Lymphoma Foundation Canada

Radiation Therapy for Hematologic Malignancies

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Role of Radiation Therapy

Lymphoma/Hodgkin's

- Stage I/II in combination with chemotherapy
- Some indolent types RT by itself can cure

Multiple Myeloma

- Bone pain (despite drug treatments)
- Nerve compression (spinal cord)
- Local control of plasmacytomas

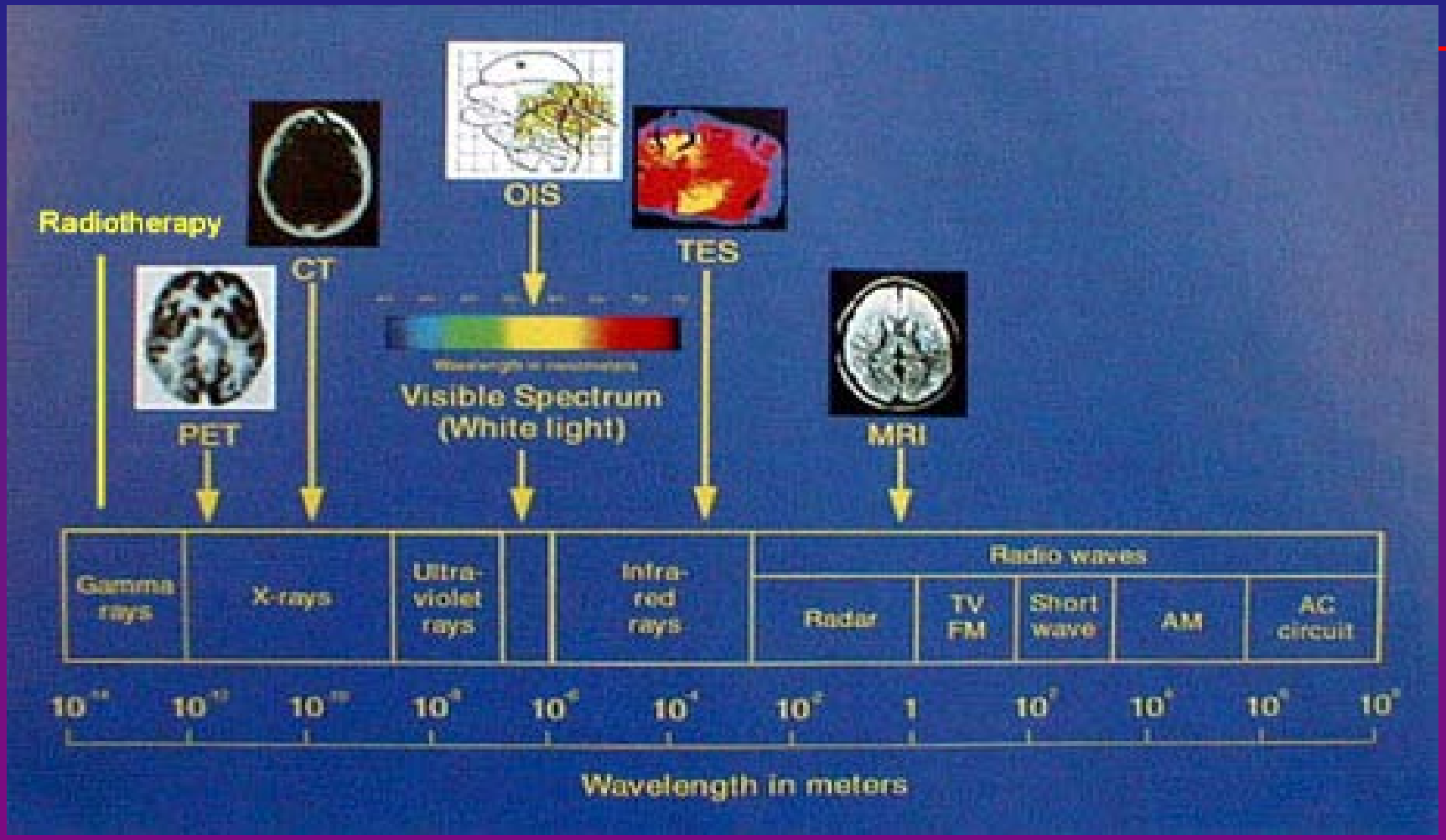
Leukemia

- Central nervous system, & total body (transplant)

