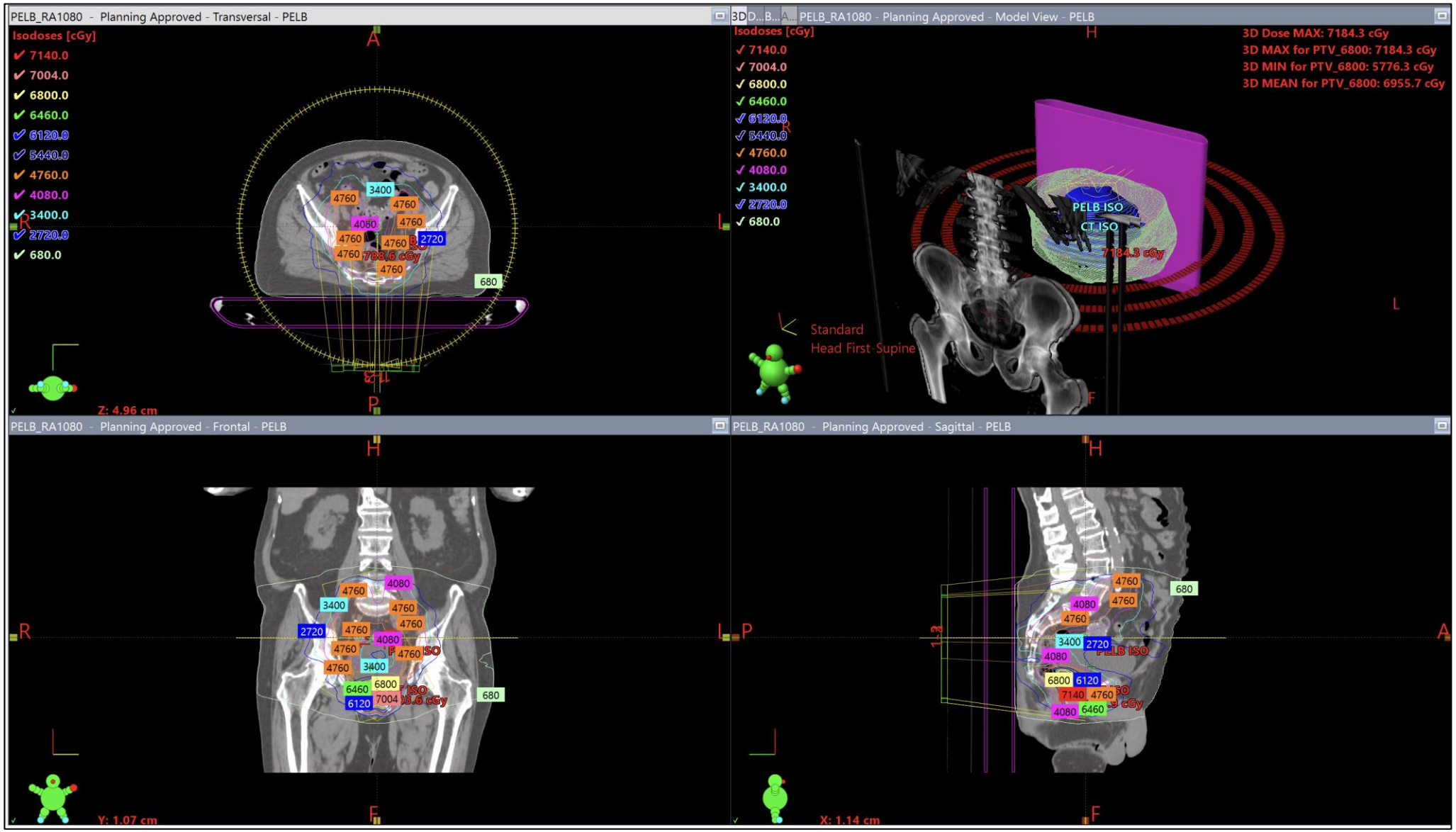
# RADIATION TREATMENT: VOLUMES TREATED



# RADIATION TREATMENT: CLINICAL TARGETS



# RADIATION TREATMENT: PLAN DESIGN



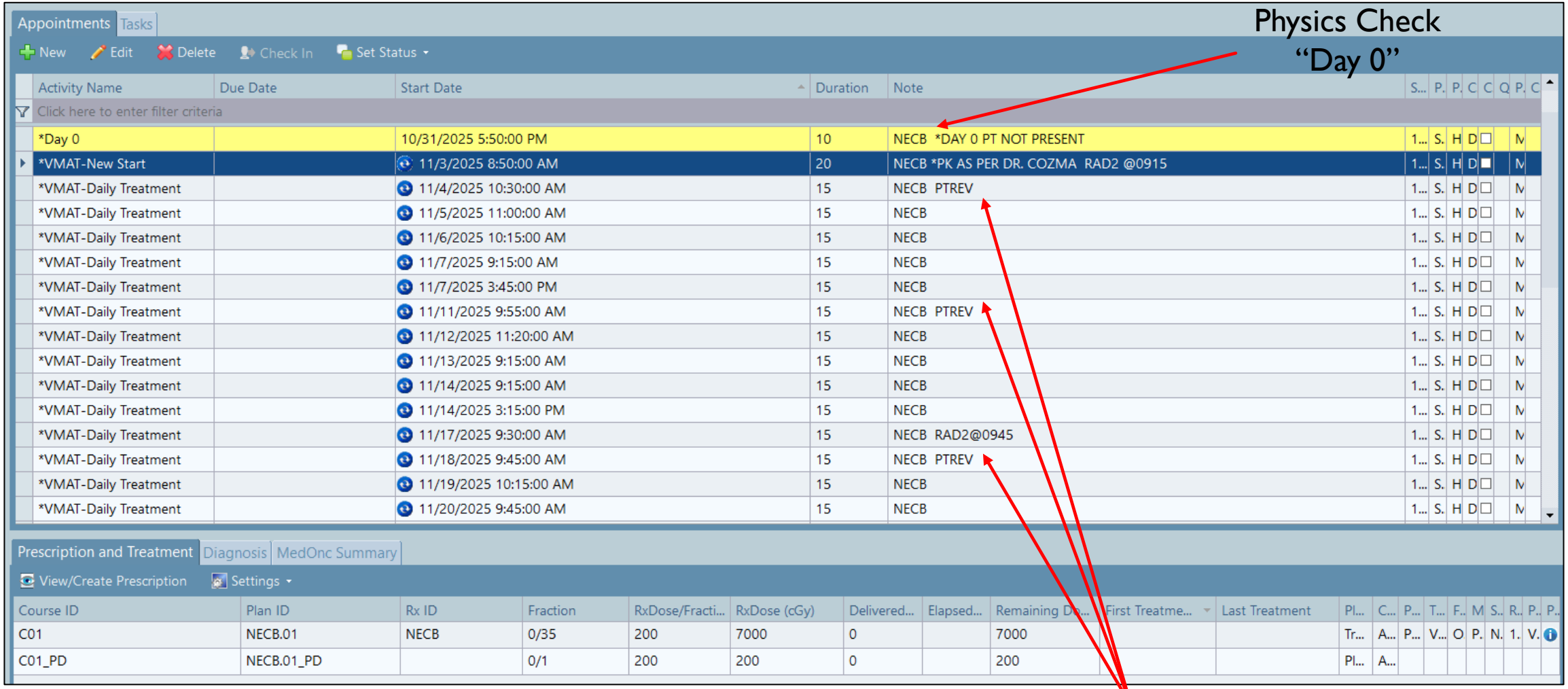
# RADIATION TREATMENT: PLAN EVALUATION




| Primary | Prescription | | | | Fraction Dose [cGy] | Total Dose [cGy] | Actual Total Dose [cGy] |
|---|---|---|---|---|---|---|---|
| ☑ | PTV_6800 | At least | 95.0 | % receives more than | 272.0 | 6800.0 | 6800.0 |
| ☐ | PTV_6800 | At least | 99.0 | % receives more than | 258.4 | 6460.0 | 6670.8 |
| ☐ | PTV_4500 | At least | 95.0 | % receives more than | 180.0 | 4500.0 | 4598.5 |
| ☐ | PTV_4500 | At least | 99.0 | % receives more than | 171.0 | 4275.0 | 4486.7 |
| ☐ | PenileBulb | Mean dose | | is less than | 204.0 | 5100.0 | 5968.7 |

