



# May the Force be with you: Exploring a Career in Radiation Oncology ...for U of C Medical Students

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CALGARY**

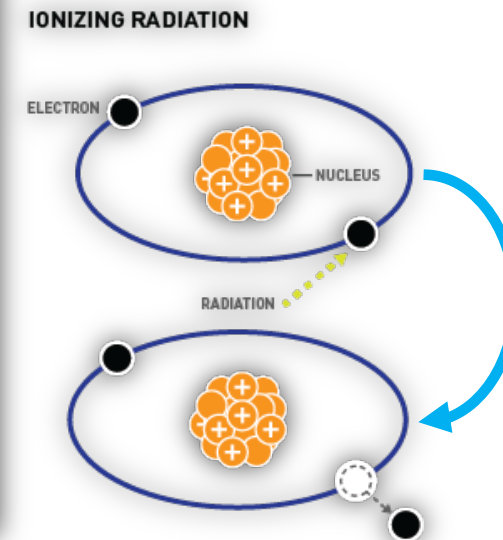
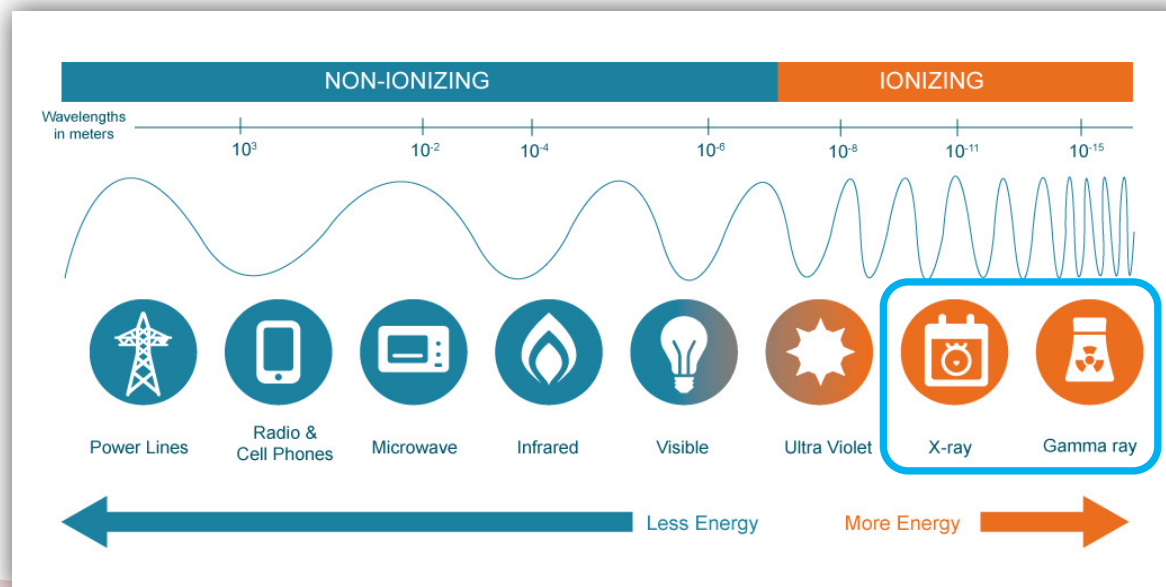
September 7, 2023

# Session Agenda

- ▶ Overview of the Specialty of Radiation Oncology (15 min)
- ▶ U of C Radiation Oncology Training Program (10 min)
- ▶ CaRMS/workforce trends & income/employment info (5 min)
- ▶ Resident perspectives (10-15 min) w/Q&A
  - Dr. Daniel Davies (PGY3) – Radiation Oncology resident experiences
- ▶ Q&A (5-10 min)

# What is Radiation Oncology?

- ▶ **Radiation Oncology** is the medical use of ionizing radiation as a form of cancer treatment to control or kill tumour cells.
- ▶ A **Radiation Oncologist** is a physician who prescribes radiotherapy to patients with malignant or benign conditions and manages their care.



# The Radiation Oncology Team

## ▶ Radiation Oncologist

- ▶ Physician who oversees the radiation therapy treatments.

## ▶ Medical Radiation Physicist

- ▶ Ensures that complex treatment plans are properly tailored for each patient and safe to deliver.

## ▶ Dosimetrist

- ▶ Works with the radiation oncologist and medical physicist to create patient-specific radiation plans.

## ▶ Radiation Therapist

- ▶ Administers the daily radiation under the doctor's prescription and supervision.

## ▶ Radiation Oncology Nurse

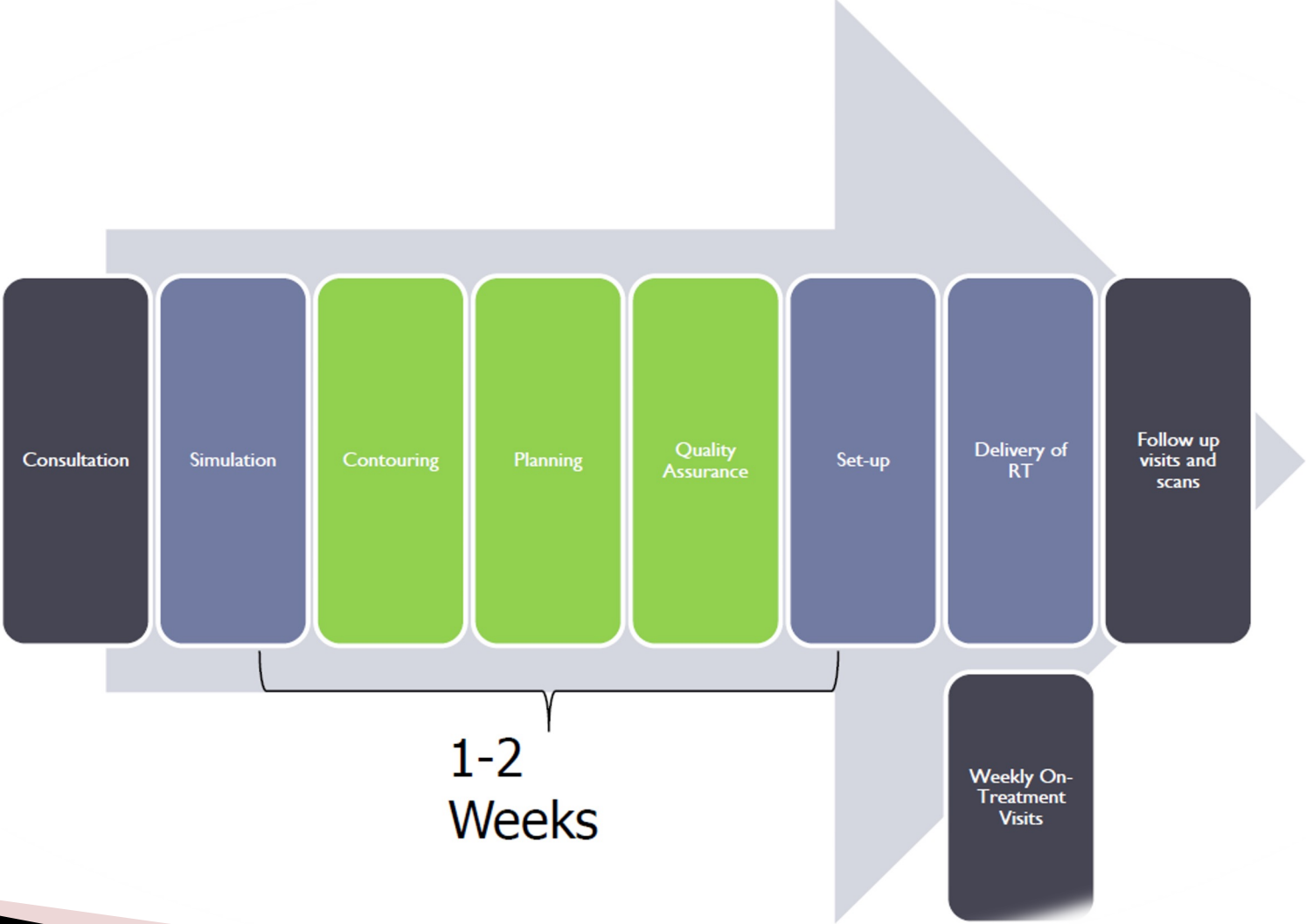
- ▶ Cares for the patient and family by providing education, emotional support and tips for managing side effects.



# Radiation Oncologist - Typical week

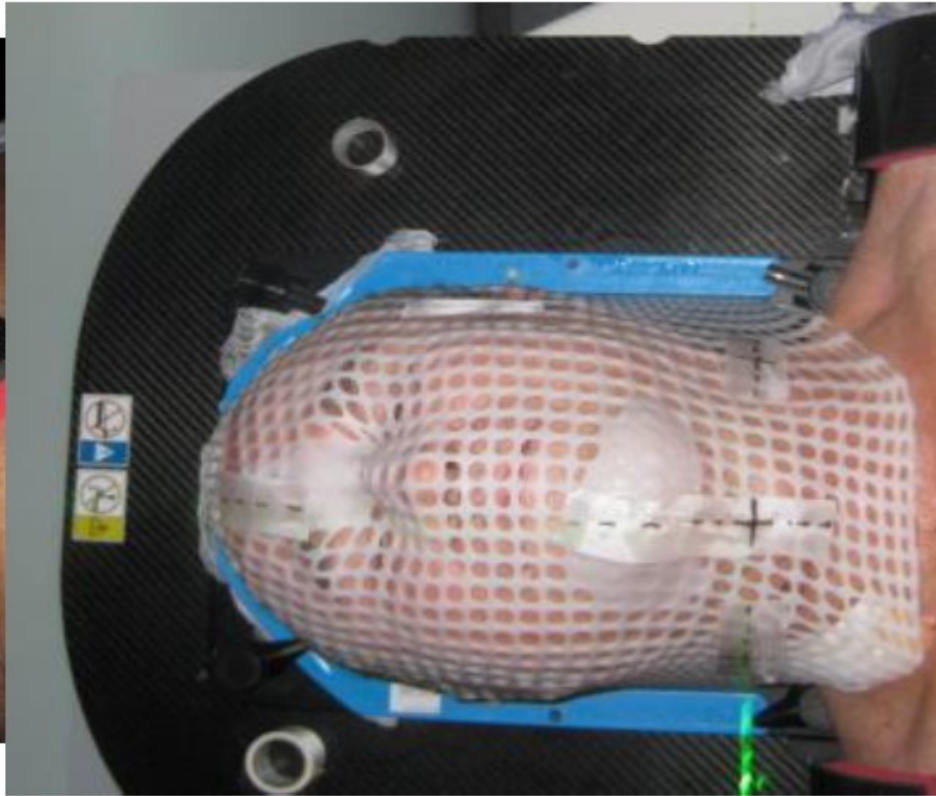
	Academic Practice (75%)	Community Practice (25%)
Clinical	Three ½ day clinics Common & rare tumour sites	Five ½ day clinics Common sites only
Non-clinical	Admin, treatment planning, research, teaching	Admin, treatment planning (research and teaching rare)
Oncall	Yes, zone coverage and inpatient care service	No oncall duties No inpatient care service
Practice Location	Urban practice affiliated with a university	Urban practice
Workday	8-10 hours per day	8 hours