Radiation Facts

- External beam (from Linac or ^{60}Co)
  - Most commonly used for lymphoma
- Brachytherapy
  - Sealed radioactive source put into the body
  - For prostate, and gynecologic applications
- Radionuclide therapy (radioimmunotherapy)
  - ^{131}Iodine or ^{90}Yttrium tagged with antibody
  - Bexxar or Zevalin
  - Harness the electron effect with short range

Electromagnetic Spectrum



Radiotherapy is the use of ionizing radiation in the treatment of malignancies.

Radiation Therapy: How?

If decision is to have radiation

- Simulation session – half to 1 hour
  - Scan (CT simulator)
  - Depending on area, may be a mask
  - Possibly tattoo marks
- Actual treatment (half hour)
  - Painless, usually multiple sessions (20)
  - Linear accelerator (Linac)

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What happens to a patient being considered for Radiation Therapy?

Consultation

↓

Simulation

↓

Dosimetry/ planning

↓

RT treatment

~ 7 – 10 days

Linac

Custom Immobilization Mask

CT Simulator

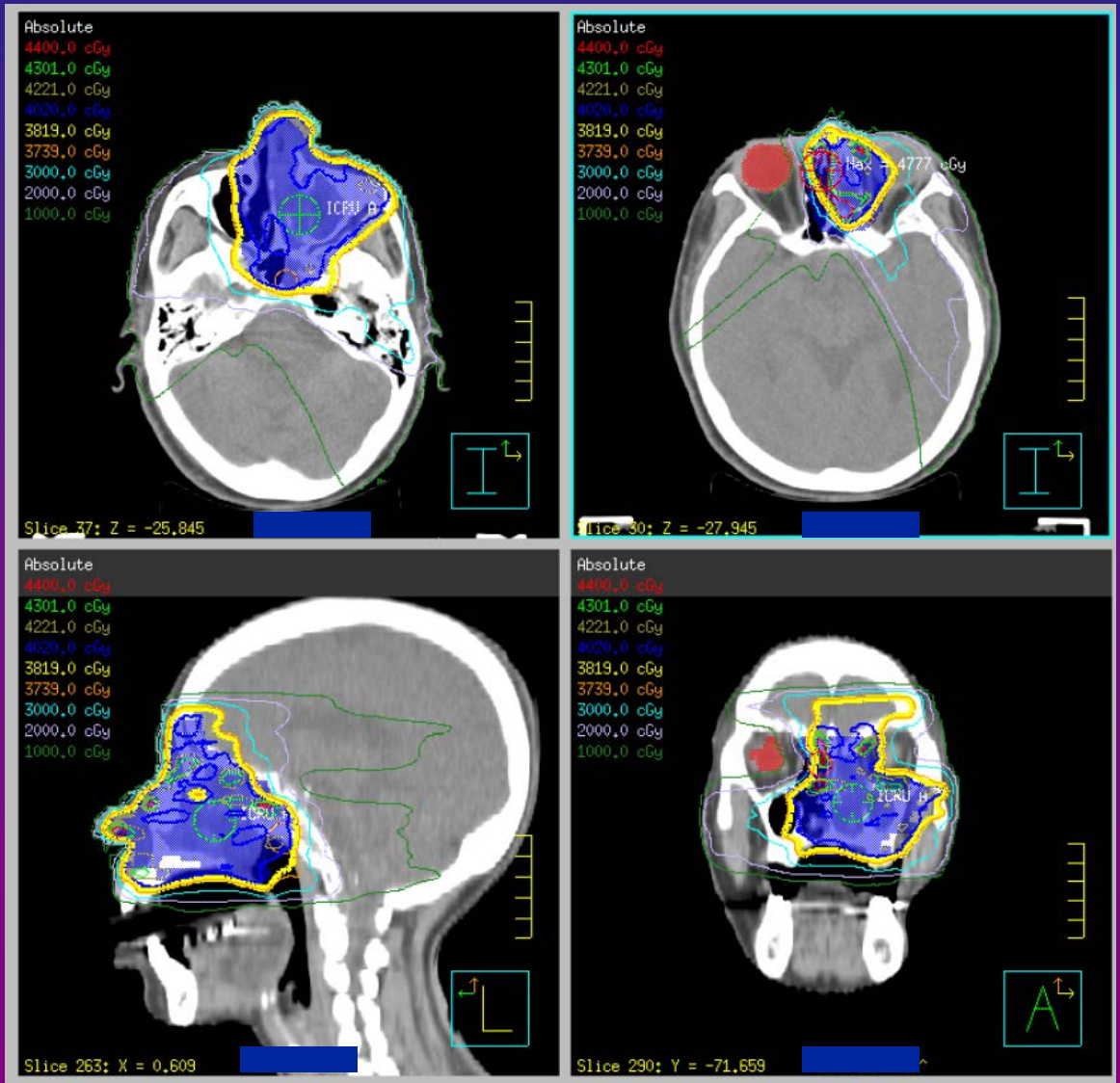
Linear Accelerator

Radiation Therapist Setting up the Treatment

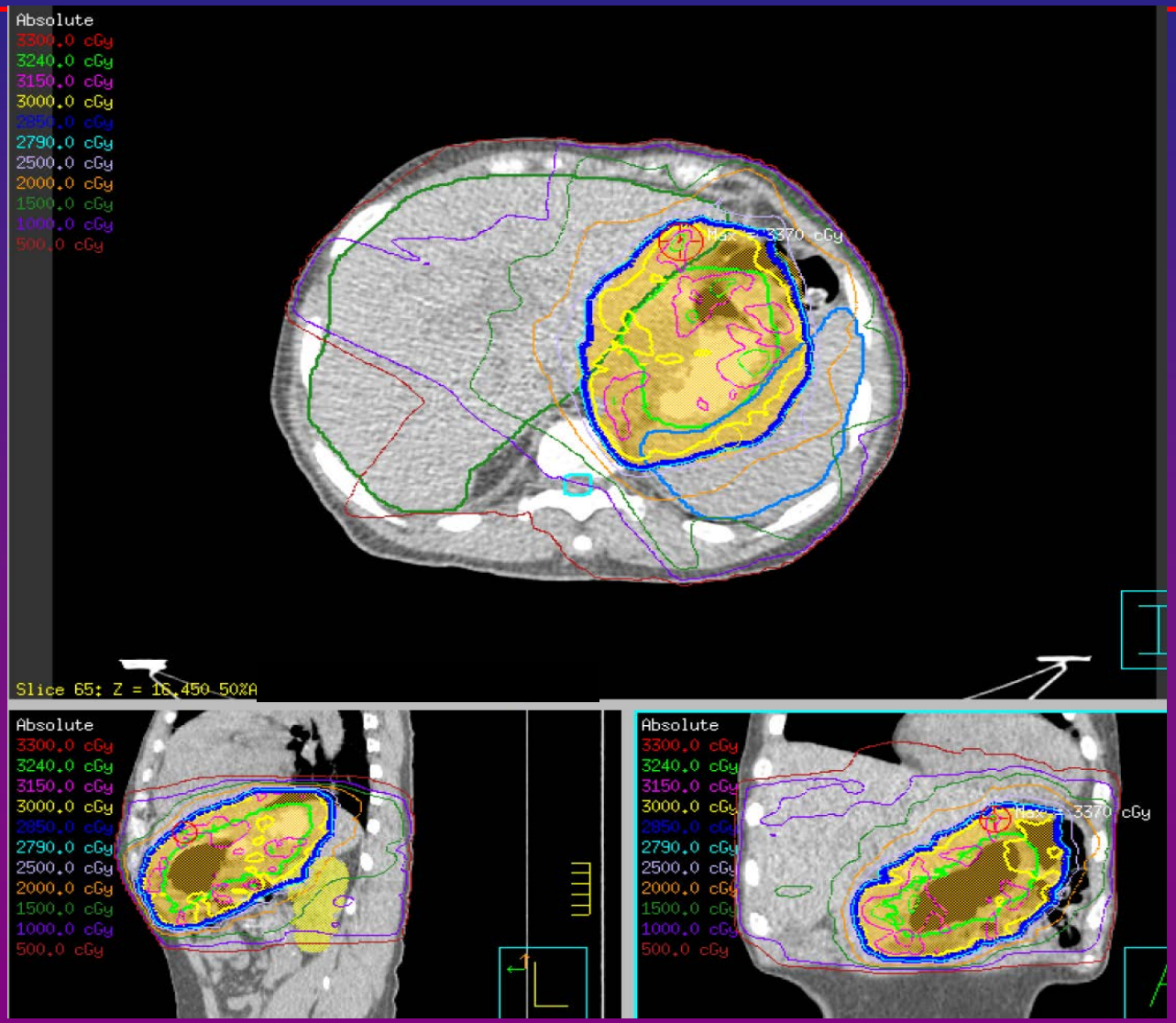
Radiation therapy technologies

- Precise targeting
- Image based 3D planning
- Intensity modulated beams (IMRT)
  - "Dose painting"
  - Protect normal tissues
