Northern Territory
RADIATION
ONCOLOGY

"Living Well with Breast Cancer" Forum

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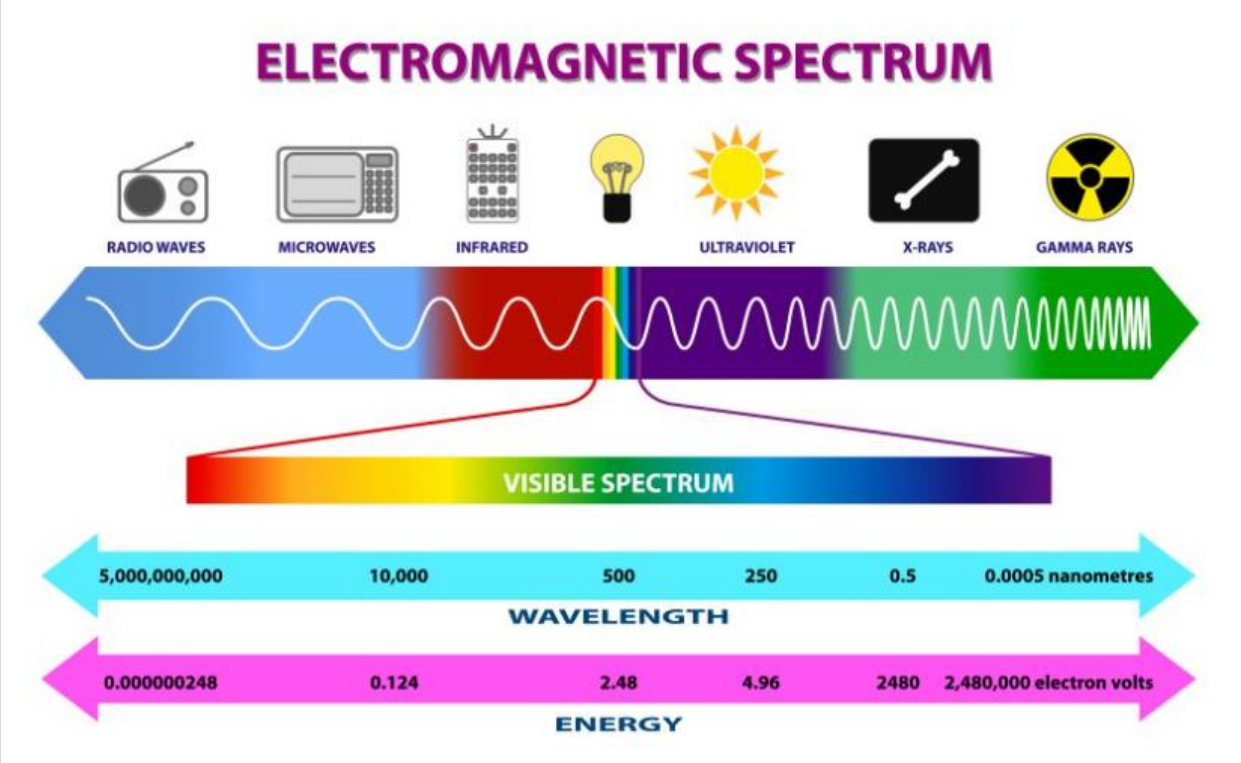
Overview of Presentation

- Background of Radiation Therapy
- Radiation Therapy Treatment Process
- How Technology is Improving Outcomes
- Supportive Care & Follow-Up

What is Radiation Therapy?

- The medical use of ionising radiation
  - High energy x-ray photons or electrons