# Overview of Patient Workflow



# Simulation

- ▶ CT scan in a reproducible treatment position

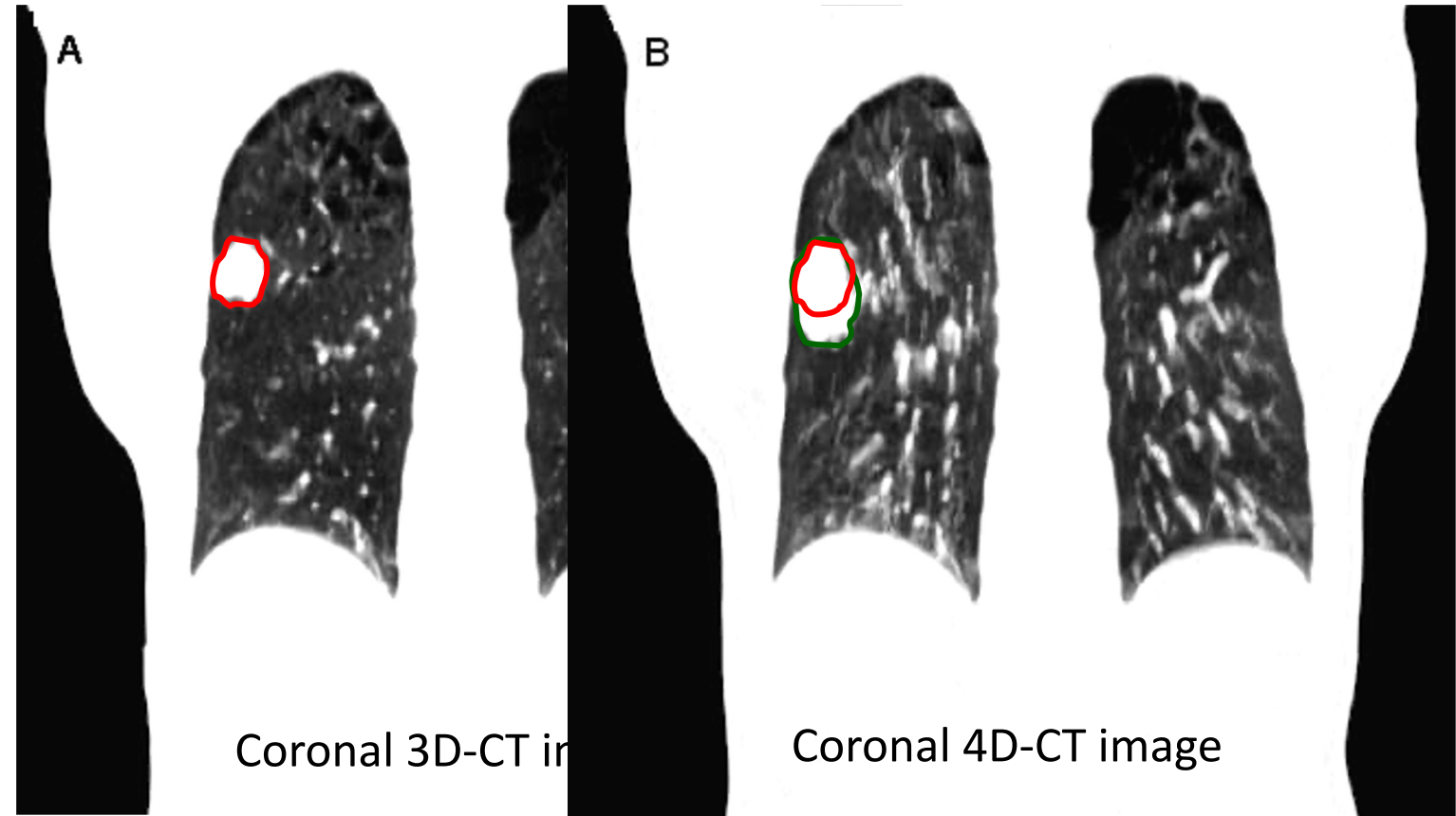


# Immobilization Devices





# Advances in Imaging and Targeting



Coronal 3D-CT image

Coronal 4D-CT image

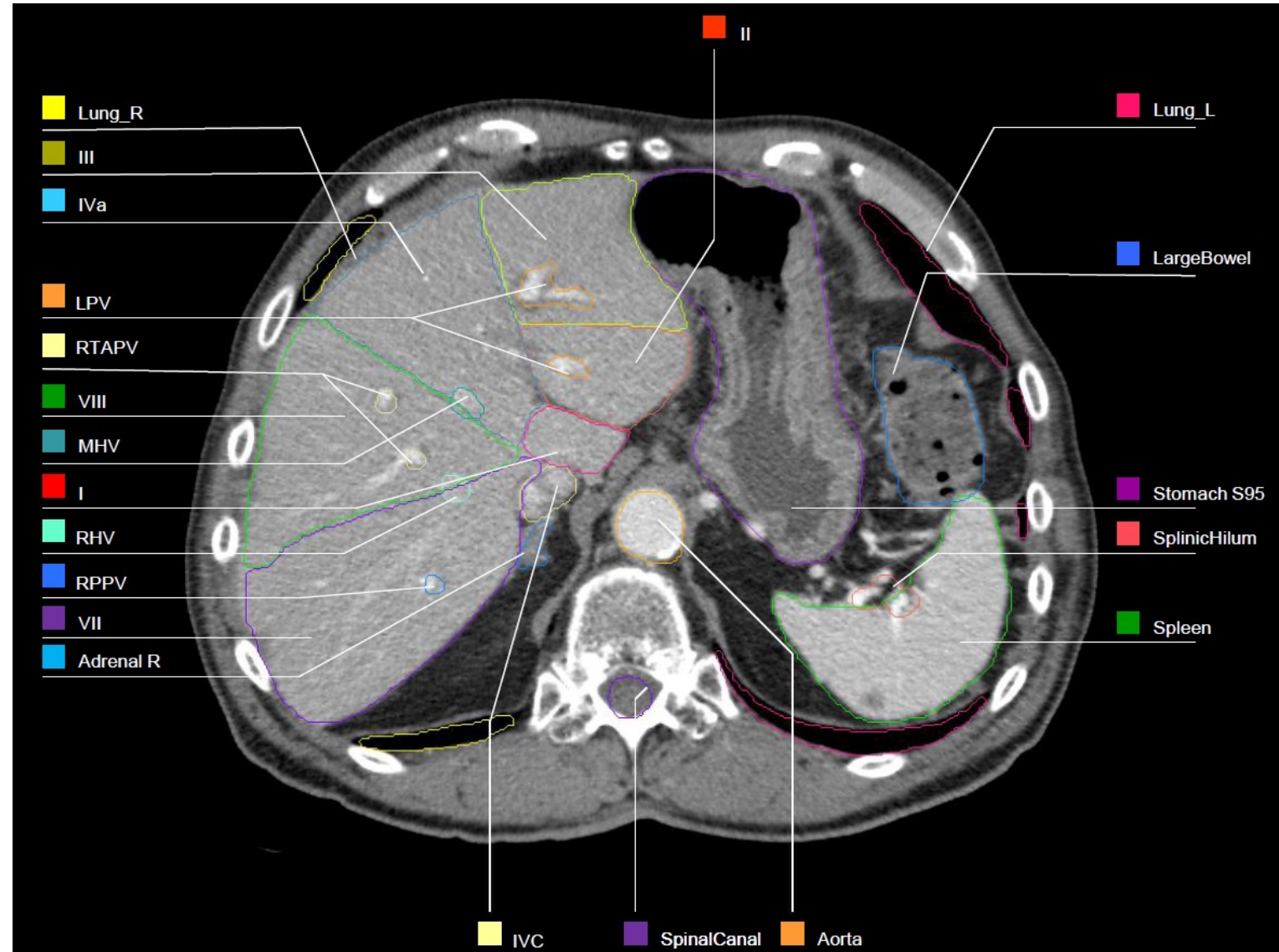
**Internal gross tumour volume (IGTV)**

**Gross tumour volume (GTV)**

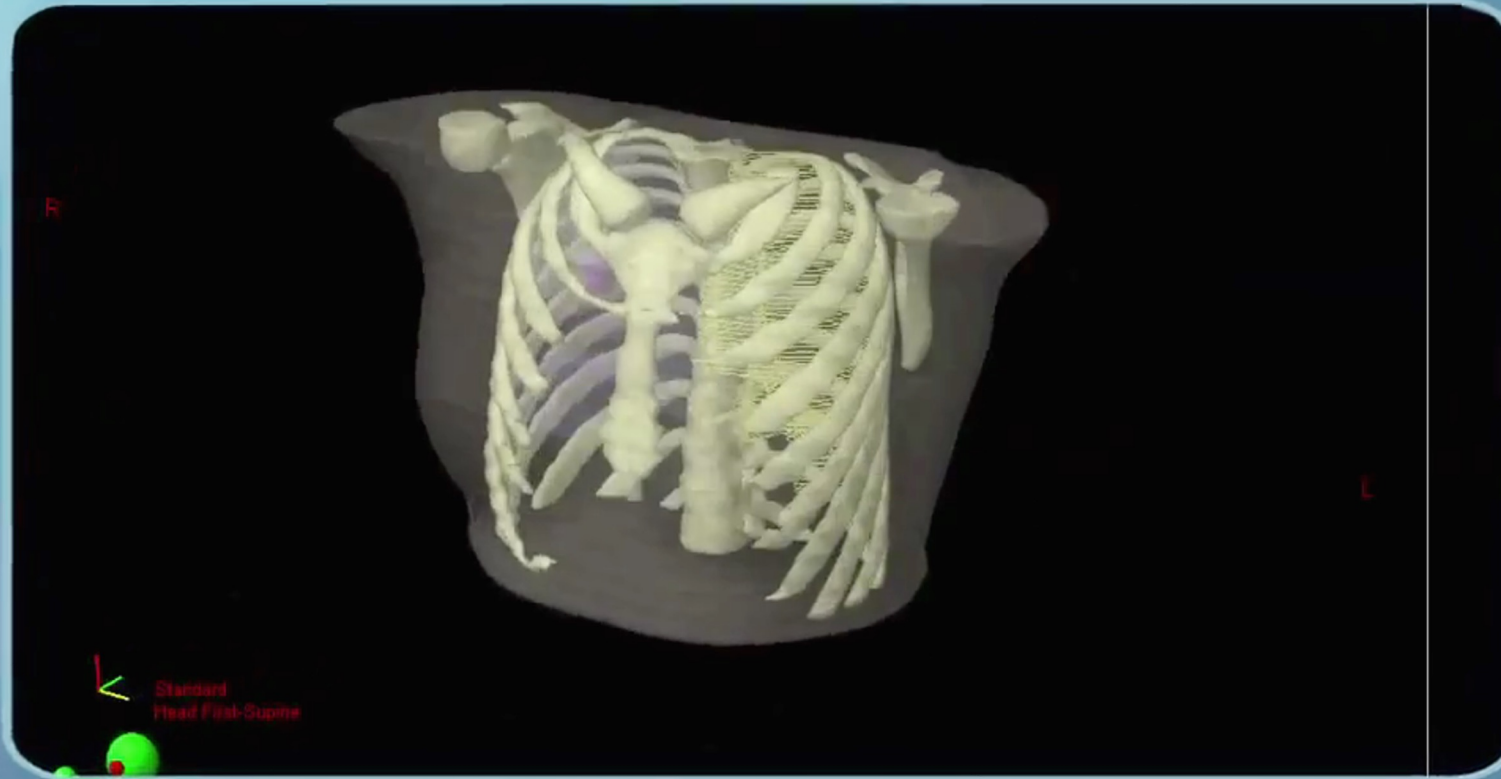
Maximal intensity projection (MIP) shows all possible tumour positions throughout the respiratory cycle

# Contouring

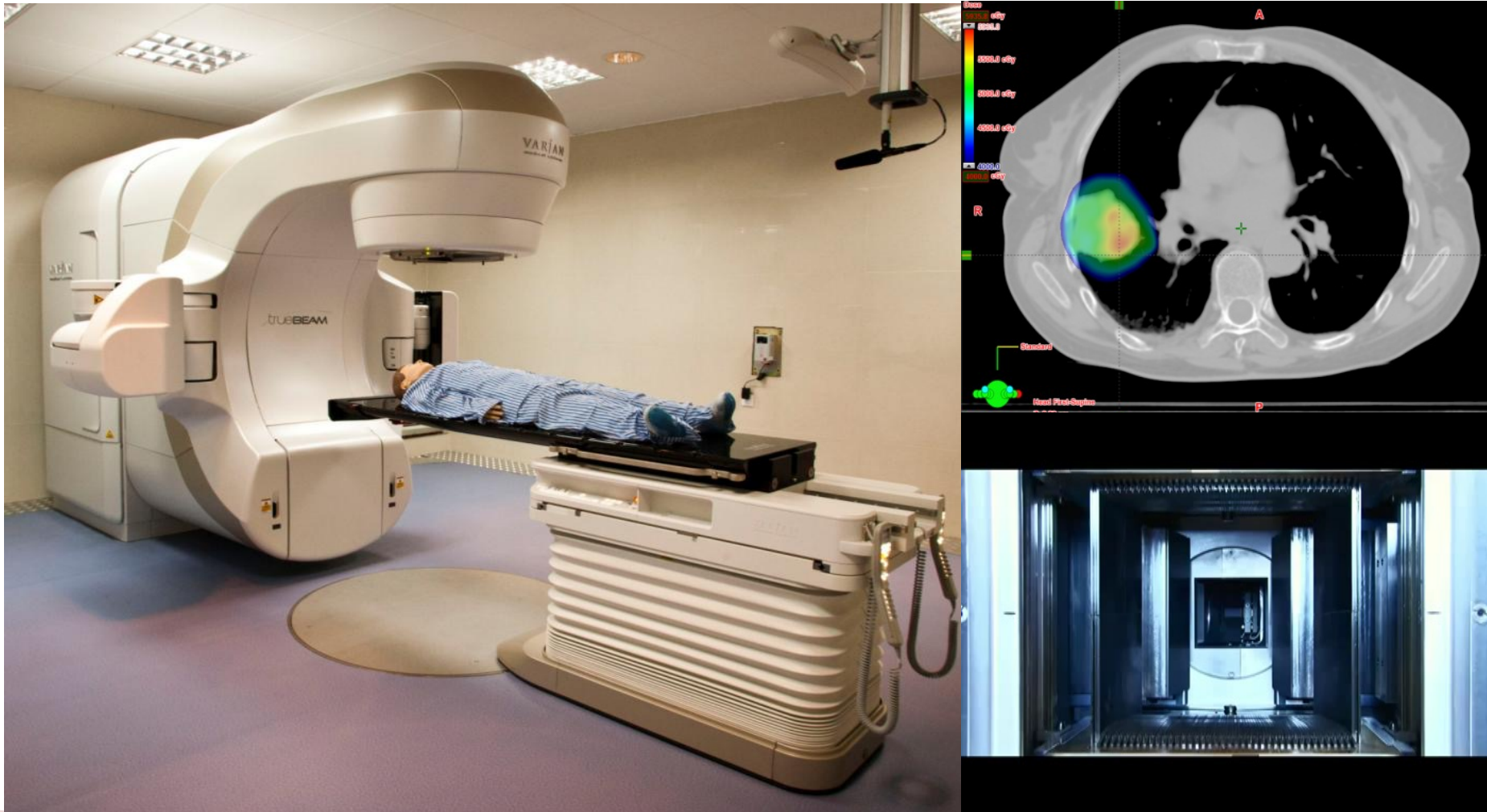
- ▶ Outline normal tissues at risk, tumour, and target volumes



