Second Primary Cancer after Prostate Brachytherapy

Dr Darren Mitchell
Consultant Clinical Oncologist
Northern Ireland Cancer Centre
Why?

- Atomic Bomb survivors
- Radiation workers
- Ankylosing spondylitis
- Children irradiated with benign conditions
Why?

Second Malignancies in Prostate Carcinoma Patients after Radiotherapy Compared with Surgery

David J. Brenner, Jr., 1,2 Rochelle E. Curtis, M.D. 1 Eric J. Hall, Jr., 1 Elaine Ron, M.D. 2
1 Center for Radiological Research, Columbia University, New York, New York.
2 Radiation Epidemiology Branch, National Cancer Institute, Bethesda, Maryland.

BACKGROUND. In the treatment of prostate carcinoma, radiotherapy and surgery are common choices of comparable efficacy; thus a realistic comparison of the potential long-term sequelae, such as the risk of second malignancy, may be of relevance to treatment choice.

METHODS. Data regarding the rate of incidence from the Surveillance, Epidemiology, and End Results Program cancer registry (1973–1983) were used to compare directly second malignancy rates in 51,584 men with prostate carcinoma who received radiotherapy (3549 of whom developed second malignancies) with 70,549 men who underwent surgery without radiotherapy (5665 of whom developed second malignancies).

Survivors of Radiation workers
- Ankylosing spondylitis
- Children irradiated with

The New England Journal of Medicine

BREAST CANCER AND OTHER SECOND NEOPLASMS AFTER CHILDHOOD HODGKIN’S DISEASE

Shyta Bhatia, M.D., M.P.H., Leslie L. Robinson, Ph.D., Chile Oravkin, M.D., Mark Greenspan, M.D., Celbi, Greta Ronin, Ph.D., Perera Forni-Bellani, M.D., and Anna T. Mendonça, M.D.
Criteria

1. Tumours should have a different histological diagnosis from the primary.
2. Appropriate latent period should be observed between the treatment of the primary tumour and the secondary cancer (>5yrs).
3. Secondary cancers should be within the radiation treatment field.
Increased Cancer Incidence

- Radiation carcinogenesis
- Sporadic
- Genetic susceptibility
- Exogenous (Environmental factors)
- Greater follow-up
• Localised prostate cancer
  Active surveillance
  Radical Prostatectomy
  Radical Radiotherapy
  Prostate Brachytherapy

• HIFU
  • Cryotherapy

• Survivorship
Second Malignancies in Prostate Carcinoma Patients after Radiotherapy Compared with Surgery

David J. Brenner, D.Sc.¹
Rochelle E. Curtis, M.A.²
Eric J. Hall, D.Sc.¹
Elaine Ron, Ph.D.²

BACKGROUND. In the treatment of prostate carcinoma, radiotherapy and surgery are common choices of comparable efficacy; thus a realistic comparison of the potential long term sequelae, such as the risk of second malignancy, may be of relevance to treatment choice.

- SEER database
- 3549 / 51,584 (6.8%) treated with radiotherapy.
- 5055 / 70,539 (7.1%) treated with surgery.

- Increased risk of Bladder, Colorectal and Lung Estimated Radiation associated solid tumours
  All years 1/290, >5 years 1/125, >10 years 1/70
Evidence of Second Primary cancers in Prostate Brachytherapy

- Single institution
  - Limited statistical power.
  - Better information (dose, co-morbidities).
    H/o IBD, smoking, APC, FHx.

- Large population based studies
  - Statistical power.
  - Limitations.
348 Men

Median FU 10.5 years

$L_{125}^{^1}$ Monotherapy †
- 2 / 125 (1.6%)

$L_{125}^{^1}$/EBRT combined therapy
- 13 / 213 (5.8%) (p=0.0623)
SECOND MALIGNANCIES AFTER PROSTATE BRACHYTHERAPY: INCIDENCE OF BLADDER AND COLORECTAL CANCERS IN PATIENTS WITH 15 YEARS OF POTENTIAL FOLLOW-UP

Stanley L. Liauw, M.D.,* John E. Sylvester, M.D.,†‡ Christopher G. Morris, M.S.,§ John C. Blasko, M.D.,† and Peter D. Grimm, D.O.†

15 pelvic malignancies

11 Bladder cancer
  8 Non-invasive
  3 Invasive
  1 Prostatic urethra †

3 Colorectal
  1 Colon †
  1 Sigmoid
  1 Rectum
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15 pelvic malignancies

- 11 Bladder cancer
  - 8 Non-invasive
  - 3 Invasive
- 1 Prostatic urethra †
- 3 Colorectal cancer †

All colorectal cancer pt had additional risk factors!
Based on SEER database information

Observed / expected
11 / 4.7  = 2.34 relative risk

Absolute risk excess of 35 per 100,000
Cancer Incidence After Localized Therapy for Prostate Cancer