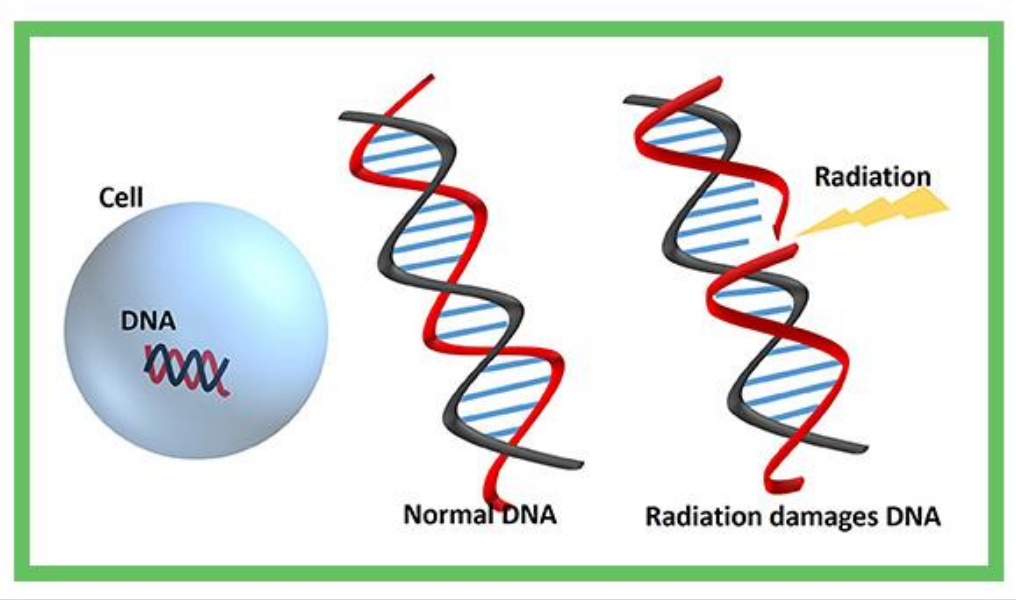


Diagnostic x-rays = kV

Therapeutic x-rays = MV
(1000kV = 1MV)

Why is radiation used?

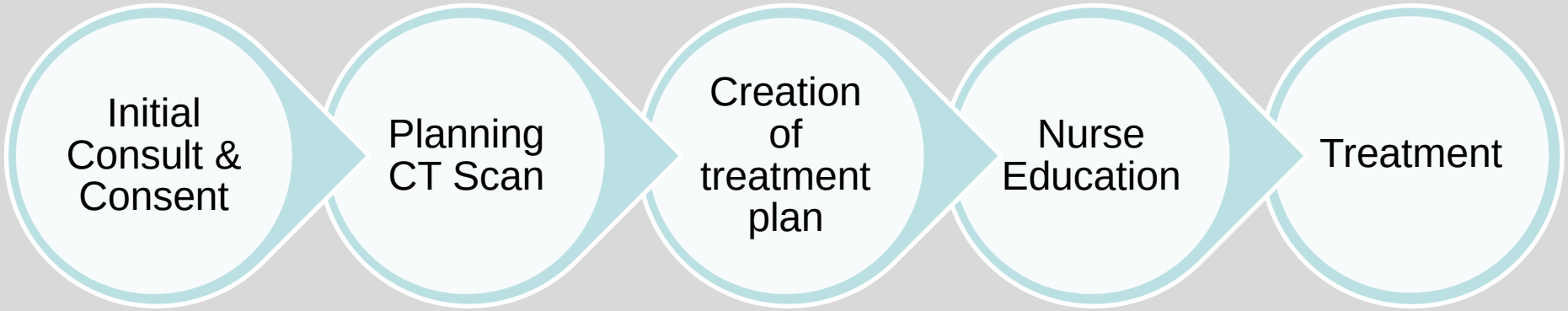
- Ability to control cell growth
  - Works by damaging the DNA of cancer cells so they cannot replicate → eventually cause cell death
  - Also affects normal tissues cells, but they have the ability to repair the damage



Common Treatment Regimes

- Evidence-based dose and number of treatments (also called fractionations)
  - Validated by clinical trials and long-term follow up data
- Most often used:
  - 50Gy / 25 fractions
  - 40Gy / 15 fractions
  - +/- 10Gy / 5 fraction boost to tumour bed depending on pathology and individual risk factors
- FAST-Forward Trial – comparing 15 fraction treatments with a 5 fraction regime
  - Not commonly utilised in Australia as limited long-term follow up data