# Treatment Planning Software



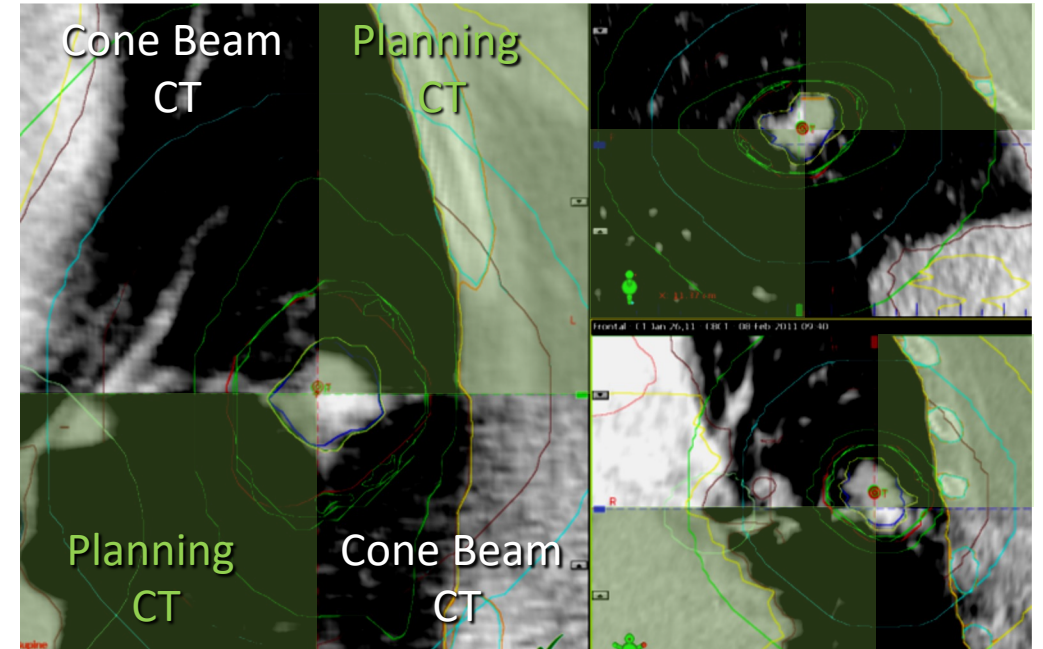
# Planning and Treatment Delivery



# Cone Beam CT and Image Guidance



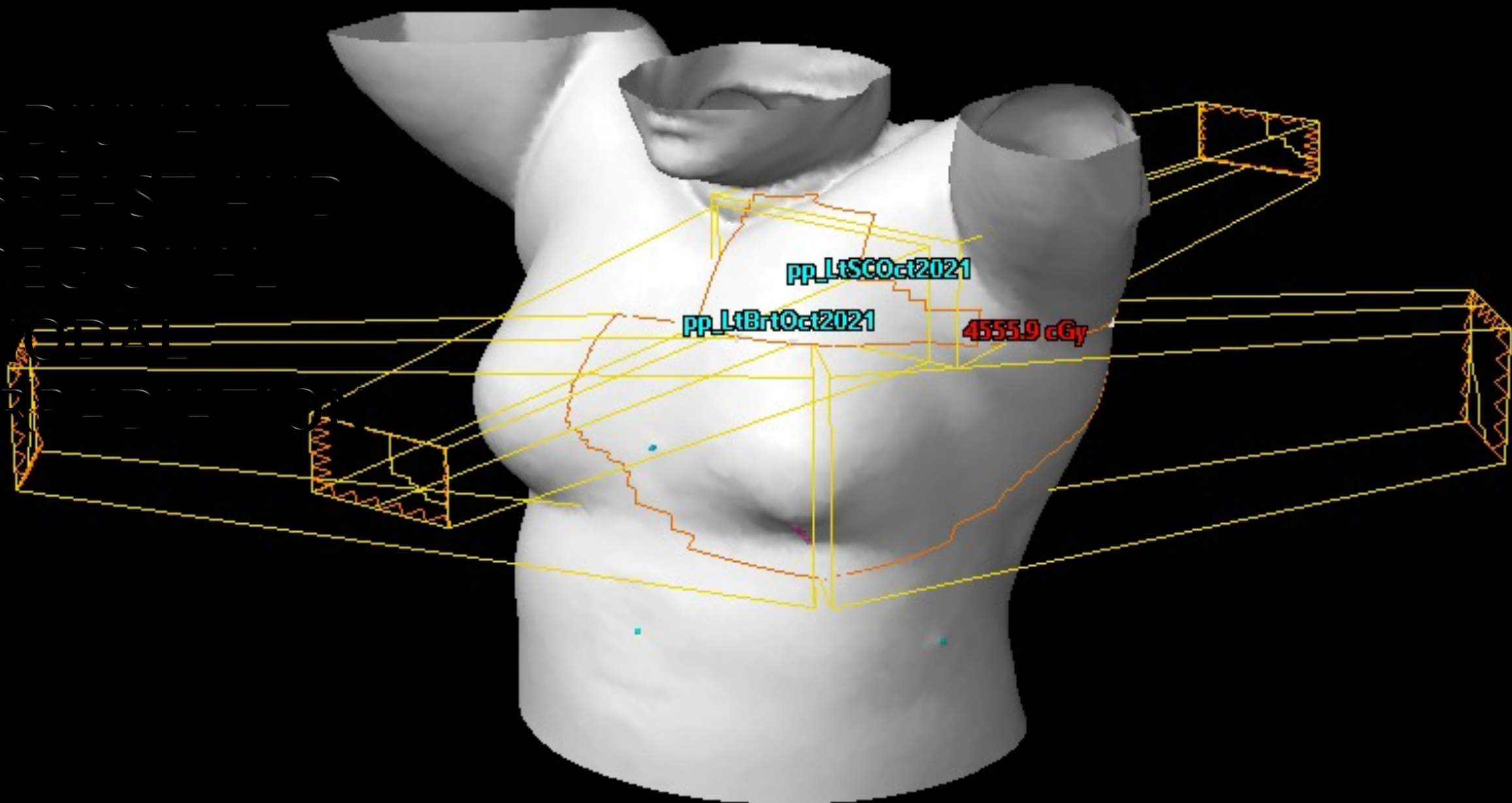
Cone Beam CT (CBCT) performed prior to treatment



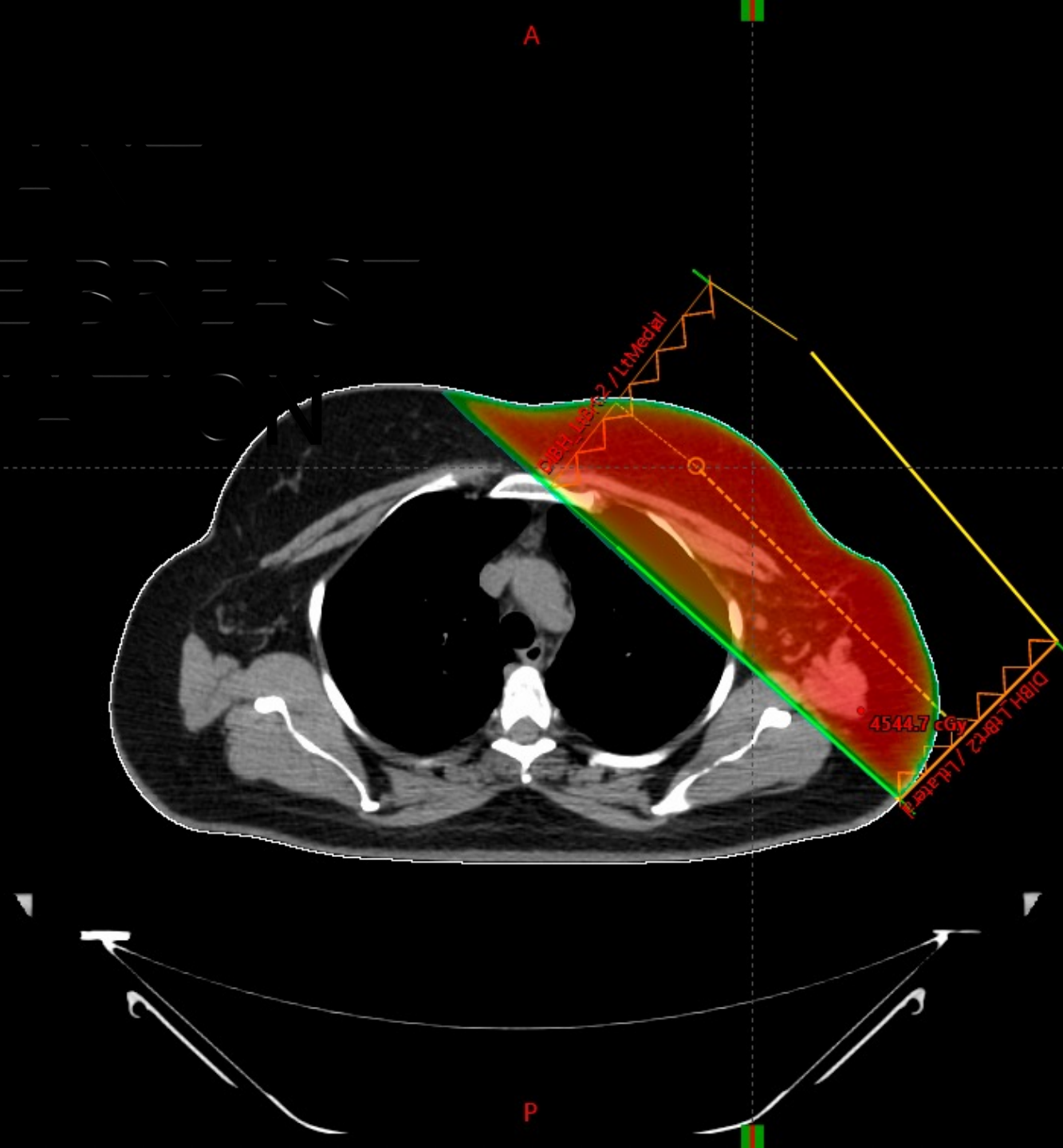
Match CBCT with planning CT  
Accuracy to  $\leq 3$  mm

# Advanced Treatment Delivery



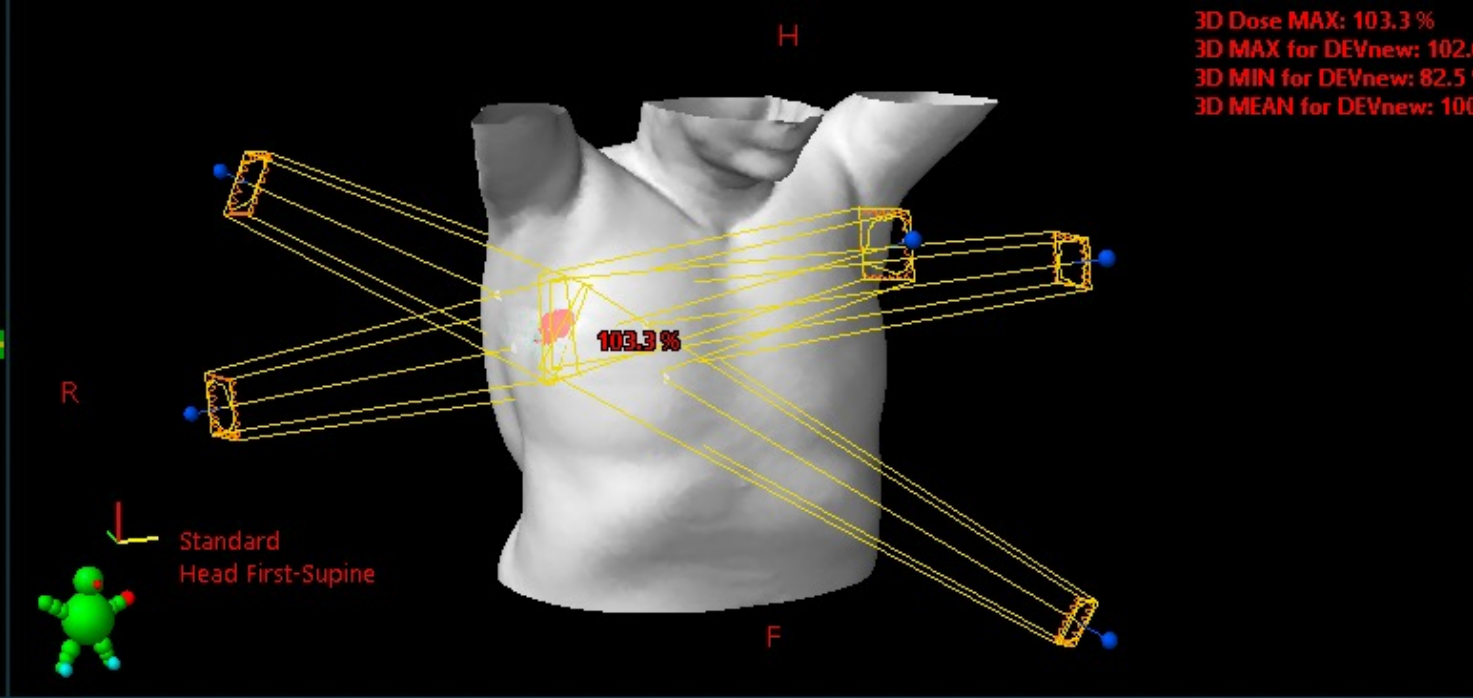
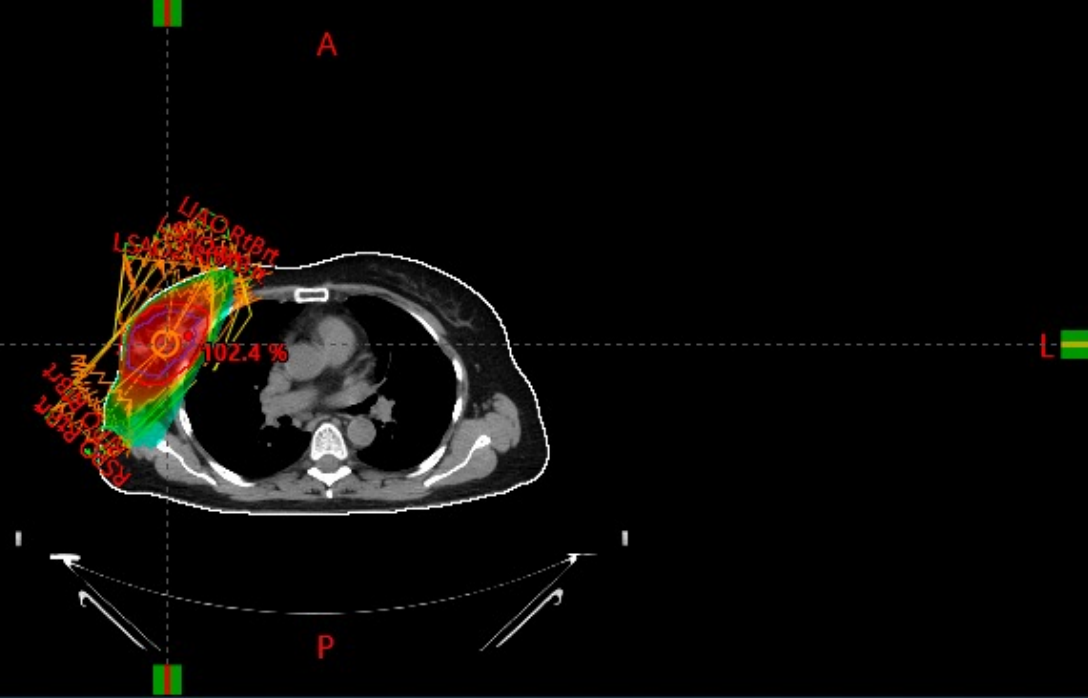


3D Dose MAX: 4555.9 cGy  
3D MAX for CTVn\_IMC\_L: 4368.4 cGy  
3D MIN for CTVn\_IMC\_L: 1794.4 cGy  
3D MEAN for CTVn\_IMC\_L: 4056.7 cGy