Kihyuck Moon, MD, PhD

BACKGROUND. Second cancers may occur in patients who have undergone radia-

- Retrospective SEER based study
  - 297,069 men treated for prostate cancer
  - 140,767 treated >5 years previously
    - Median follow-up 10.6 years

- EBRT / EBRT + Seeds / Seeds alone / No RT

- Unlikely that 3D conformal or IMRT was used
## Cancer Incidence After Localized Therapy for Prostate Cancer

*Kihyuck Moon, MD, PhD*  

**BACKGROUND.** Second cancers may occur in patients who have undergone radia-

<table>
<thead>
<tr>
<th></th>
<th>EBRT</th>
<th>EBRT+ seeds</th>
<th>Seeds</th>
<th>No RT</th>
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</thead>
<tbody>
<tr>
<td>No</td>
<td>39,850</td>
<td>2219</td>
<td>1285</td>
<td>94,541</td>
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<tr>
<td>Rectum</td>
<td>0.44%</td>
<td>0.50%</td>
<td>0.08%</td>
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<tr>
<td>Bladder</td>
<td>1.46%</td>
<td>1.15%</td>
<td>1.27%</td>
<td>0.89%</td>
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<tr>
<td>Lung and Bronchus</td>
<td>2.05%</td>
<td>1.68%</td>
<td>1.18%</td>
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Cancer Incidence After Localized Therapy for Prostate Cancer

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<tr>
<td>Sigmoid colon</td>
<td>1.26 ‡</td>
<td>0.93</td>
<td>0.25</td>
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<tr>
<td>Rectum</td>
<td>1.6 ‡</td>
<td>1.59</td>
<td>0.3</td>
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<tr>
<td>Bladder</td>
<td>1.63 ‡</td>
<td>1.08</td>
<td>1.4</td>
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BACKGROUND. Second cancers may occur in patients who have undergone radiation therapy for prostate cancer.
Conclusion

Rates of second malignancy are low
EBRT significantly increases the risk of developing a second malignancy
BT have the lowest risk of developing a second cancer

?? Short follow-up
?? Age at treatment and other contributing factors
- Retrospective SEER based study
  228,235 men treated for prostate cancer 1988 - 2002

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<th>BT</th>
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<tr>
<td>No Sx</td>
<td>40,433</td>
<td>48,400</td>
<td>10,223</td>
<td>9,096</td>
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Retrospective SEER based study
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<td>40,433</td>
<td>48,400</td>
<td>10,223</td>
<td>9,096</td>
</tr>
<tr>
<td>Age &gt;65</td>
<td>82.7%</td>
<td>82.1%</td>
<td>63.1%</td>
<td>64.3%</td>
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<tr>
<td>Age &gt;75</td>
<td>48.7%</td>
<td>30%</td>
<td>15%</td>
<td>16%</td>
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<tr>
<td>Mean</td>
<td>73</td>
<td>70.5</td>
<td>66.7</td>
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SECOND PRIMARY CANCER AFTER RADIOTHERAPY FOR PROSTATE CANCER—A SEER ANALYSIS OF BRACHYTHERAPY VERSUS EXTERNAL BEAM RADIOTHERAPY

MAY ABD EL-WAHAB, M.D., * ISILDINHA M. REIS, DR.P.H., ‡‡ AND KARA HAMILTON, M.P.H. †
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MAY ABDEL-WAHAB, M.D.,* ISILDINHA M. REIS, DR.P.H.,† †AND KARA HAMILTON, M.P.H.‡

- **>1yr**
  - EBRT significantly greater SPC than BT
    - 277/100,000
  - EBRT significantly greater SPC than No RT/No Sx
    - 207/100,000

- **>5yr**
  - EBRT significantly greater SPC than No RT/No Sx
    - 475/100,000
### B. SPC

<table>
<thead>
<tr>
<th>Treatment</th>
<th>1-5 yrs rate</th>
<th>&gt; 5 yrs rate</th>
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<tbody>
<tr>
<td>No XRT, no surgery</td>
<td>1969</td>
<td>1950</td>
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<td>Beam radiation</td>
<td>2040</td>
<td>2425</td>
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<tr>
<td>Radioactive implants</td>
<td>1894</td>
<td>1935</td>
</tr>
<tr>
<td>Combination</td>
<td>1840</td>
<td>2094</td>
</tr>
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</table>

Age-adjusted rate per 100,000
C. Primary Pelvic SPC: • 1-5 yrs • 5 or more yrs

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<th>&gt; 5 yrs rate</th>
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<tr>
<td>No XRT, no surgery</td>
<td>290</td>
<td>307</td>
</tr>
<tr>
<td>Beam radiation</td>
<td>356</td>
<td>469</td>
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<tr>
<td>Radioactive implants</td>
<td>279</td>
<td>473</td>
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<tr>
<td>Combination</td>
<td>381</td>
<td>354</td>
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</table>
Conclusion

- Limited evidence currently
- Informed consent for procedure
- Ongoing prevention
  - Surveillance sigmoidoscopy 5, 10, 15yrs
    - ‘RUF!’
  - Cystoscopy