Radiation Treatment Process



Initial Consult & Consent

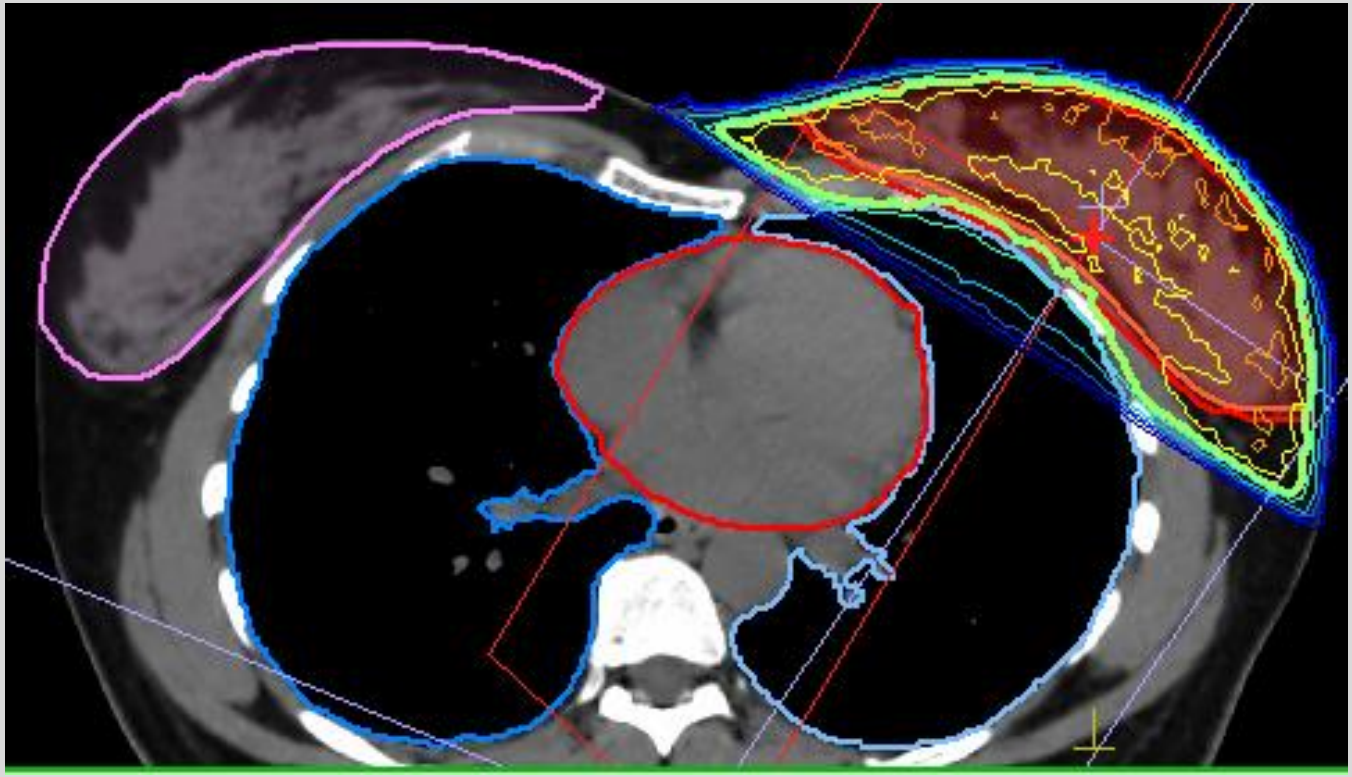
- Rationale for treatment
- Expected outcomes
- Side effects
- Informed consent

Planning CT Scan

- CT scan in treatment position
- References for accurate daily setup

Creation of treatment plan

- Individualised treatment plan
- Aim to deliver maximum tumour coverage with minimal dose to normal tissues & organs



Normal Tissue Doses

Organ	1.8-2 Gy fractionation regimen	Hypofractionation regimen • 40 Gy in 15 fx
Ipsilateral lung	• V20 Gy <30%[19] • V5 Gy <70%[20] • For tangential fields it is recommended that central axis lung exposure should be <3 cm, ideally 2cm or less if achievable.	• V17 Gy <35%[12] (combined dose from both chest wall/breast and nodal plans)
Contralateral lung	• V5 Gy <10%	
Heart	• V25 Gy <10%[21] • Mean Heart Dose (MHD) <5 Gy ◦ This dose constraint may be difficult to achieve and considered according to individual patient risk/benefit factors.	• V17 Gy <10%
Contralateral breast	• V3 Gy <10%[20]	
Spinal cord	• Acceptable: Max dose equivalent to ≤45 Gy in 2 Gy fractions. • Ideally max dose ≤40 Gy.	