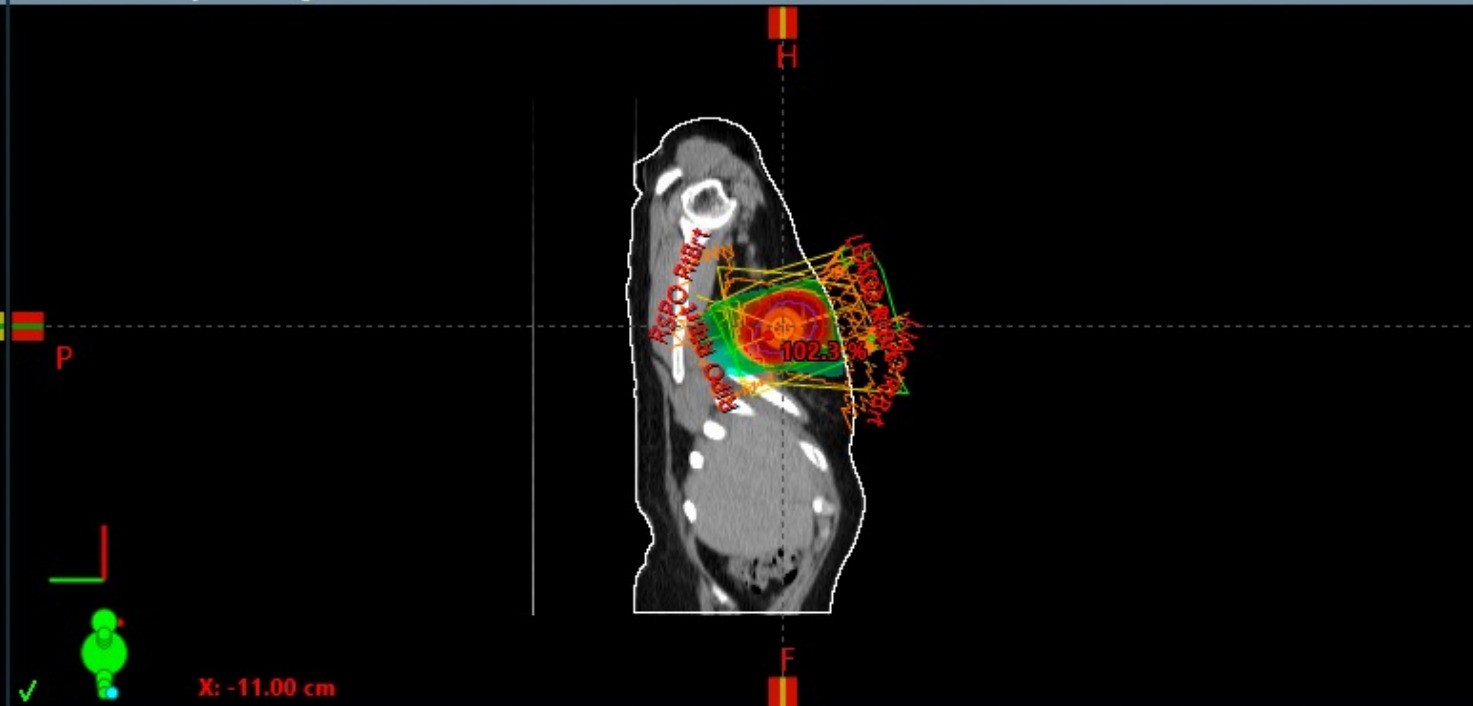
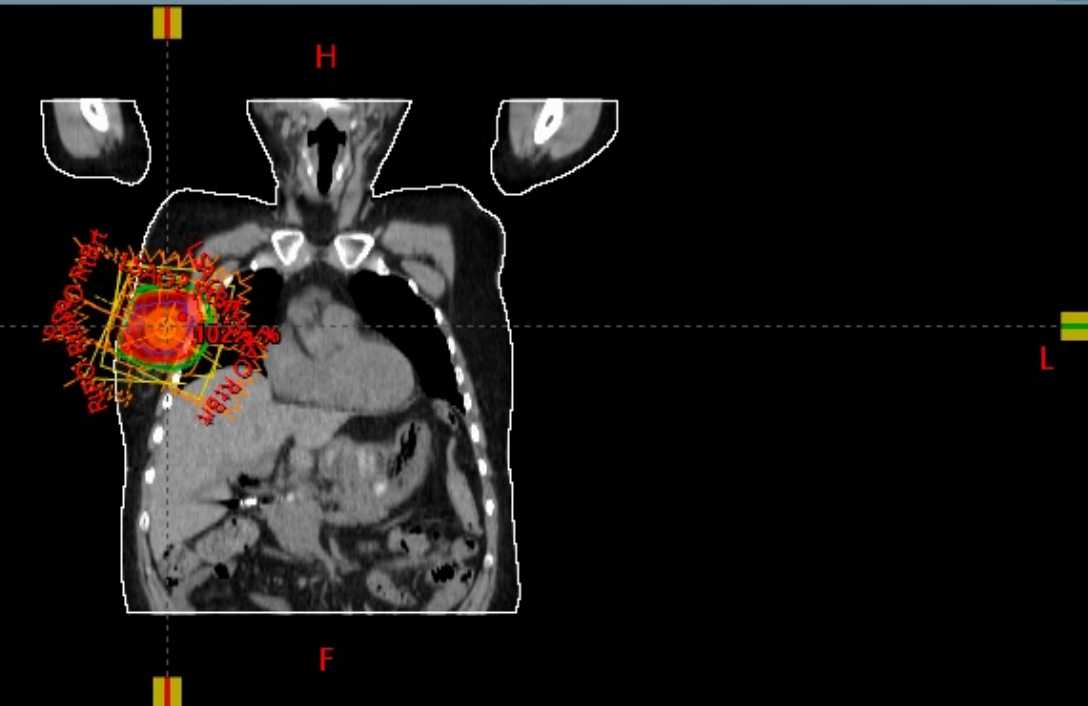


st-Supine  
m





noflash new - Rejected - Sagittal - Rt Breast



Color wash [cGy]

4404.7

4404.7

4000.0

3500.0

3000.0

2500.0

2000.0

1554.6

1000.0

500.0

0.0

0.0

0.0

0.0

0.0

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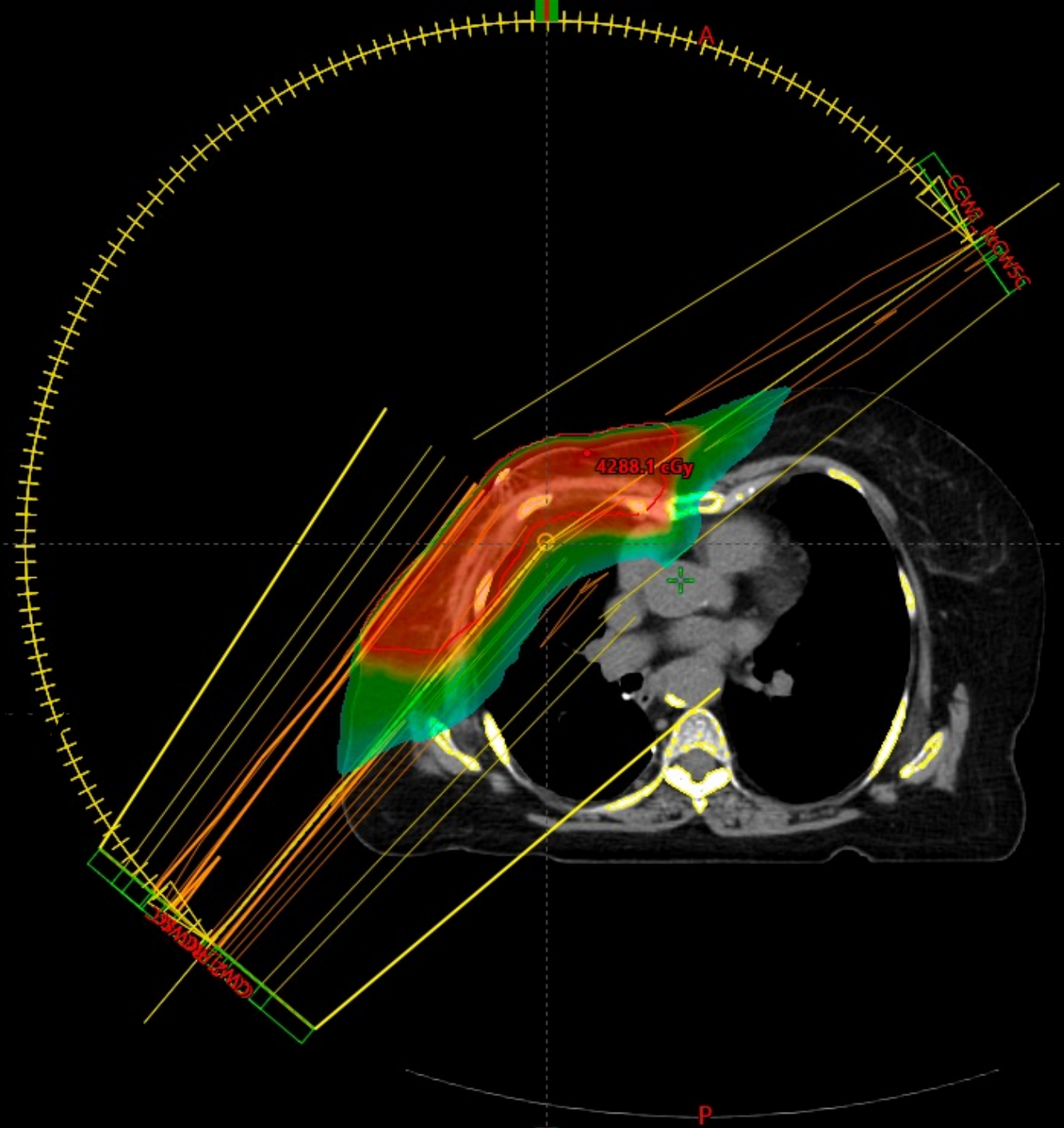
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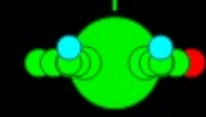
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Standard

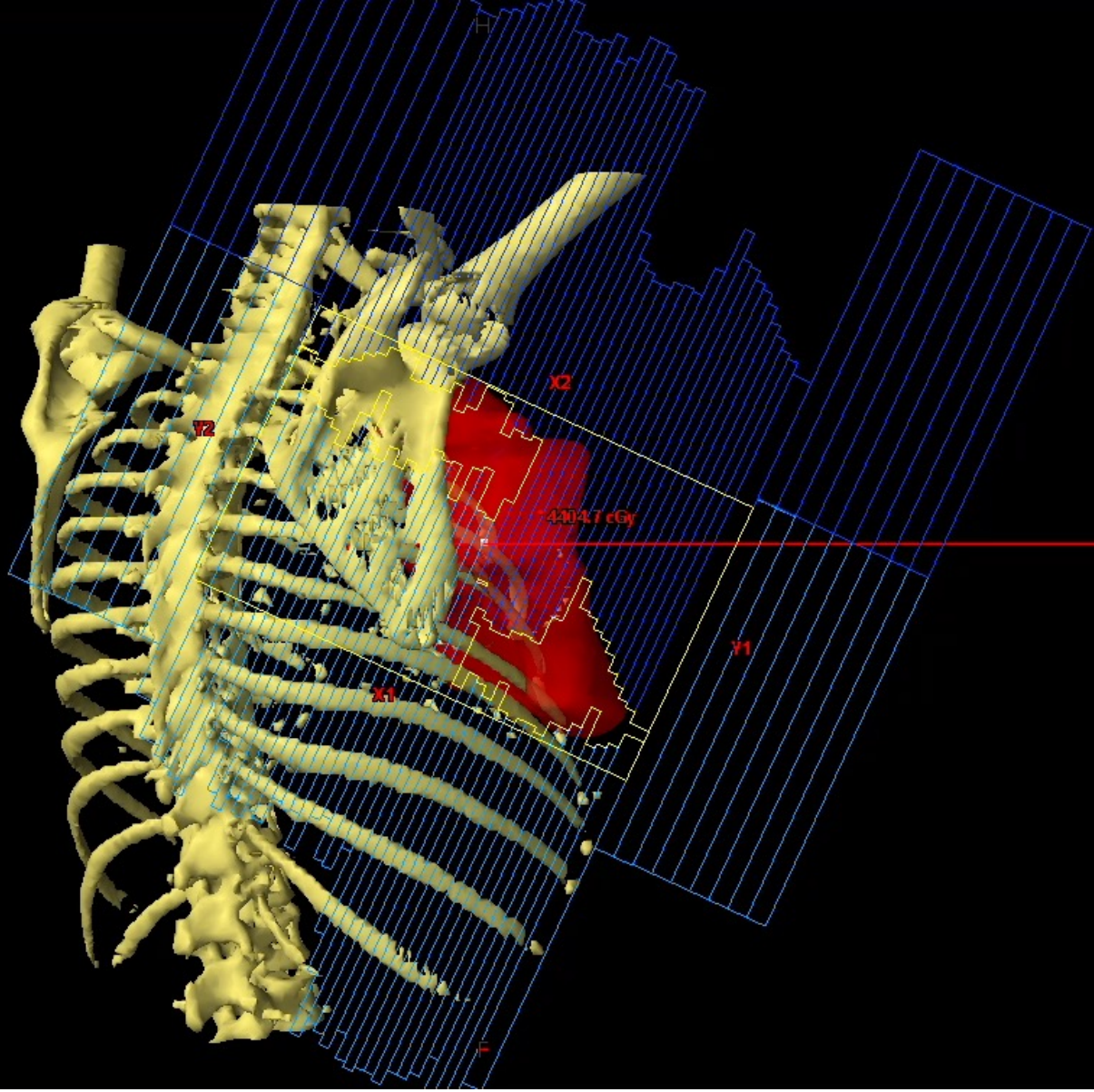


Head First-Supine  
Z: -2.70 cm

Isodoses [cGy]

3D Dose MAX: 4404.7 cGy  
3D MAX for PTV\_4000: 4404.7 cGy  
3D MIN for PTV\_4000: 0.0 cGy  
3D MEAN for PTV\_4000: 4011.3 cGy

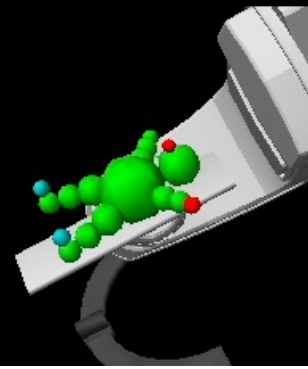
- 4400.0
- 4320.0
- 4200.0
- 4080.0
- 4000.0
- 3800.0
- 3600.0
- 3200.0
- 2800.0
- 2400.0
- 2000.0
- 1200.0