  - Quantitative assessments
  - Safe treatment
  - Vigorous quality assurance
- Image guidance as required

IMRT: Sinus location



Intensity modulated RT for gastric lymphoma



Radiation Therapy: Lymphoma

- Hematologic malignancies are very radiation sensitive
- Doses used range:
  - 12 Gy for the CNS phase in leukemia
  - 20 Gy for low risk Hodgkin after chemo
  - 30 Gy for most lymphomas
  - 40 Gy for resistant tumors
- Much lower than for other cancers
  - Breast cancer (50 Gy), prostate (78 Gy)

Radiation Therapy: Expectations

- Daily attendance Monday – Friday
- Within first day or two, if pain present, pain may worsen (flare reaction)
- Within a week or two: tumor if present will shrink
- Affect tissues locally only, side effects are dose and volume dependent

Radiation Therapy: Expectations

- Does not interfere with chemotherapy
  - Exception: adriamycin
- Does not produce drop in blood counts
  - Exception: very large area of treatment
- Fairly well tolerated for most areas
- For same area, repeatable once (depending on dose/area treated)

Radiation Therapy: Possible Side Effects

Neck	Taste, dryness, swallowing
Chest	Swallowing, lung reaction/scar
Abdomen	Nausea, loose stools
Pelvis	Blood counts
Extremities	Nil
Any site	Skin redness (mild), fatigue
Late effect*	Second malignancy