Source: eviq.org.au

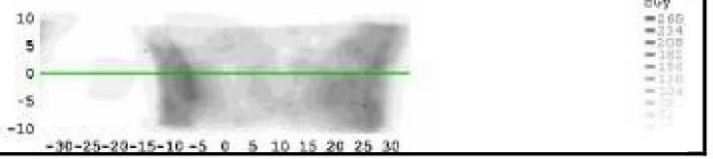
Quality Assurance

- Rigorous process
- Multi-layer check and re-check
- Independent check of calculated dose

Beam Data for CalcPt_1

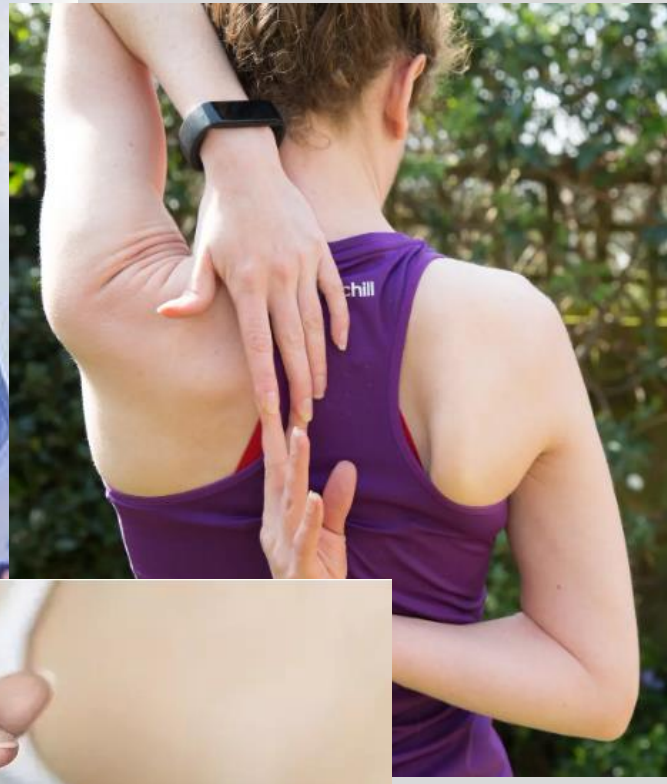
	Beam Desc.	Depth	Equiv. Path	SSD	OADx	OADz	Dose	RTP Dose	% Diff.
1	ARC2s	9.67	9.67	90.33	0.00	0.00	2.2190	2.2290	-0.4%

- Physics measurement on the machine

Field	γ-pass rate (%) 3%/2mm	Dose Map
ARC2s	99.7	

Nurse Education

- Introduce themselves and explain how they can help you throughout treatment
- Provide information about skin care & general well-being while receiving RT



Treatment

- Positioned in the same way as the planning CT
- Quality assurance checks performed prior to delivering radiation
- Total treatment time approx. 15 minutes