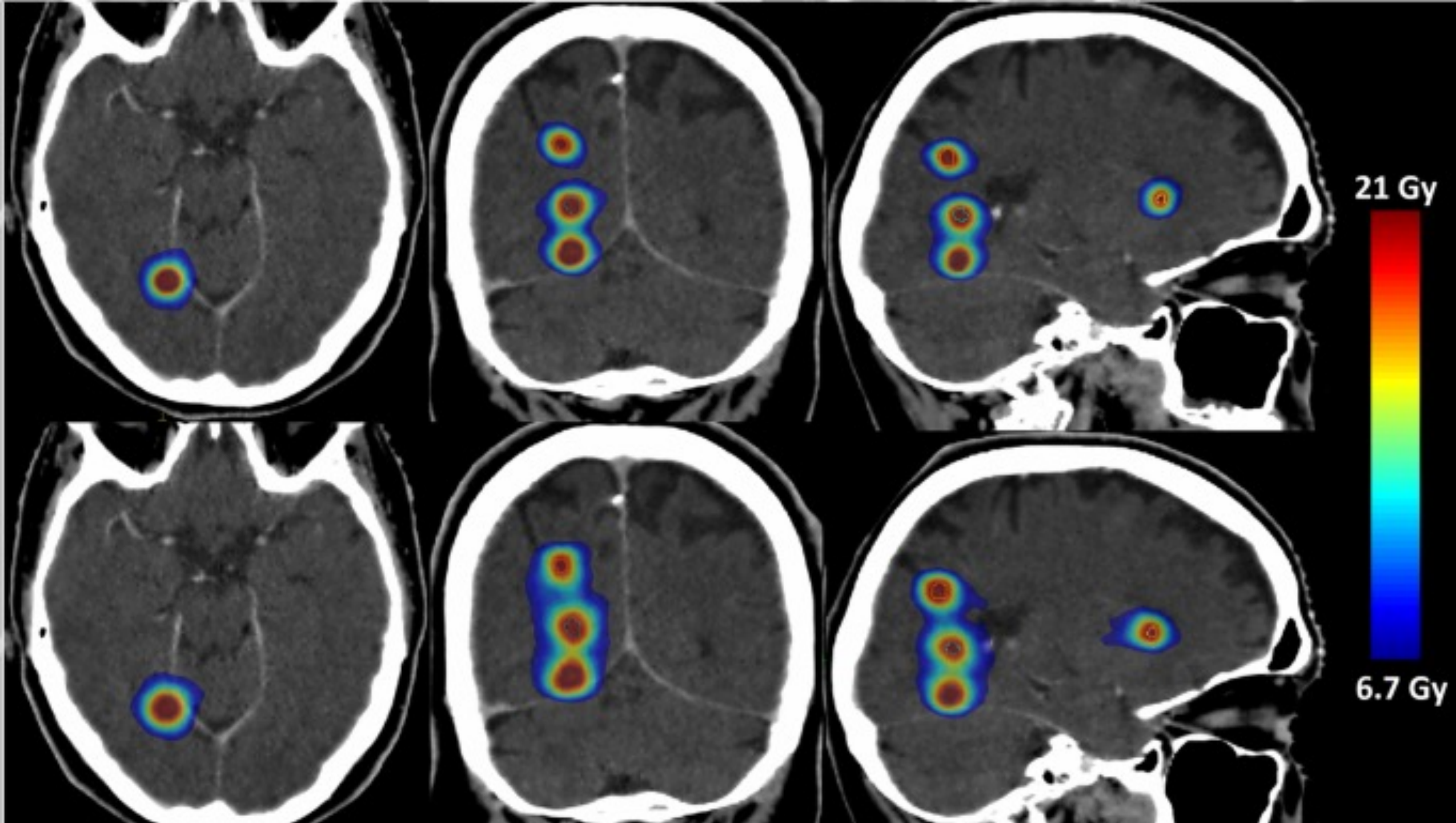


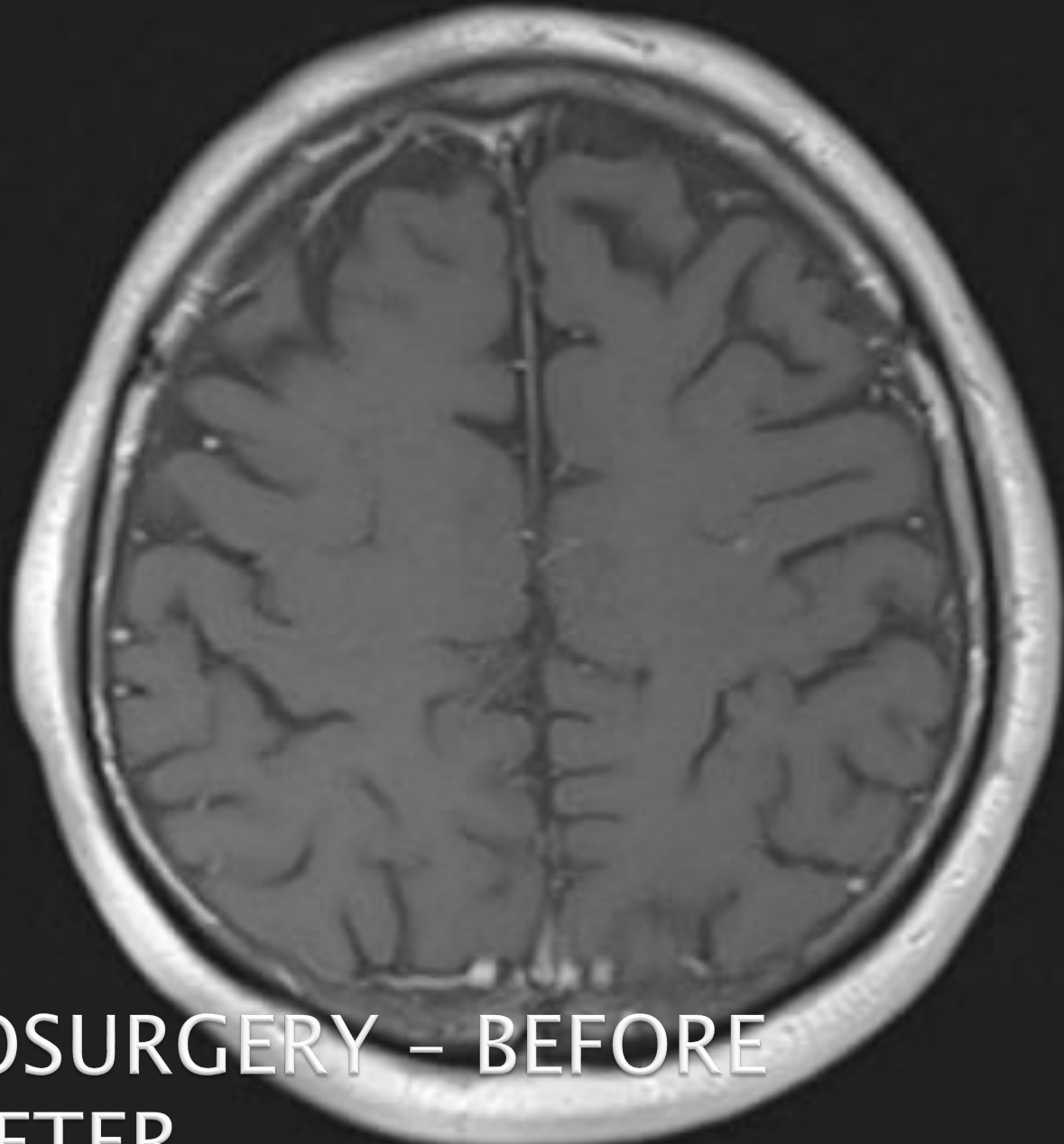
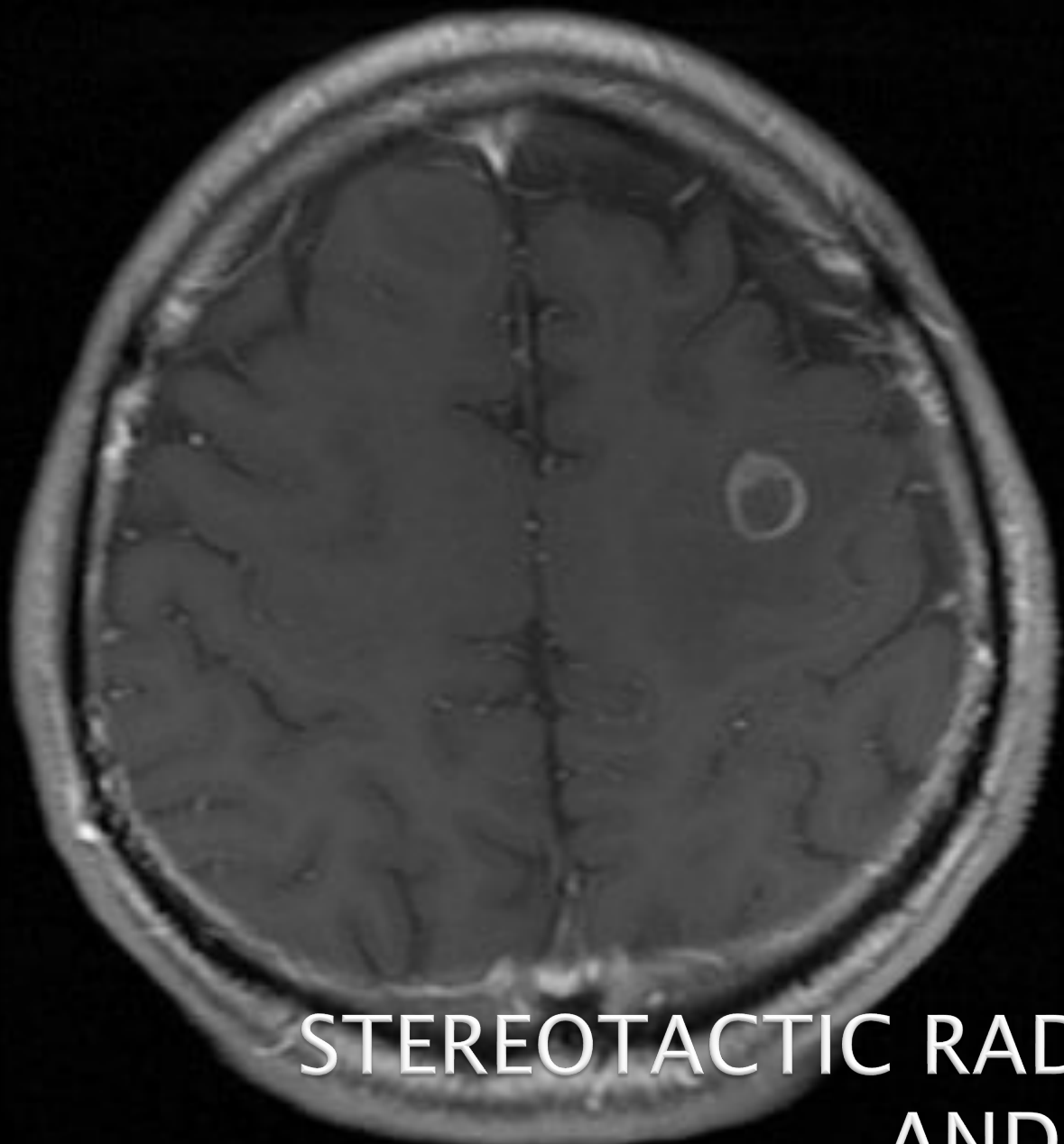
L

R

Standard  
Head First-Supine







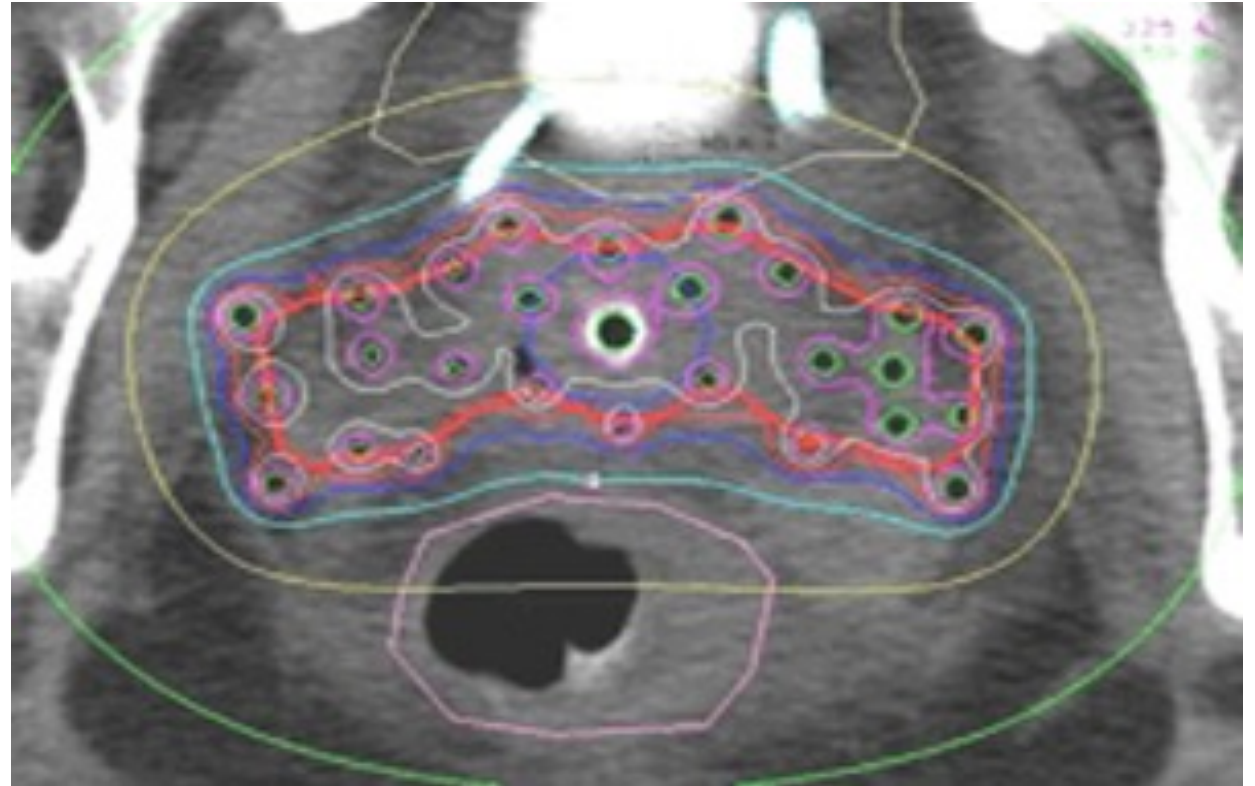
STEREOTACTIC RADIOSURGERY – BEFORE  
AND AFTER





# Brachytherapy

- ▶ Operating room work environment and requires procedural skills
- ▶ Insertion of radioactive seeds or plastic catheters containing radioisotope sources
- ▶ Permanent 125-Iodine seed implantation for prostate cancer
- ▶ Uses for:
  - Vulvar tumors
  - Vaginal tumors
  - Cervix cancers
  - Breast cancer





# What makes Radiation Oncology appealing?

- ▶ **Caring for patients dealing with a serious illness**
  - In general, 50% curative and 50% palliative
- ▶ **A rewarding practice environment**
  - Incorporates continual advances in care and technology, promotes life-long learning, research opportunities, medical education, team-based care
- ▶ **“Lifestyle” specialty**
  - Minimal call requirements and most work is dealt with during regular working hours
  - No evening or weekend work; part-time work possible

# Downsides to Radiation Oncology?

- ▶ **Need to cope with dying patients, including pediatric patients**
- ▶ **Training longer than some specialties**
  - Most residents (~60%) complete a one-year clinical research fellowship after residency training
- ▶ **Most staff positions are academic**
  - “Clinical only” work at academic centres now uncommon
- ▶ **Specialty is resource-dependent (i.e. radiation equipment)**
  - May need to train or work in non-preferred locations

# Training Program Highlights

- ▶ U of C Radiation Oncology Residency Program established in 2002
- ▶ 26 graduates
  - 6 more currently in training
- ▶ 5-year residency training; direct entry via CaRMS Match
- ▶ **100% success rate** at Royal College exams

# Current Residents



Dr Catherine Stewart  
PGY1



Dr Conrad Bayley  
PGY2



Dr Allison Rau  
PGY2



Dr Daniel Davies  
PGY3



Dr Amanda Khan  
PGY3



Dr Steven Xu  
PGY4

# Graduate Employment

- ▶ Former graduates employed in Alberta (10), Saskatchewan (2), BC (5), Ontario (3), Saudi Arabia (1) and USA (4)