*Mainly young people with Hodgkin's

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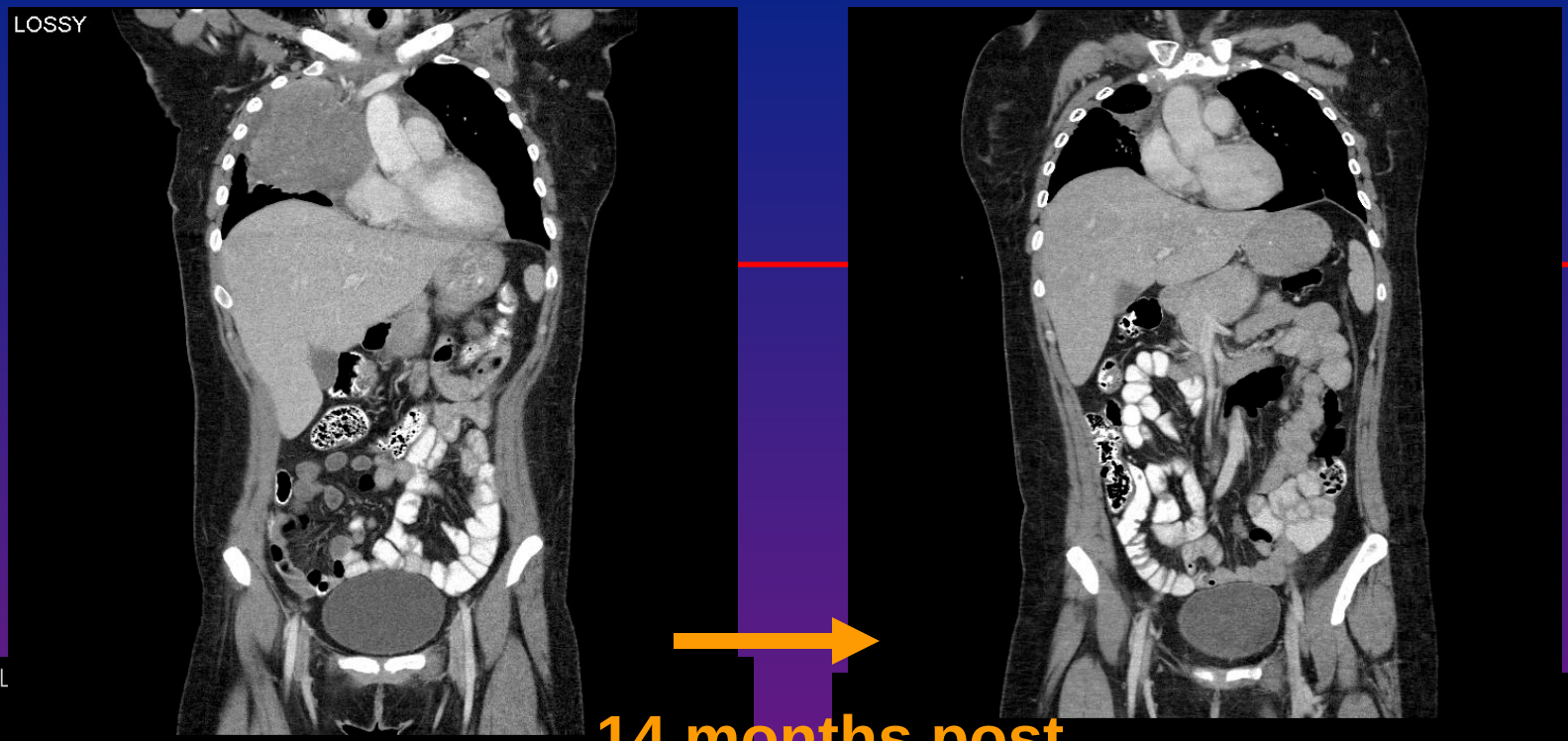
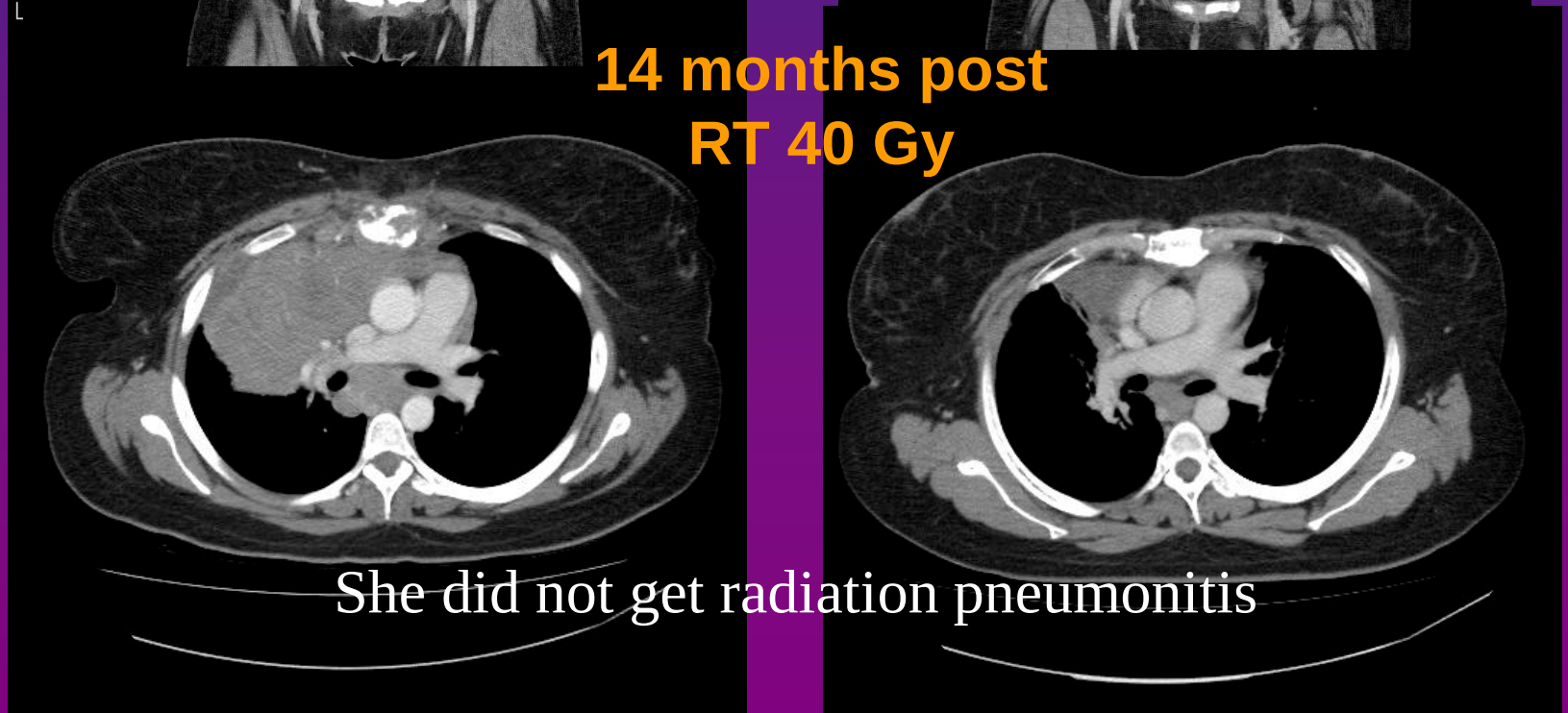