Quality Assurance

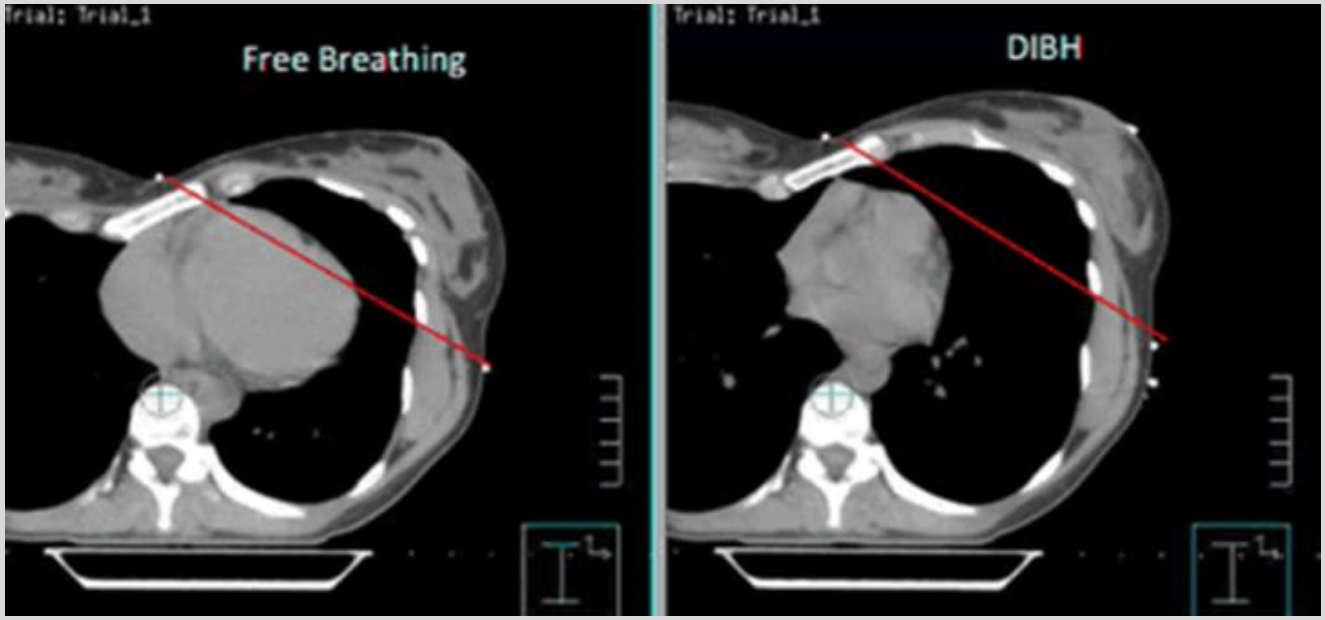
- Pre-treatment check of data
- "Time-out" before delivery
  - Correct patient
  - Correct site
  - Correct procedure

Australian Commission for Safety and Quality in Health Care

Improving Outcomes with Technology

Treatment in Breath Hold

- Commonly utilised for left-sided breast / post-mastectomy treatments
- Aim is to inflate the lungs so that the heart is pushed away from the ribs