# Social Activities



# Recent Program Initiatives

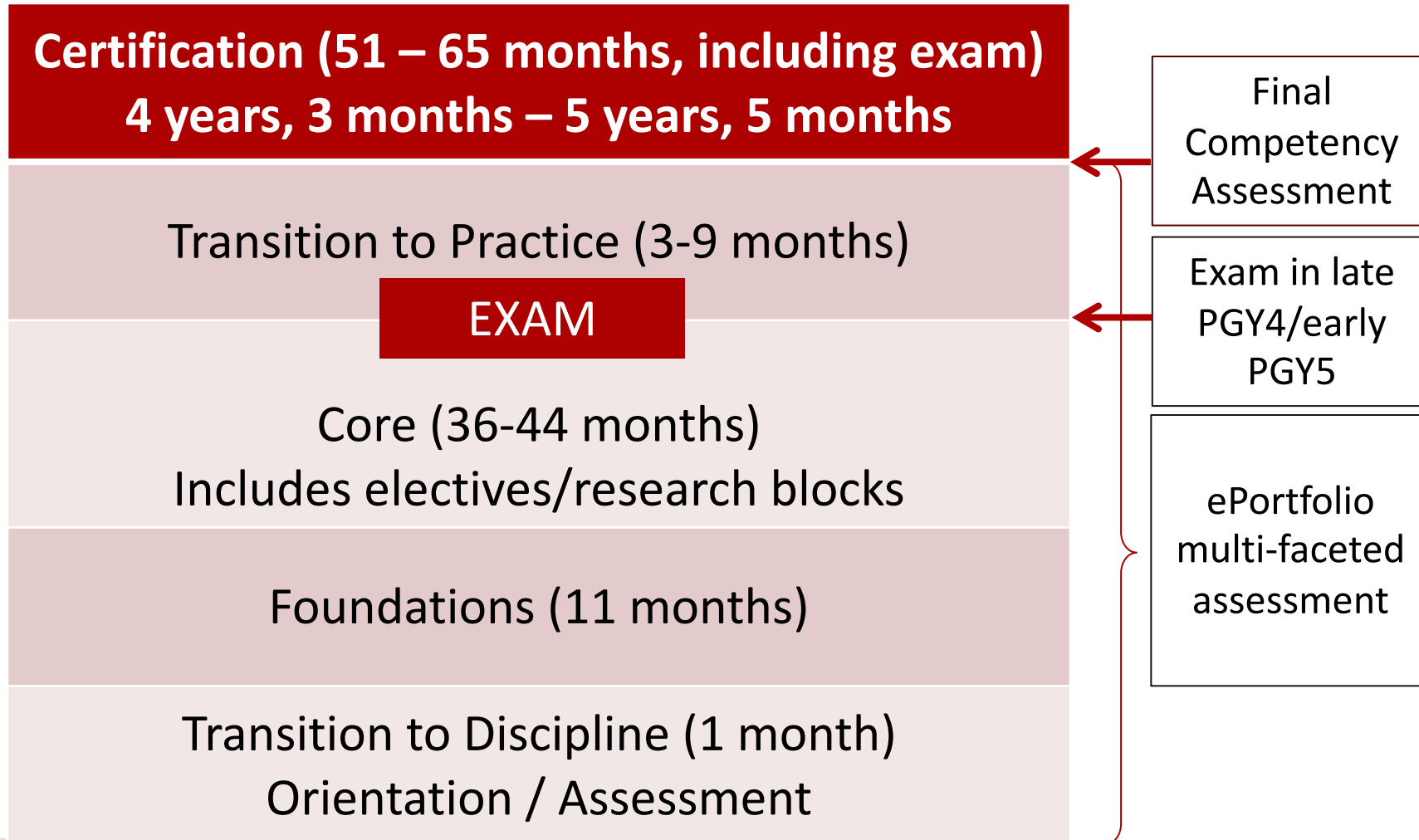
- ▶ **Competency By Design (CBD)** program launched in July 2019
  - Secured \$116,900 over 7 years for CBD program development, simulation-based education development, and infrastructure development
- ▶ 1 of 3 accredited **Royal College Area of Focused Competence (AFC)** programs in Brachytherapy
- ▶ Hosted **RO Exam Prep Course in 2019/20 and 2022/23**

# EPA Breakdown per Stage

<b>Transition to Practice</b>	<b>EPA 1</b> Professional development and personal wellness plan		<b>EPA 2</b> Assess/manage cancer patients at a consultant level		<b>EPA 3</b> Manage day-to-day aspects of practice		<b>EPA 4</b> Complete a scholarly project	
<b>Core</b>	<b>EPA 1</b> Initial patient assessment	<b>EPA 2</b> Develop/communicate a management plan	<b>EPA 3</b> Radiation treatment planning	<b>EPA 4</b> On-treatment management	<b>EPA 5</b> Follow-up plan	<b>EPA 6</b> Teaching/propagating RO knowledge		
<b>Foundations</b>	<b>EPA 1</b> Manage common medical/surgical problems		<b>EPA 2</b> Identifying learning needs and address knowledge gaps		<b>EPA 3</b> Manage medical error/adverse event		<b>EPA 4</b> Assess/manage cancer patients in various settings	
<b>Transition to Discipline</b>	<b>EPA 1</b> History and Physical Exam				<b>EPA 2</b> Patient Handover			



# Radiation Oncology CBD Roadmap



# What makes an impressive candidate?

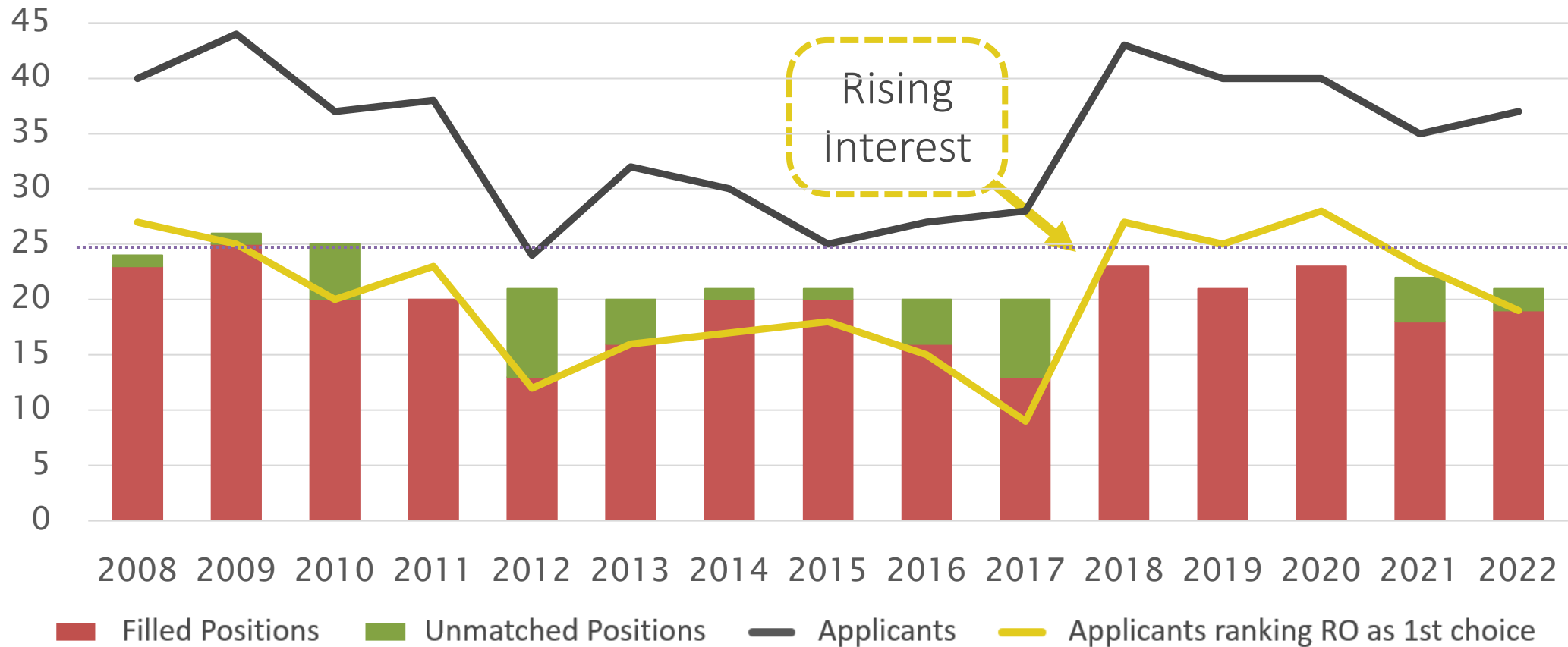
## ▶ **CaRMS application/CV:**

- Candidates who demonstrate empathy, maturity, strong clinical skills, good communication skills, leadership ability, and ability to self-reflect for personal improvement
- Well-rounded with interests outside medicine
- Explored radiation oncology with at least one elective
- *Optional/Bonus: Research experience*

## ▶ **Strong interview performance**

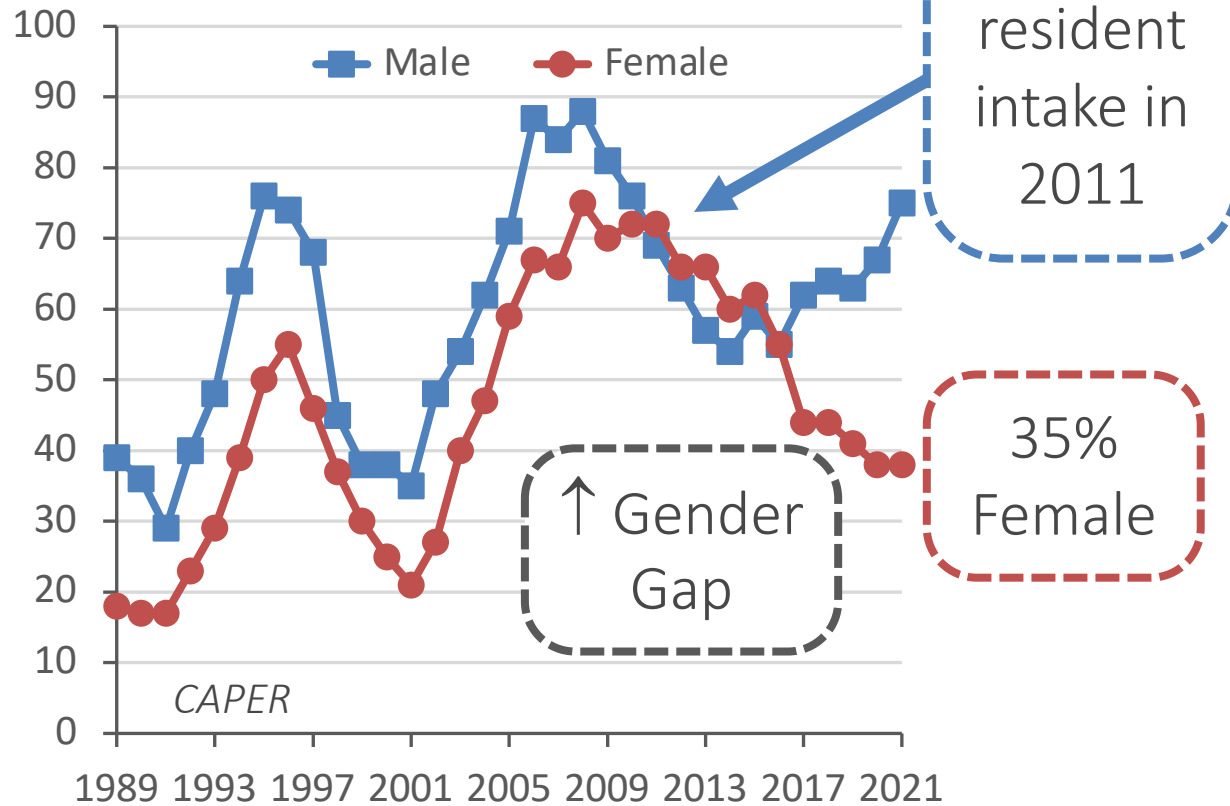
# CaRMS Data Trends

CMG Applicants & Quota in the R-1 Match (2008-2022, 1<sup>st</sup> Iteration)

