THE ROLE OF RADIATION ONCOLOGY IN A VALUE BASED WORLD

❖ A Cautionary Tale in 2 Acts

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A Brief History of Radiation Oncology

The Beginning (from the Book of Genesis)

1 In the beginning God created the heavens and the earth. 2 Now the earth was formless and empty, darkness was over the surface of the deep, and the Spirit of God was hovering over the waters.

3 And God said, “Let there be light,” and there was light. 4 God saw that the light was good, and he separated the light from the darkness.
A Brief History of Radiation Oncology

The Beginning

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Light is a photon and photons are radiation so Radiation has been around since the Beginning
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Please note that God made no mention of cis-platinum based chemotherapy or gemcitabine at any point during the creation.
Fast forward to 1985:

- 75% of all cancer patients have radiation in their care

- Most patients receive only surgery, radiation, or chemotherapy with very little combined modality therapy

- Radiation is still a fairly toxic treatment with the total dose delivered often limited by this toxicity

- Radiation Oncologists believe that more dose is the answer to better care
Radiation Quickly Progresses in the Next Decade:

- The use of 3-dimensional conformal radiation therapy allows for moderate dose escalation
- Many patients start to receive combined modality therapy with acceptable toxicity
- Radiation is a less toxic treatment but the total dose delivered is still limited due to toxicity
- Radiation Oncologists still believe that more dose is the answer to better care
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The IMRT ERA Dawns

Radiation Enters a New ERA with IMRT:

- The use of intensity modulated radiation therapy allows for significant dose escalation
- Many patients continue to receive combined modality therapy with even less toxicity
- Radiation Oncologists are now nearly certain that more dose is the answer to better care
- In a fee for service world this leads to markedly increased costs as IMRT is used with little oversight
- Radiation Oncologists continue to cling to 1.8-2.0 Gy daily doses leading to prolonged treatment durations of up to 2 months
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The IMRT ERA Marches On

Radiation Oncology **Embraces** IMRT:
- The use of intensity modulated radiation therapy leads to spiraling costs for both equipment and treatment
- Radiation Oncologists still believe that more dose is the answer to better care, but in Canada there just isn’t enough machine space to treat all patients with IMRT
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The IMRT ERA Marches On

Radiation Oncology Questions IMRT:

- The use of intensity modulated radiation therapy leads to spiraling costs for both equipment and treatment.

- Radiation Oncologists still believe that more dose is the answer to better care, but in Canada there just isn’t enough machine space to treat all patients with IMRT.

- Researchers revive implant treatment (Brachytherapy) in the treatment of several cancers most notably Prostate Cancer.
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The IMRT ERA Marches On

Radiation Oncology Looks to Augment IMRT:
- The use of intensity modulated radiation therapy leads to spiraling costs for both equipment and treatment
- Radiation Oncologists still believe that more dose is the answer to better care, but in Canada there just isn’t enough machine space to treat all patients with IMRT
- Researchers revive implant treatment (Brachytherapy) in the treatment of several cancers most notably Prostate Cancer
- Radiation Oncologists in the US begin to explore the use of higher daily doses leading to shorter treatment times (Hypofractionation) across several common malignancies (Prostate, Breast, and Lung Cancers)
Radiation for Prostate Cancer Then and Now

At the Dawn of the IMRT Era:
- Most prostate cancer patients received
  1-2 planning simulations
  Up to 44 daily treatments
  Total treatment costs of $20-30,000

- Many urologists began to open their own radiation treatment facilities
  Raised the question of inappropriate utilization
  Increased cost to society
Radiation for Prostate Cancer Then and Now

At the Dawn of the IMRT Era:
- Most prostate cancer patients received
  - 1-2 planning simulations
  - Up to 44 daily treatments (8+ weeks of care)
  - Total treatment costs of $20-30,000
- Many urologists began to open their own radiation treatment facilities
  - Raised the question of inappropriate utilization
  - Increased cost to society

Value Based Radiation Options Today:
- Prostate Brachytherapy
  - Single treatment low dose rate seeds
  - Two fraction high dose rate implant
- Stereotactic Body Radiation Therapy
  - Five treatments over 2 weeks
  - Often referred to as Cyber Knife
- Hypofractionated Radiation Therapy
  - External beam treatments at 2.7 Gy daily for 26 treatments
  - Pioneered at the Fox Chase Cancer Center
- Standard Fraction Radiation Therapy
  - 2.0 Gy daily treatments for 8 weeks
Radiation for Lung Cancer Then.....

At the Dawn of the IMRT Era:

- Most lung cancer patients received
  - 1-2 planning simulations
  - Up to 37 daily treatments (7+ weeks of care)
  - Total treatment costs of $20-30,000

- Many patients with early disease would undergo limited surgery
  - Not all patients could tolerate this care
  - No other viable options
Radiation for Lung Cancer Then and Now

At the Dawn of the IMRT Era:
- Most lung cancer patients received
  - 1-2 planning simulations
  - Up to 37 daily treatments (7+ weeks of care)
  - Total treatment costs of $20-30,000
- Many patients with early disease would undergo limited surgery
  - Not all patients could tolerate this care
  - No other viable options

Value Based Radiation Options Today:
- Stereotactic Body Radiation Therapy
  - Five treatments over 2 weeks
  - Often referred to as Cyber Knife
- Hypofractionated Radiation Therapy
  - External beam treatments at 4.11 Gy daily for 17 treatments
  - External beam treatments at 7.0 Gy daily for 10 treatments
  - Pioneered at the MD Anderson Medical Center
Accelerated Radiation in Other Cancers

**Value Based Options in Breast Cancer:**
- Hypofractionated treatment for breast conservation cut the number of treatments from 25-35 treatments to 15 with the use of 2.67 daily treatments
- Initial concerns about the cosmetic outcome never arose
- Recent data (ASTRO 2017) shows that even post-mastectomy radiation can be accelerated without added toxicity
- Accelerated partial breast irradiation with Ir-172 allows treatment for some patients with 10 treatments in five days

**Value Based Radiation Options in Palliation:**
- Stereotactic Body Radiation Therapy
  - Five treatments over 2 weeks
  - Often referred to as CyberKnife
- Hypofractionated Radiation Therapy
  - External beam treatments at 3.0 Gy daily for 10 treatments
  - External beam treatments at 4.0 Gy daily for 5 treatments
  - Single fraction 8.0 Gy external treatment
  - Endorsed by ASTRO in Choosing Wisely campaign
Radiation Therapy is Ready for Value Based Care

1. Accelerated radiation therapy has been found to be:
   • Safe
   • Effective

2. Shorter course treatments are available in a number of common cancers
   ▪ Lung Cancer
   ▪ Breast Cancer
   ▪ Prostate Cancer
   ▪ Palliative care

3. Not all patients are or will be candidates for shorter treatment options

4. The challenge is to move the needle in care from prolonged daily treatments to shorter course accelerated care when possible and appropriate