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

Princess Margaret Hospital
University Health Network
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)
What happens to a patient being considered for Radiation Therapy?

- Consultation
- Simulation
- Dosimetry/planning
- RT treatment
- Linac

~ 7 - 10 days
Custom Immobilization Mask
CT Simulator
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
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
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;