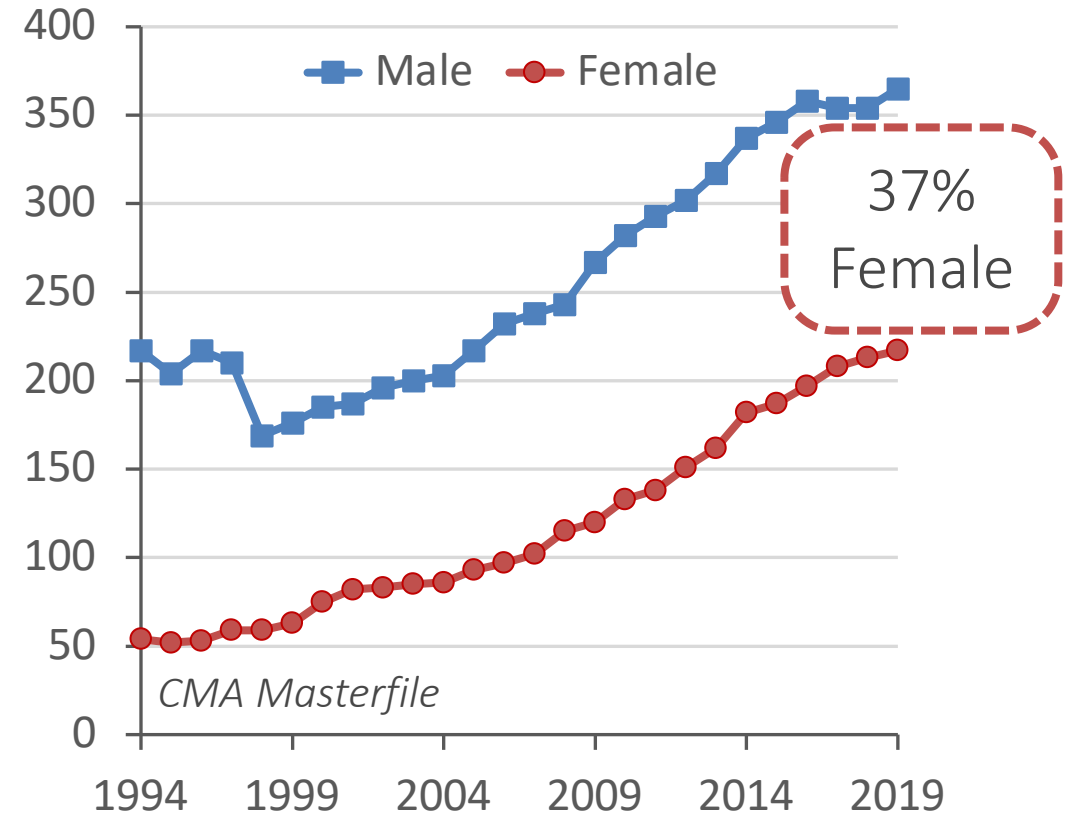


# Human Resources Trends

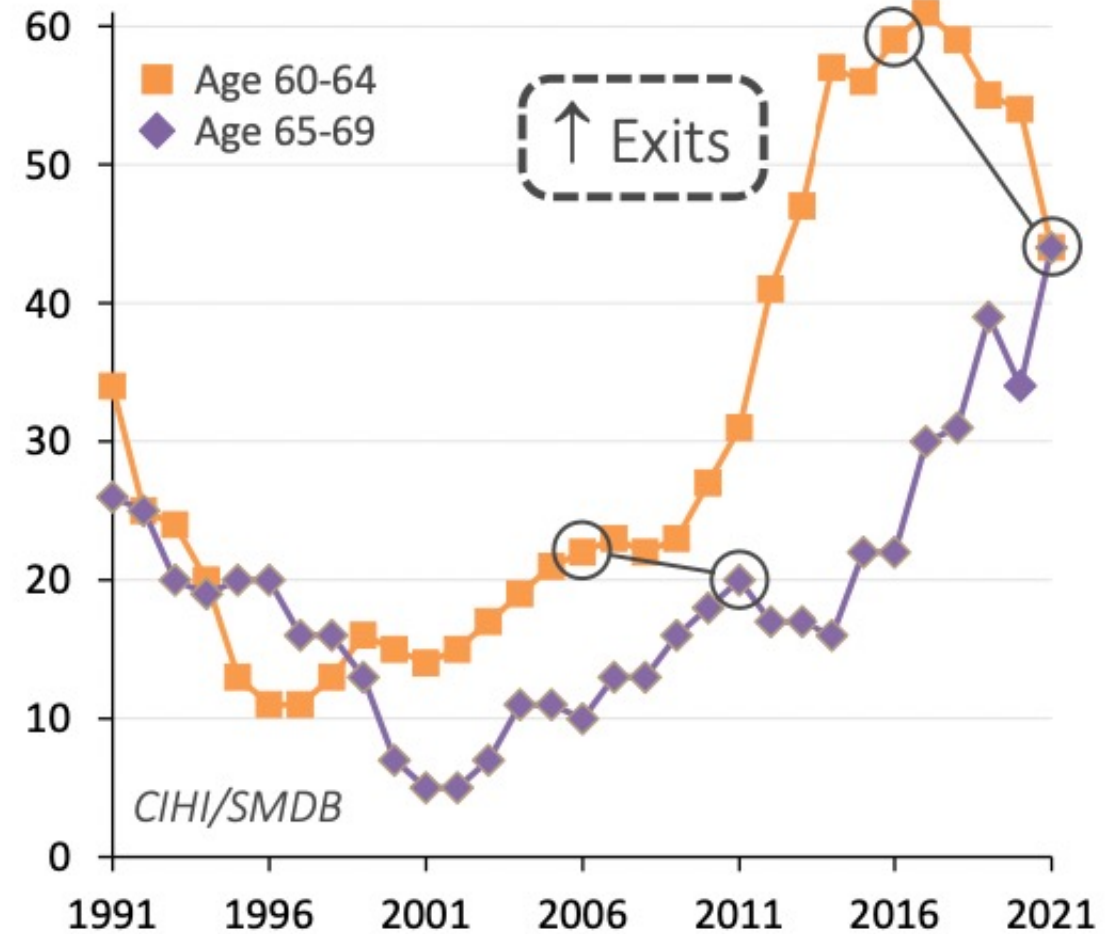
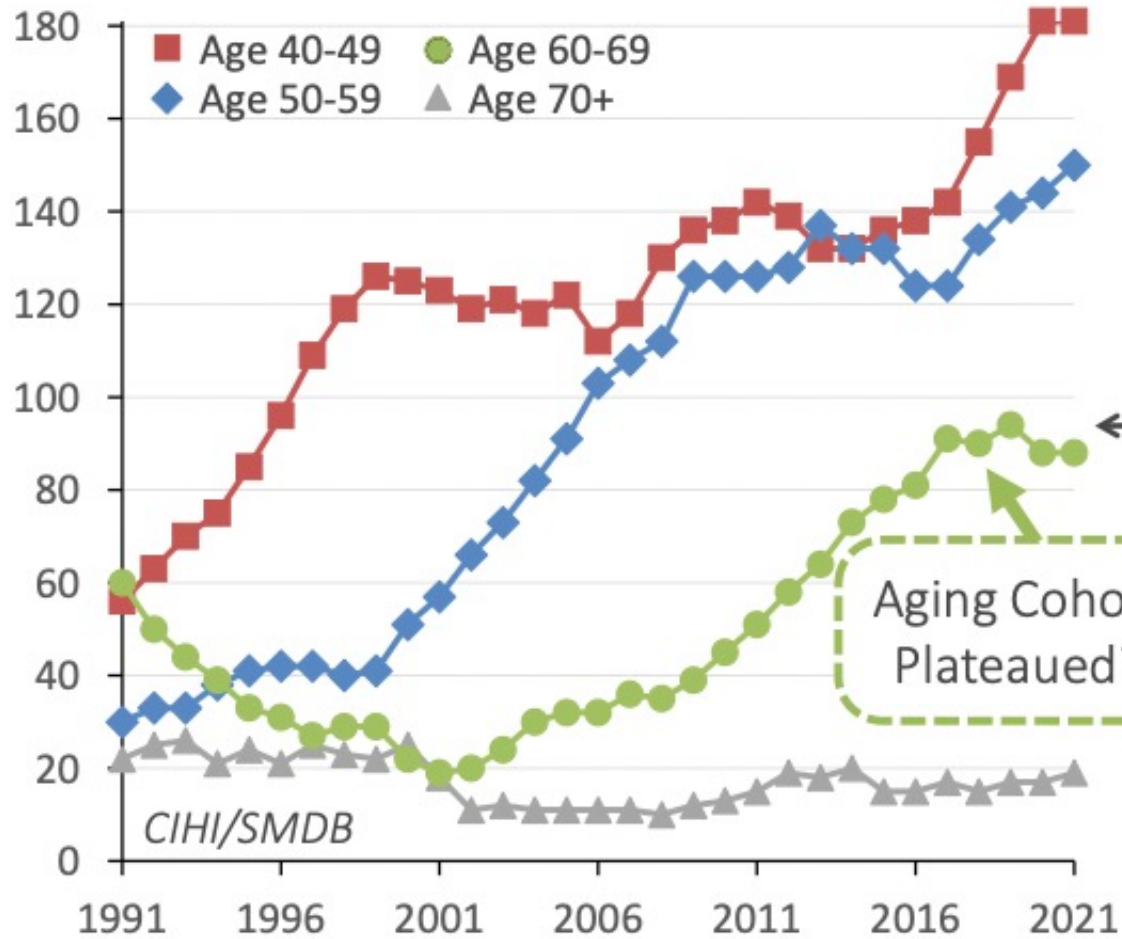
Number of Residents/Year  
excluding fellows and visa trainees



