Do Modern Techniques for Radiotherapy of Prostate Cancer Really Matter in Decreasing Erectile Dysfunction?

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Rotterdam, The Netherlands
External-Beam Radiotherapy (EBRT)

- Introduction of linear accelerators
- Till mid 1980s, conventional techniques
- 3 dimensional-conformal radiotherapy (3D-CRT)
- Intensity-modulated radiotherapy (IMRT)
- Image-guided techniques (IGRT)
- Stereotactic radiation
- Protons
EBRT and Prostate Cancer

IGRT
EBRT for Prostate Cancer (cont’d)
SEXUAL FUNCTION AFTER THREE-DIMENSIONAL CONFORMAL RADIOTHERAPY FOR PROSTATE CANCER: RESULTS FROM A DOSE-ESCALATION TRIAL

Gerard J. van der Wieken, M.D.,* Wim L.J. van Putten, M.Sc.† and Luca Incrocci, M.D., Ph.D.**


CKVO 96-10 trial
268 pts

45 no baseline data
29 HT
n=194

Questionnaire at baseline, 6 mos, 1, 2 & 3 yrs
OUTCOMES AFTER INTENSITY-MODULATED VERSUS CONFORMAL RADIOThERAPY IN OLDER MEN WITH NONMETASTATIC PROSTATE CANCER


a) Bowel Complications

Cumulative Incidence (%)

<table>
<thead>
<tr>
<th>Months</th>
<th>CRT</th>
<th>IMRT</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>12</td>
<td>30</td>
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<tr>
<td>24</td>
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<td>36</td>
<td>50</td>
<td>50</td>
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<tr>
<td>48</td>
<td>60</td>
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No. at risk

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<tr>
<th>CRT</th>
<th>6,753</th>
<th>5,689</th>
<th>4,515</th>
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<td>IMRT</td>
<td>5,845</td>
<td>5,133</td>
<td>3,554</td>
<td>1,532</td>
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b) Urinary Complications

Cumulative Incidence (%)

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<th>Months</th>
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</thead>
<tbody>
<tr>
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No. at risk

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<td>5,220</td>
<td>3,823</td>
<td>1,717</td>
<td>439</td>
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Rate per 100 person-years

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<th>Parameter</th>
<th>Rate per 100 person-years</th>
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<tbody>
<tr>
<td></td>
<td>IMRT vs conformal RT (CRT)</td>
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<tr>
<td>Morbidity</td>
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<tr>
<td>GI morbidity</td>
<td>14.7</td>
<td>13.4</td>
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<tr>
<td>Hip fractures</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Erectile dysfunction</td>
<td>5.3</td>
<td>5.9</td>
</tr>
<tr>
<td>Oncological efficacy</td>
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<tr>
<td>Additional cancer therapy</td>
<td>3.1</td>
<td>2.5</td>
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</table>
The HYPRO Trial

n=820

19x3.4 Gy vs 39x2 Gy

Intermediate and high risk PCa.

Sexual Function After Hypofractionated Versus Conventionally Fractionated Radiotherapy for Prostate Cancer: Results From the Randomized Phase III HYPRO Trial

Ruud C. Wortel, MD,¹ Floris J. Pos, MD, PhD,² Wilma D. Heemsbergen, PhD,² and Luca Incrocci, MD, PhD¹

J Sex Med 2016 13:1695-703
n=32
ED increased from 38% at baseline to 71% post-radiation (p=0.02)
Protons

- Initial sites uveal melanomas, skull base tumors
- Reduced risk of secondary malignancies (by 26-39%)
- Costs often exceed 100,000 USD in the US
- Installation costs 100-200 millions USD
- A few studies (about 1600 pts) on PCa.
Protons and Prostate Cancer

Figure 2. Incidence of potency over time is shown.
Brachytherapy and Prostate Cancer

- Strict inclusion criteria
- High-dose rate (HDR) with Ir192
- Low-dose rate (LDR) with Pd103 or I125
- Excellent biochemical control
- Reduced side effects
Long-term erectile function following permanent seed brachytherapy treatment for localized prostate cancer

Wee Loon Ong\textsuperscript{a,b}, Benjamin R. Hindson\textsuperscript{a}, Catherine Beaufort\textsuperscript{a}, Paul Pharoah\textsuperscript{b}, Jeremy L. Millar\textsuperscript{a,c,*}

Radiotherapy and Oncology 112 (2014) 72–76

n=366, l-125, IIEF-5
Tomotherapy
Fig. 1 – The vicious cycle of post-radical prostatectomy erectile dysfunction.
DOSE–VOLUME PARAMETERS OF THE CORpora CAVERnOSA DO NOT CORRELATE WITH ERECTILE DYSFUNCTION AFTER EXTERNAL BEAM RADIOTHERAPY FOR PROSTATE CANCER: RESULTS FROM A DOSE–ESCALATION TRIAL

GERARD J. VAN DER WIELEN, M.D.,* MISCHA S. HOOGEMAN, Ph.D.,* GERT R. DOHLE, M.D., Ph.D.,† WIM L. J. VAN PUTTEN, M.SC.,‡ AND LUCA INCROCCI, M.D., Ph.D.*


Fig. 2. Average absolute dose–volume histograms (DVH) of the crura, the superiormost 1-cm segment of the crura and the penile bulb of patients with and without erectile dysfunction (ED) at 2 years after external beam radiotherapy. The error bars indicate 1 standard deviation. No statistically significant differences were found between the dose–volume parameters and ED (Kruskal-Wallis test).
Changes in the Penile Arteries of the Rat after Fractionated Irradiation of the Prostate: A Pilot Study

Gerard J. van der Wielen, MD,* Marcel Vermeij,† Bas W.D. de Jong, PhD,‡ Maarten Schuit, MD,¶ Johannes Marijnissen, PhD,§ Dik J. Kok, PhD,‡ Wytske M. van Weerden, MSc, PhD,‡ and Luca Incrocci, MD, PhD*

*J Sex Med 2009;6:1908–1913

Figure 1 A schematic picture of the anatomy of the prostate, rectum, bladder, and penis of the rat and the radiation field.
ED and Radiotherapy for Prostate Cancer

Summary

- Incidence: 40%
- Onset: 1-3 years
- Arterial injury, arterial occlusion and cavernosal arterial insufficiency
- Endothelial dysfunction and structural alterations in corporal smooth muscles
- Distal pudendal arteries, crurae are at risk
- Vascular risk factors to be considered
  (DM, hypercholesteroleemia, smoking...)

Do Modern Techniques for Radiotherapy of Prostate Cancer Really Matter in Decreasing Erectile Dysfunction?

Probably not…..

Thank you
World Meeting on Sexual Medicine

20th Congress of the European Society for Sexual Medicine
21st World Meeting of the International Society for Sexual Medicine

February 28 - March 3, 2018
Lisbon, Portugal

Jointly organized by:

European Society for Sexual Medicine
www.essm.org

International Society for Sexual Medicine
www.issm.info

See you in Lisbon!
www.issmessa2018.org