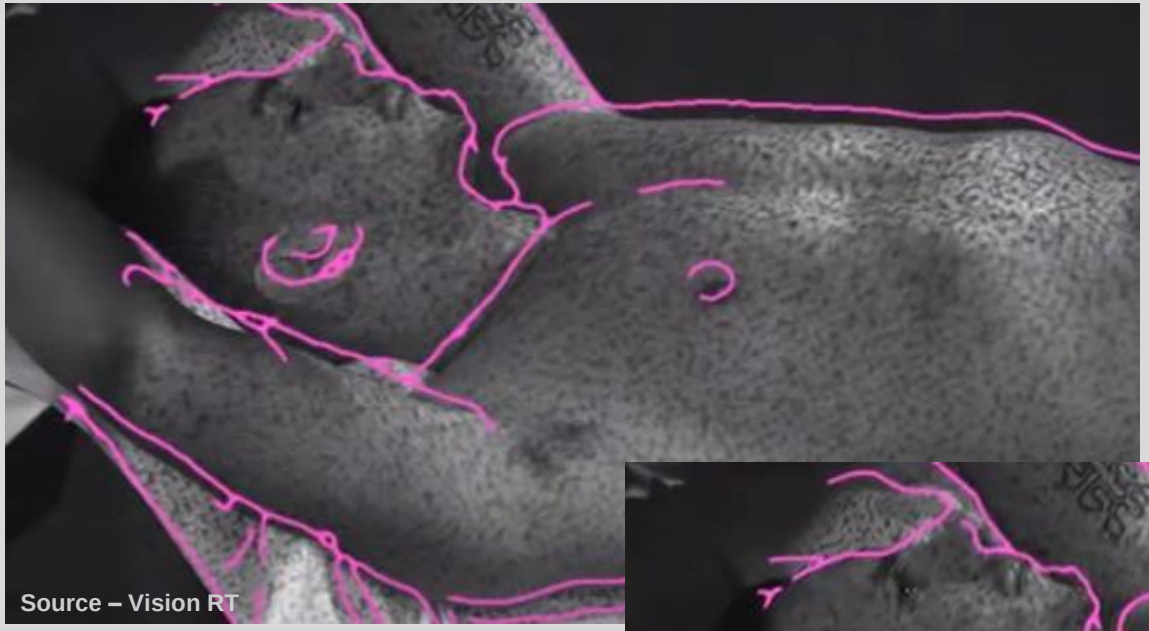


Spirometry-based Breath Hold

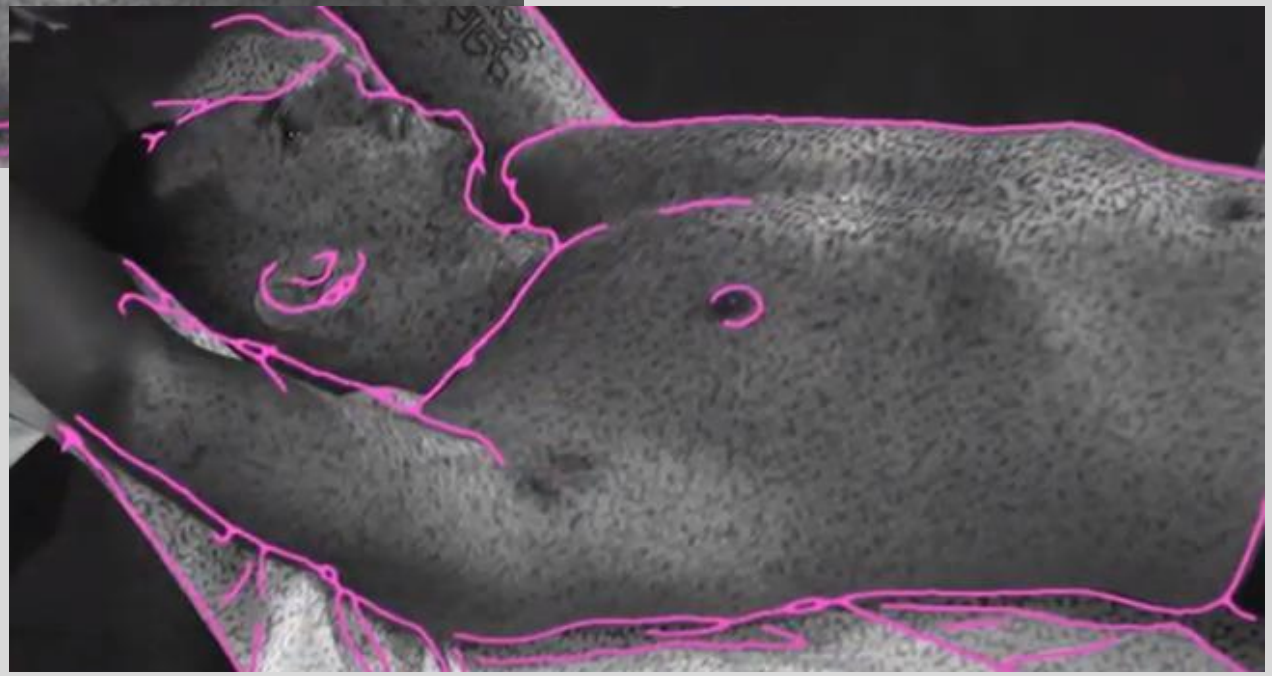
- Computer-controlled spirometer measures input and output of breath to display a breathing cycle
- Patient activates the system and takes a comfortable deep breath in
- The lung capacity at ‘comfortable’ inhale breath hold recorded at CT

- During treatment, the radiation is delivered only when the breath-hold volume is reached

Surface Guided Breath Hold



- Reference outline (pink) acquired from planning CT



- Radiation delivered only when patient takes a breath in and their skin surface matches the reference outline

Volumetric Modulated Arc Therapy (VMAT)