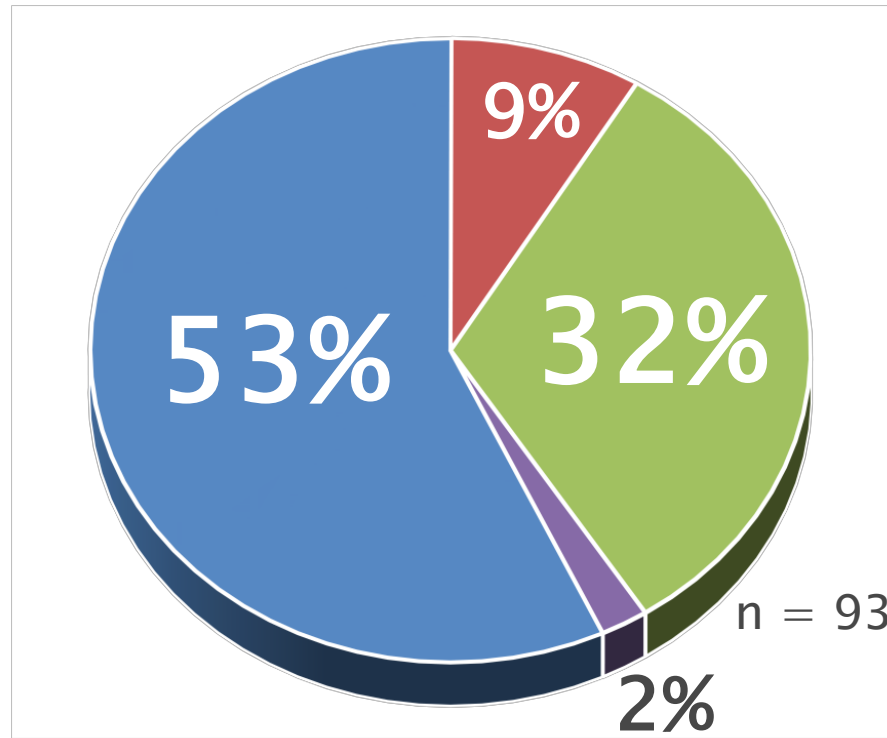
Radiation Oncologists in Canada



# Workforce: Age Demographic Trends



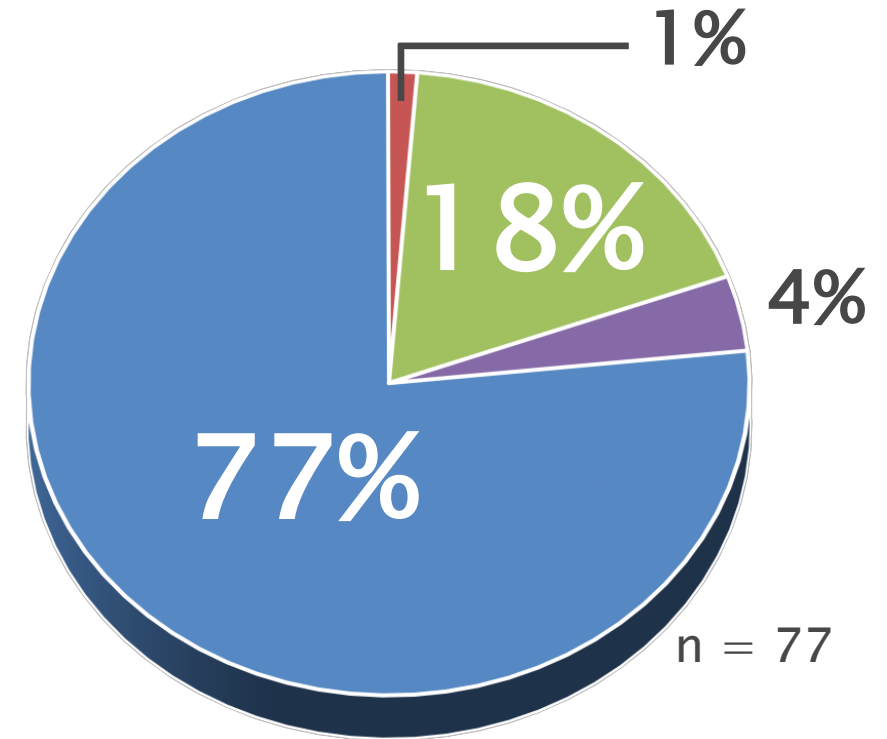
# Post-graduate Employment Outcomes



2018 Survey  
2015-2018 grads

- Staff
- Locum
- Fellowship
- Other

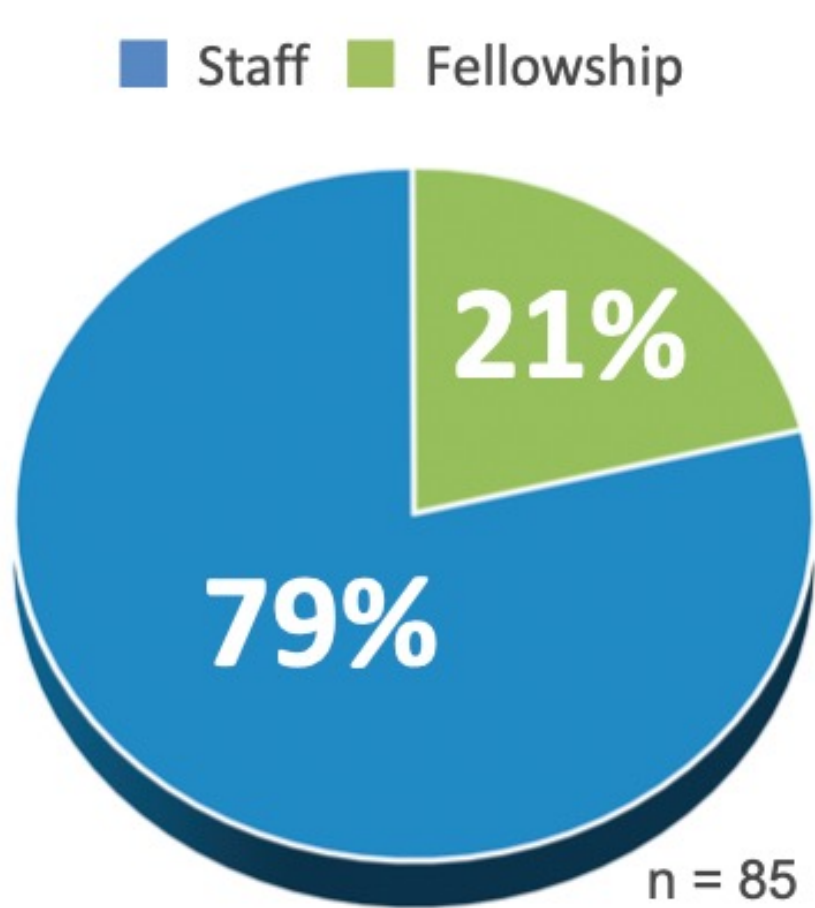
$P < 0.01$



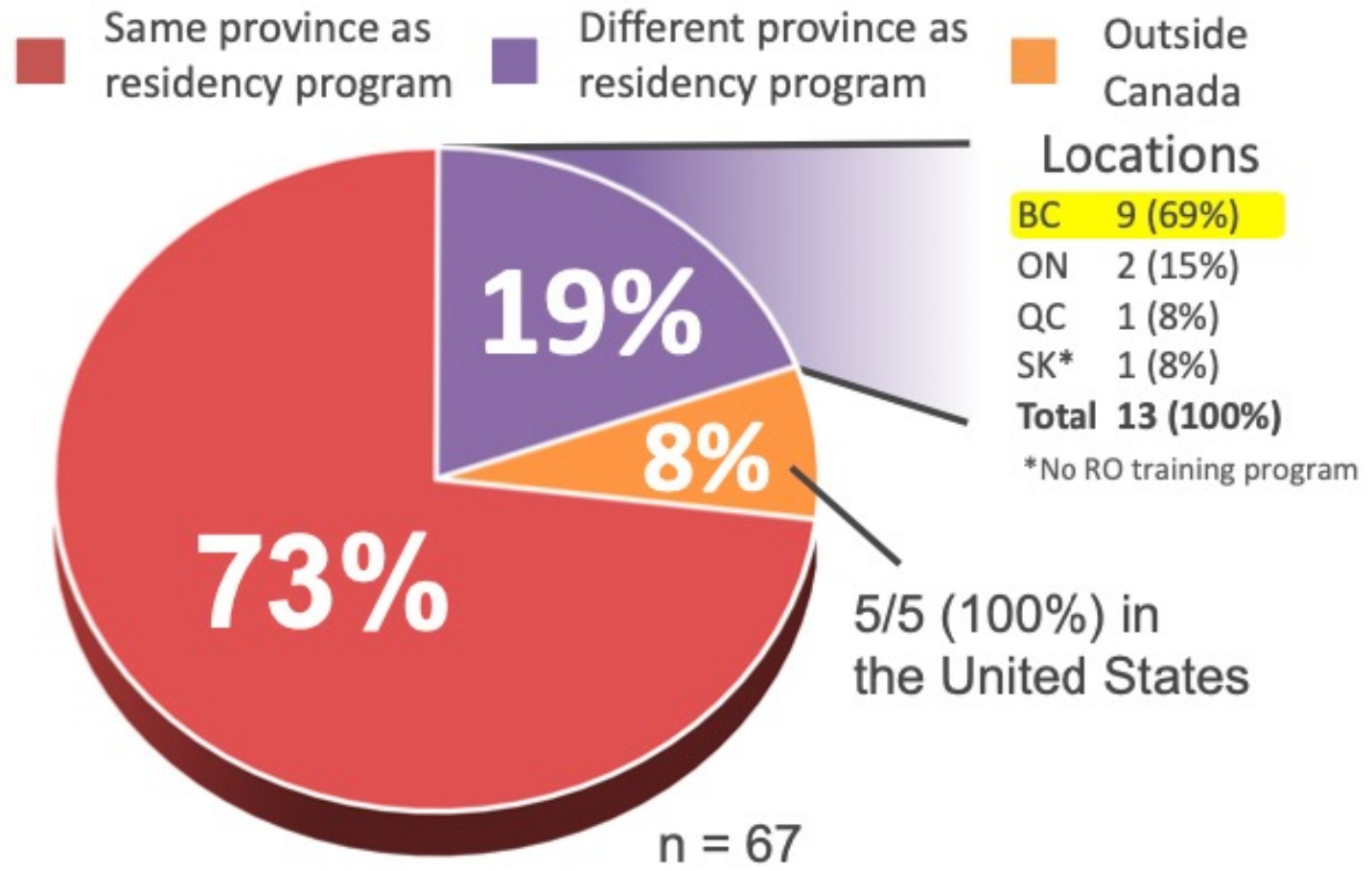
2020 Survey  
2017-2020 grads

*Wu et al. (2022) Adv Radiat Oncol 7:3100915.*

# 2020-2023 Graduates' Employment Outcomes

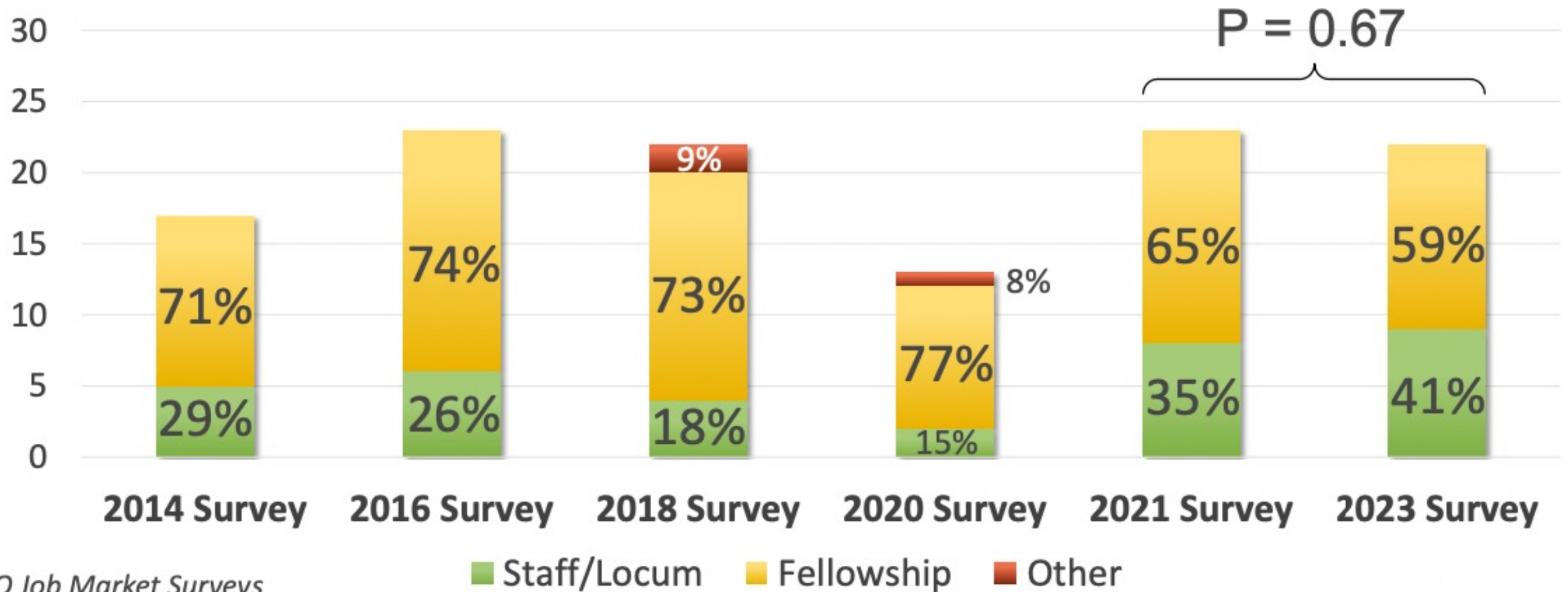


Employment Status



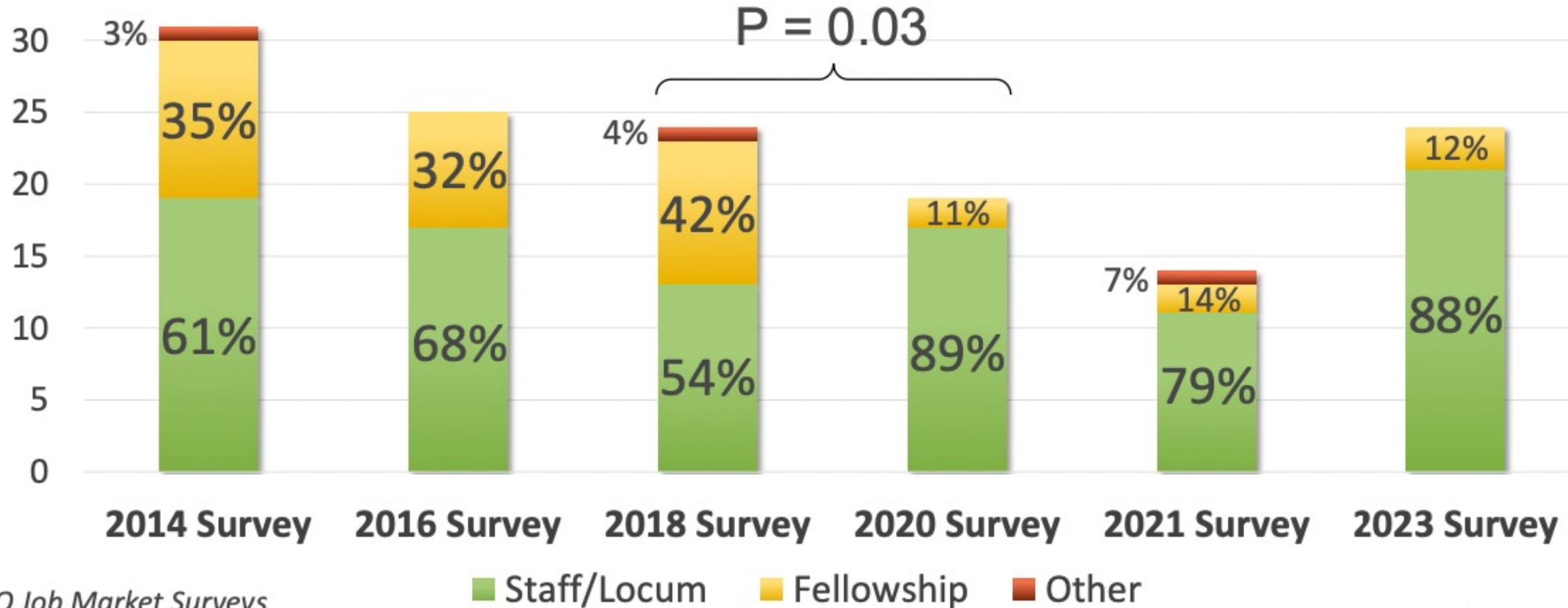
Location of Staff Positions

# Employment status at graduation

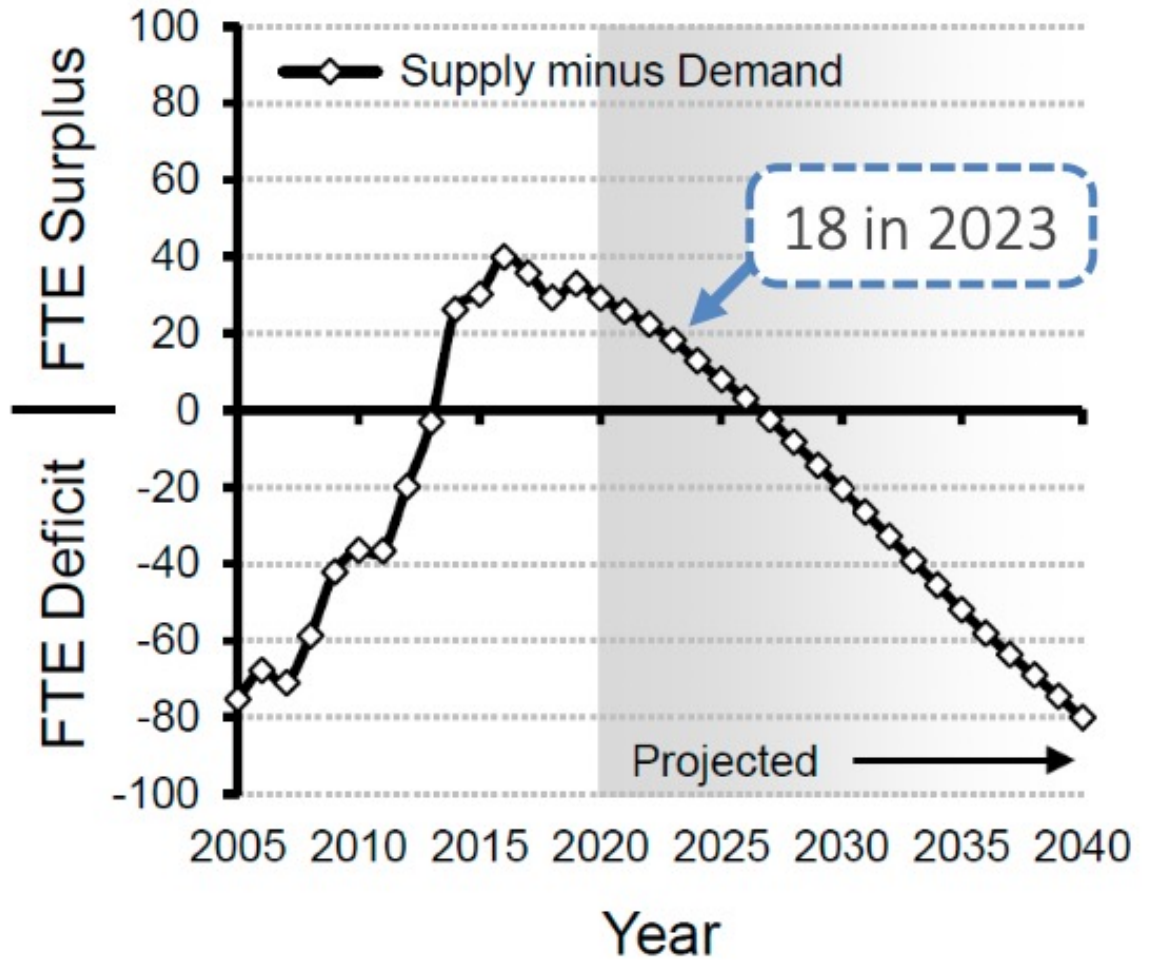
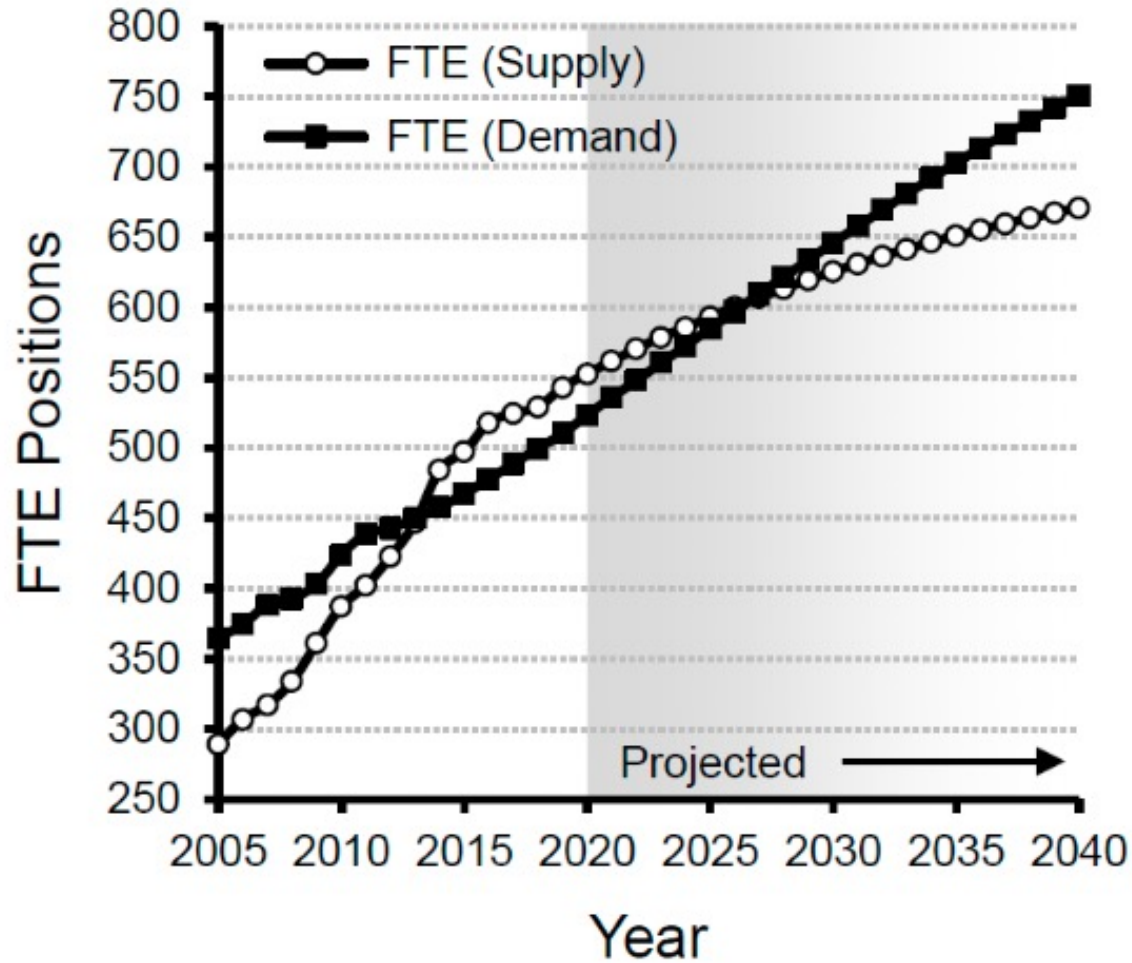




# Status: One year post-graduation



# Supply and Demand Projections



# Employment Outlook in Alberta

AHS  
Physician  
Workforce  
Plan and  
Forecast

2018-2028

The 43% needs-based increase after 10 years reflects higher anticipated service requirement in Alberta's aging and growing population.

This group's forecast also projects an almost 50% replacement of the current FTE complement due to anticipated retirements over the 10-year forecast period.

Workforce need is ~3-4 FTE per year for the next few years

# New Calgary Cancer Centre (2023)





# Radiation Oncologist Income

- ▶ Starting salaries across Canada: **\$300-500k per year**
- ▶ Senior Radiation Oncologists: **\$400-750k per year**
  
- ▶ Employment in Alberta is salaried; not fee-for-service
  - **Option 1:** AHS employee with 'self-funded' benefits, including LT disability insurance, health/dental, life insurance, and a **pension**
  - **Option 2:** Paid as a contractor with incorporated business practice; no employee benefits

# Interested in Radiation Oncology?

**Come spend some time with us:**

- ▶ Clinical elective (typically 1 or 2 weeks)
- ▶ Get involved with research projects



Complete description of program listed on CaRMS web page (carms.ca) or <http://departmentofoncology.com/education-training/residency/>

Contact **Melissa Watkins** – Program Administrator for medical student electives; Email: [Melissa.Watkins2@ahs.ca](mailto:Melissa.Watkins2@ahs.ca)

# Resident Perspective

## Dr. Daniel Davies



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# Special Thanks to Dr Shaun Loewen

For presentation and data

# Questions?

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