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The Use of an Injectable Spacer Material in Conjunction With High Dose-Rate Brachytherapy for Prostate Cancer

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Purpose:
To evaluate the use of an injectable spacer material for high-doserate (HDR) brachytherapy for prostate cancer.

Materials and Methods:
Between January and August 2010, 24 HDR brachytherapy implants were performed at the Cancer Center of Irvine. The implants were part of an overall radiotherapy course consisting of HDR brachytherapy combined with intensity modulated radiation therapy. The HDR was administered via two implants separated by one week. In order to increase the distance between the prostate and rectum, the patients were administered a spacing material in the prostate rectal interspace. The spacer was administered transperineally at the time of catheter implantation. Each patient was imaged pre implantation, post implantation, and every two weeks until the end of the treatment course. The 3D image datasets were used to determine the spacer distribution from the prostate base to apex, and 3D HDR brachytherapy treatment plans were analyzed to quantify rectal dose sparing. Results: 3D image analysis shows the injection of a spacer material increases the mean prostate rectal spacing by 0.9cm, 0.8cm and 0.8cm at the base, middle and apex of the gland. Dose volume histogram analysis reveals an average decrease in rectal V70 and V50 from 41.4% and 54% to 33.6% and 42.3%, respectively, with the use of the spacer material. In addition, the maximum rectal dose fell 36.6% due to the increase in prostate rectal spacing.

Conclusions:
Since the primary benefits of HDR prostate brachytherapy are dose localization and normal tissue sparing, it is important to minimize the dose to the rectum.We have demonstrated that spacing on the order of 0.8 e 0.9 cm is achievable with the use of an injectable tissue spacer. This enhanced spacing provides significant dosimetric advantages. In this study we have demonstrated that the injection of a tissue spacer is feasible, quantifiable and a viable means to enhance rectal dose sparing