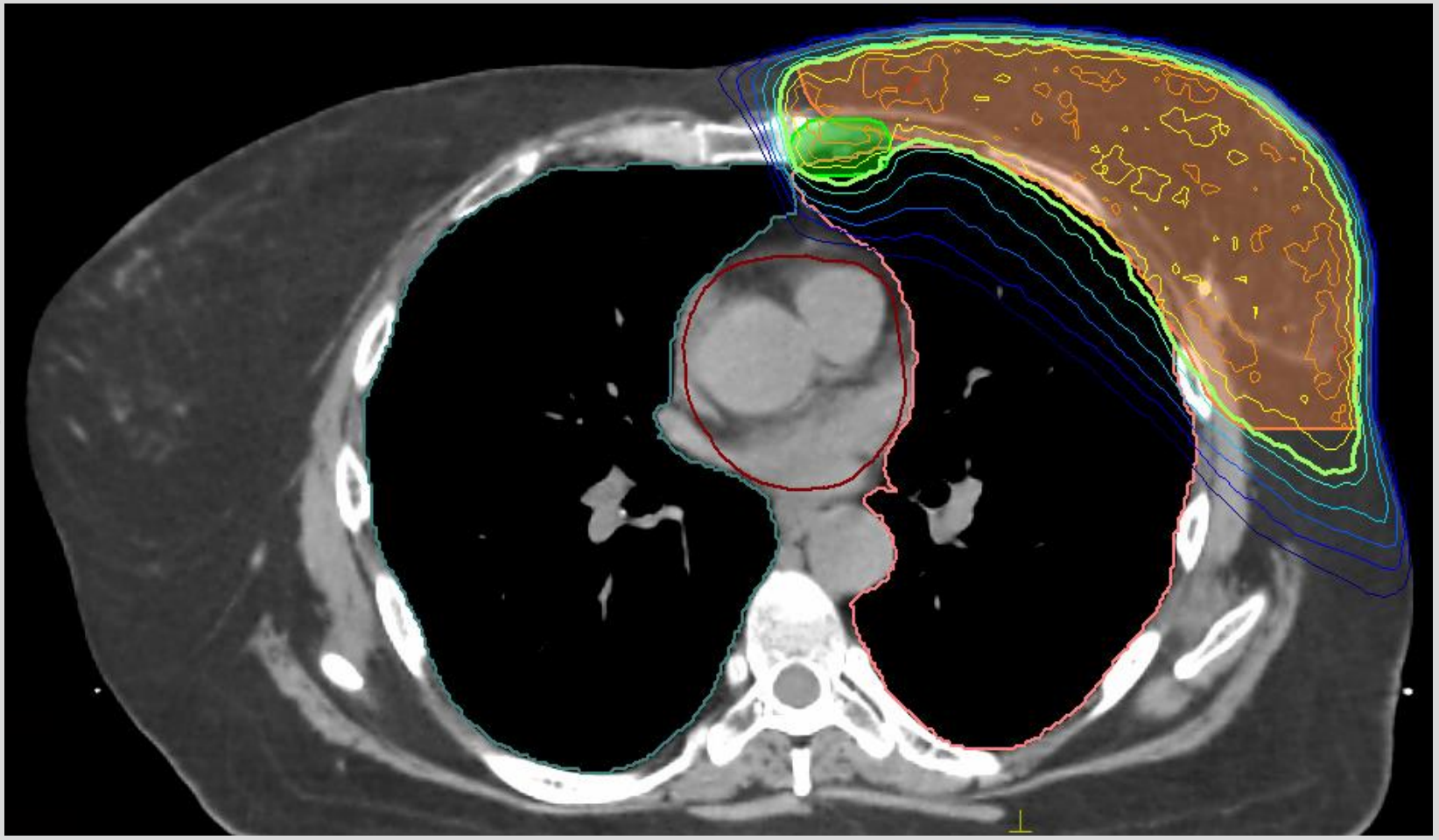
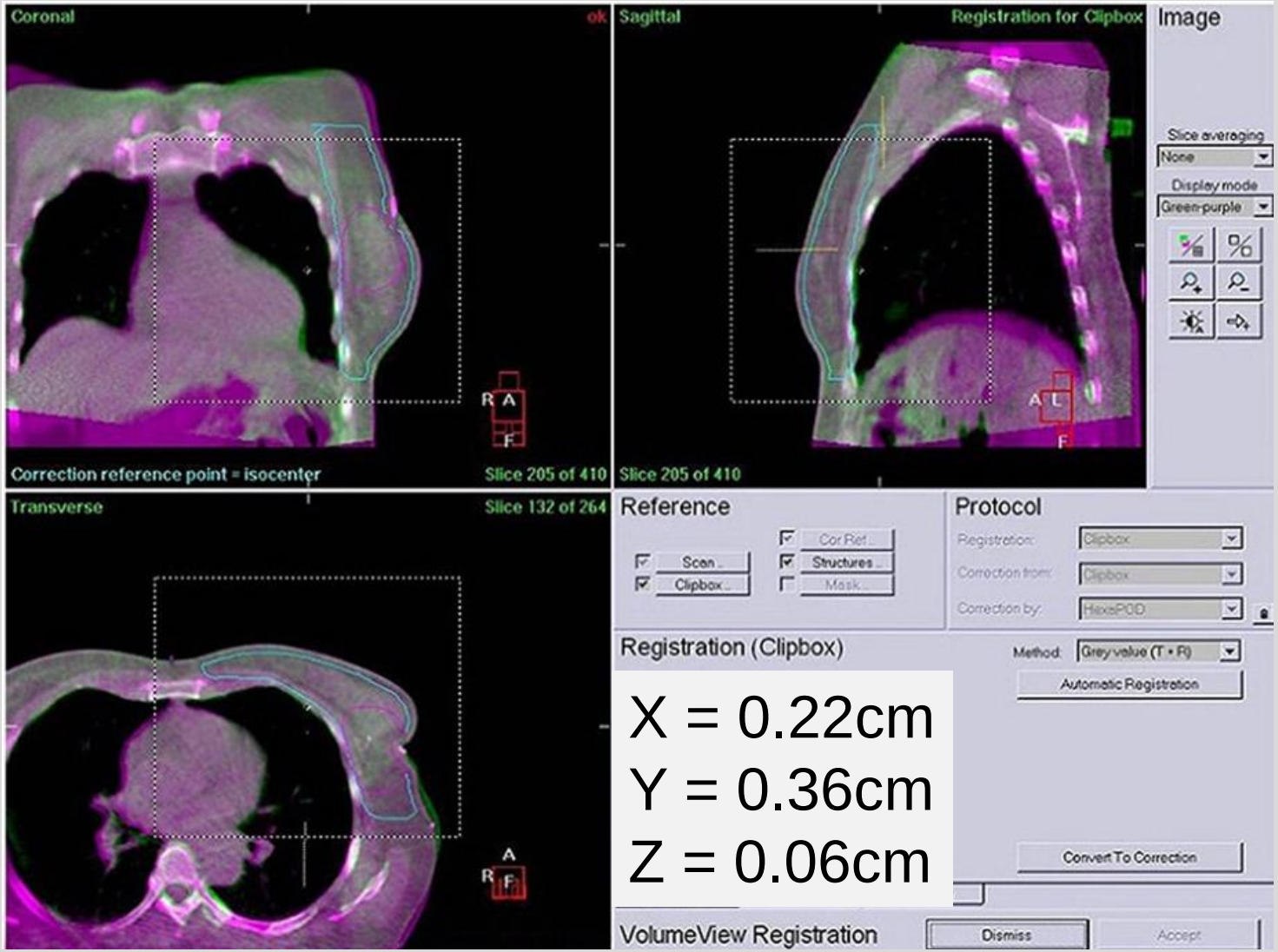


Image-Guided Radiation Therapy



Supportive Care & Follow-Up

- Breast Cancer Nurse
- Weekly radiation nurse review
- Aboriginal Liaison Services
- Allied Health Services
  - Occupational Therapy
  - Physiotherapy
  - Psychology
- Mid & final treatment review with Radiation Oncologist (RO)
- Regular post-treatment follow-up with RO