



Radiation Oncology Consultants

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ROC May 2013 Newsletter

High Dose Rate Brachytherapy for Prostate Cancer at Advocate Illinois Masonic Medical Center *Santosh Yajnik, M.D.*

Multiple well designed prospective trials have shown that safe dose-escalation within the prostate improves cure rates for prostate cancer. High dose rate (HDR) brachytherapy is a highly precise and conformal tool that allows the radiation oncologist to safely deliver a strong dose of radiation therapy to the prostate while sparing surrounding normal tissues. HDR brachytherapy is state-of-the-art treatment that harnesses advances in imaging and treatment planning software to deliver a highly precise treatment and is now offered at Advocate Illinois Masonic Medical Center.

During HDR brachytherapy, approximately 15 to 20 afterloading catheters are placed within the peripheral substance of the prostate gland during a brief operating room procedure. We then perform CAT scan based treatment planning. During treatment planning, the prostate target volume is contoured as are the surrounding normal tissues. Our physicians and physics team then creates a treatment plan that maximizes the prescription dose to the prostate while minimizing the dose delivered to surrounding normal tissues. During treatment, a single 5 mm Iridium-192 source is moved through the implanted catheters at 2.5 to 5.0 mm intervals. By changing the combination of dwell times within each catheter, an infinite variety of dose distributions can be created and the dose that is delivered can be sculpted very precisely to the prostate.

For low risk prostate cancer patients, HDR brachytherapy can be used as monotherapy. For intermediate and high risk prostate cancer patients, HDR brachytherapy can be used as a boost treatment and combined with an abbreviated course of external beam radiation therapy.

Demanis et al. published their results in 298 patients with localized prostate cancer treated with HDR monotherapy between 1996 and 2005 (1). Patients were treated at either the California Endocurietherapy (CET) or William Beaumont Hospital. With a median follow-up time of 5.2 years, the 8-year rate of local control of the prostate cancer was 99%, biochemical control rate was 97% and cause-specific survival was 99%. The treatment was safe and had low rates of side-effects.

HDR brachytherapy has been compared to low dose rate "seed implant" and shown to be a superior treatment in properly selected patients. Grills et al. compared HDR monotherapy with seed implantation in 149 early stage patients

with prostate cancer (2). Both treatment modalities led to excellent rates of biochemical prostate cancer control. However, HDR brachytherapy led to significantly less side-effects than seed implantation. HDR brachytherapy led to decreased rates of acute urinary and gastrointestinal toxicity. Chronic side-effects were also reduced with HDR brachytherapy. The 3-year actuarial impotence rate was 45% for patients undergoing seed implant and only 16% for patients undergoing HDR brachytherapy.

For appropriately selected intermediate and high risk prostate cancer patients, HDR brachytherapy can be used as a boost treatment combined with an abbreviated course of external beam radiation therapy. In clinically localized prostate cancer, a randomized phase 3 trial was performed comparing external beam radiation therapy alone to external beam radiation therapy combined with an HDR brachytherapy boost (3). Treatment with HDR brachytherapy combined with external beam radiation therapy led to a significant improvement in prostate cancer relapse free survival compared with external beam radiation therapy alone.

HDR brachytherapy is a collaborative effort with urology. HDR brachytherapy is performed by Dr. Santosh Yajnik at Advocate Illinois Masonic Medical Center, where the radiation oncology department can be reached at 773-296-7076.