| Structure | Index | | Target Value | Actual Value |
|---|---|---|---|---|
| PTV_6800 | D1.00cc [cGy] | is less than | 7140.00 | 7132.91 |
| Bladder | V70.00Gy [% of volume] | is less than | 15.00 | 0.22 |
| Bladder | V66.00Gy [% of volume] | is less than | 25.00 | 5.60 |
| Bladder | V64.00Gy [% of volume] | is less than | 35.00 | 6.39 |
| Bladder | V60.00Gy [% of volume] | is less than | 50.00 | 7.79 |
| Femur_Head_R | V52.00Gy [% of volume] | is less than | 33.00 | 0.00 |
| Rectum | V70.00Gy [% of volume] | is less than | 15.00 | 0.64 |
| Rectum | V64.00Gy [% of volume] | is less than | 25.00 | 16.71 |
| Rectum | V60.00Gy [% of volume] | is less than | 35.00 | 22.30 |
| Rectum | V50.00Gy [% of volume] | is less than | 50.00 | 39.98 |
| Bowel_Small | D0.02cc [cGy] | is less than | 5200.00 | 4802.75 |
| Femur_Head_L | V52.00Gy [% of volume] | is less than | 33.00 | 0.00 |

# RADIATION TREATMENT: SCHEDULING AND DELIVERY




Appointments | Tasks

New | Edit | Delete | Check In | Set Status

| Activity Name | Due Date | Start Date | Duration | Note |
|---|---|---|---|---|
| Click here to enter filter criteria | | | | |
| *Day 0 | | 10/31/2025 5:50:00 PM | 10 | NECB *DAY 0 PT NOT PRESENT |
| *VMAT-New Start | | 11/3/2025 8:50:00 AM | 20 | NECB *PK AS PER DR. COZMA RAD2 @0915 |
| *VMAT-Daily Treatment | | 11/4/2025 10:30:00 AM | 15 | NECB PTREV |
| *VMAT-Daily Treatment | | 11/5/2025 11:00:00 AM | 15 | NECB |
| *VMAT-Daily Treatment | | 11/6/2025 10:15:00 AM | 15 | NECB |
| *VMAT-Daily Treatment | | 11/7/2025 9:15:00 AM | 15 | NECB |
| *VMAT-Daily Treatment | | 11/7/2025 3:45:00 PM | 15 | NECB |
| *VMAT-Daily Treatment | | 11/11/2025 9:55:00 AM | 15 | NECB PTREV |
| *VMAT-Daily Treatment | | 11/12/2025 11:20:00 AM | 15 | NECB |
| *VMAT-Daily Treatment | | 11/13/2025 9:15:00 AM | 15 | NECB |
| *VMAT-Daily Treatment | | 11/14/2025 9:15:00 AM | 15 | NECB |
| *VMAT-Daily Treatment | | 11/14/2025 3:15:00 PM | 15 | NECB |
| *VMAT-Daily Treatment | | 11/17/2025 9:30:00 AM | 15 | NECB RAD2@0945 |
| *VMAT-Daily Treatment | | 11/18/2025 9:45:00 AM | 15 | NECB PTREV |
| *VMAT-Daily Treatment | | 11/19/2025 10:15:00 AM | 15 | NECB |
| *VMAT-Daily Treatment | | 11/20/2025 9:45:00 AM | 15 | NECB |

Prescription and Treatment | Diagnosis | MedOnc Summary

View/Create Prescription | Settings

| Course ID | Plan ID | Rx ID | Fraction | RxDose/Fracti... | RxDose (cGy) | Delivered... | Elapsed... | Remaining Dose | First Treatme... | Last Treatment |
|---|---|---|---|---|---|---|---|---|---|---|
| C01 | NECB.01 | NECB | 0/35 | 200 | 7000 | 0 | | 7000 | | |
| C01_PD | NECB.01_PD | | 0/1 | 200 | 200 | 0 | | 200 | | |

# RADIATION TREATMENT: A MULTIDISCIPLINARY TEAM

## Radiation Oncologists:
- Prescribe RT
- Delineate the treatment volumes
- Follow patients clinically (weekly)

## Radiation Therapists:
- Deliver the RT daily
- Monitor the patient on treatments

## Medical Dosimetrists:
- Support with patient positioning considerations / questions
- Design the radiation treatment plan
- Fuse diagnostic imaging
- Quality Assurance

## Medical Physicists:
- Ensure daily machine QA
- Commissioning and QA of new technology
- Second check, confirm RT plans
- Patient-specific QA for complex cases
- Develop policies and procedures for RT
- and much much more

## Registered Nurses:
- Consultation and initial teaching
- Support patients on RT treatment
- Collaborate and coordinate with RTs
- and much much more

## Support and Allied Health:

# THANKS FOR YOUR ATTENTION!

## QUESTIONS?