14 months post
RT 40 Gy



She did not get radiation pneumonitis

Radiation Therapy: Availability

Around Metro Toronto:

- Princess Margaret Cancer Centre
- Sunnybrook Hospital
- Credit Valley Hospital
- Lakeridge Health (Oshawa)
- Southlake Cancer Centre (Newmarket)

There is no significant wait list at Princess Margaret

Conclusions and Questions

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Large Cohort Studies did not show increased SM risk with addition of RT:

BNLI:
Retrospective cohort study of 2,456 NHL pts

SIR of solid cancer in no-RT cohort:	1.0 (95% CI, 0.7-1.4)
SIR of solid cancer in RT cohort:	1.2 (95% CI, 0.8-1.7)

SEER:
Retrospective cohort study of 77,823 NHL pts :

SIR of SM in no-RT cohort:	1.13 (95% CI, 1.1-1.2)
SIR of SM in RT cohort:	1.18 (95% CI, 1.1-1.2)

GISL:
Retrospective cohort study of 1,280 DLBCL pts:

SIR of SM in no-RT cohort:	1.16 (95% CI, 0.79-1.63)
SIR of SM in RT cohort:	0.92 (95% CI, 0.42-1.75)

Mudie et al. JCO 24:1568, 2006;
Tward et al. Cancer 107:108, 2006;
Sacchi et al. Haematologica 93: 298, 2008