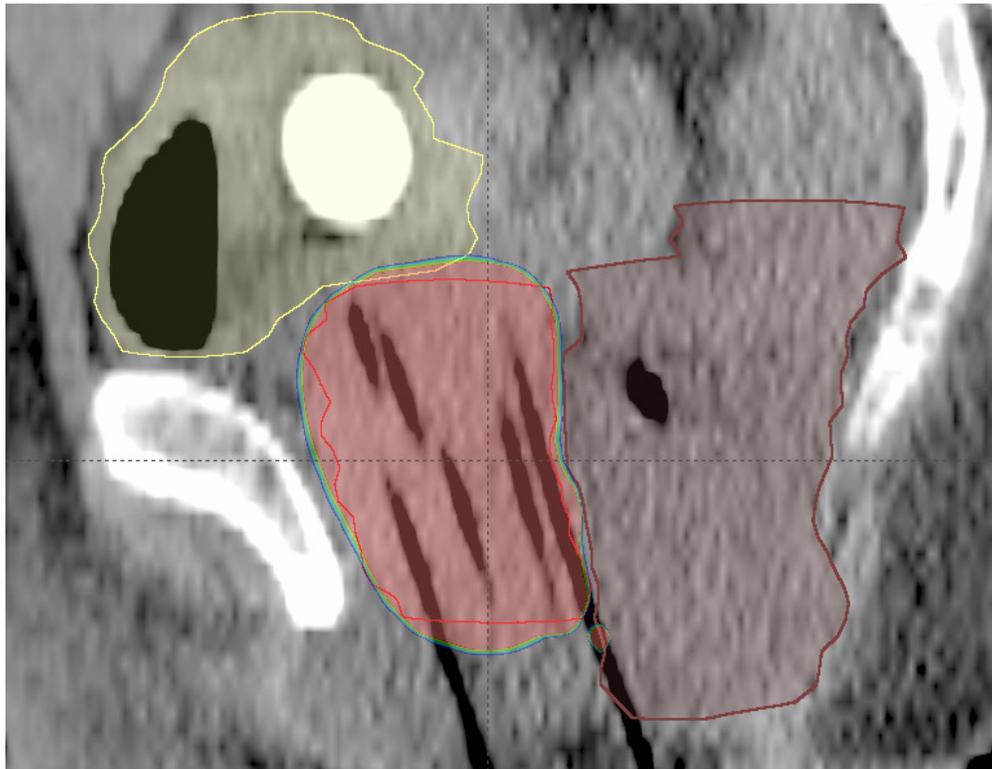


Figure 1 Legend: This is a sagittal image of an HDR brachytherapy treatment plan. The prostate gland is contoured in red. The bladder is depicted in yellow and rectum in brown. The HDR catheter tracts can be seen coursing through the prostate gland. The color wash shows the 90% through 100% prescription isodoses treating the prostate while relatively sparing the adjacent bladder and rectum.

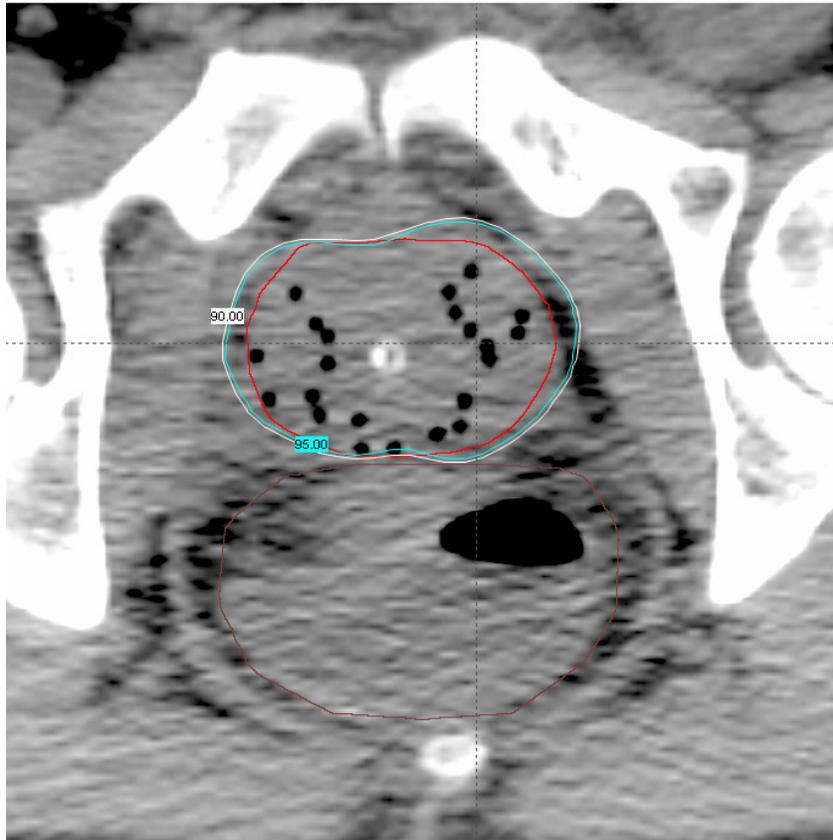


Figure 2 Legend: This is an axial image of an HDR brachytherapy treatment plan. The prostate is contoured in red and the white and blue lines represent 90% and 95% of the prescribed dose. The rectum is contoured in brown. Please note how the prescribed dose is conformally sculpted to the prostate while relatively sparing the nearby normal tissues including the rectum.

1. Demanes et al. High-dose-rate monotherapy: safe and effective brachytherapy for patients with localized prostate cancer, *Int J Radiat Oncol Biol Phys*, 2011 Dec 1; 81(5): 1286-92
2. Grills et al. High dose rate brachytherapy as prostate cancer monotherapy reduces toxicity compared to low dose rate palladium seeds, *J Urol*. 2004, Mar; 171(3): 1098-104
3. Hoskin et al. Randomised trial of external beam radiotherapy alone or combined with high-dose-rate brachytherapy boost for localized prostate cancer. *Radiother Oncol*. 2012 May; 103(2): 217-22.