all analyses, the tolerable error as 10% above or below, DRE under- and overestimated the PV in 66.7% and 12.0%, respectively. TRUS, using the traditional ellipsoid formula, under- and overestimated the PV in 71.3% and 6.7%, respectively and TRUS, using the bullet shaped formula, under- and overestimate the PV in 38.7% and 30.0%, respectively. The overall rate of ''precise'' measurements was 21.3%, 22.0% and 31.3% for DRE, TRUS (ellipsoid) and TRUS (bullet). No statistical significant correlation was found between TRUS measurements errors and clinical-pathological features.

**Conclusions:** Prostate measurements obtained using TRUS are often inaccurate. However, the bullet-shaped formula demonstrated better volume measurement accuracy. Caution is necessary when using PV estimated by TRUS as main criteria to select prostate cancer patients for brachytherapy implant.

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## 2383 A Gold Fiducial Based CT/MRI Fusion Method for Prostate Treatment Planning

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**Purpose/Objective(s):** In order to more correctly delineate the pelvic anatomy, we routinely utilize MRI images for prostate treatment planning. The usefulness of the data depends upon the accuracy to which the planning CT and MRI image are registered to one another. We have developed a CT/MRI fusion technique based upon implanted gold seed correlation. The method is both objective and accurate, and it can be readily adopted in a clinical setting.

**Materials/Methods:** Gold seed makers as a surrogate for the prostate during IGRT have been in accepted use for many years. Our method utilizes the same implanted gold fiducials used for IGRT to co-register CT and MRI datasets. Each prostate IMRT patient is surgically implanted with 5 gold seeds. The fiducials are placed at the prostate base, apex, left and right lateral mid-gland, and posterior mid-gland. Subsequent to seed implantation, the patient undergoes both CT and MRI imaging. In addition to the standard treatment planning CT, the patient undergoes two MRI imaging sequences. The first image (MRI1) is optimized for soft tissue contrast, while the second image (MRI2) is optimized for maximum gold seed contrast. MRI2 is required since MRI1 (the scan optimized for soft tissue contrast) will not display the gold fiducials prominently. Since both MRI scans are performed at the same imaging session, they share a common DICOM coordinate system. The three image datasets are imported into a commercially available treatment planning system. MRI2 (fiducial optimized MRI) is fused with the treatment planning CT by registering the gold fiducials on each image dataset to one another in treatment planning space. It is then a straightforward matter to register MRI1 to MRI2 since the images share a common DICOM coordinate system. The end result is an optimally fused CT/MRI image dataset for the purposes of treatment planning.

**Results:** We utilize this gold fiducial based fusion method routinely in our clinic. The method has taken the both the subjectivity and uncertainty out of the image fusion process. The technique is both quick and accurate. Dosimetrists and physicists can readily perform the fusion, while the physician can validate the quality of the fusion prior to contouring.

**Conclusions:** CT/MRI image datasets provide useful information for prostate treatment planning. The usefulness of the data depends upon the accuracy to which the images sets are registered to one another. We have developed a fusion method that can be readily adopted in a clinical setting. This gold fiducial based fusion technique provides an objective and accurate method for CT/MRI image correlation.

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## 2384 Cesium-131 Prostate Brachytherapy: PSA Outcome

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**Purpose/Objective(s):** To report biochemical outcomes from a series of localized prostate cancer patients treated with Cesium-131 brachytherapy as sole definitive therapy.

**Materials/Methods:** Two hundred twenty-one (221) patients were treated between November 2004 and August 2007 with Cesium-131 monotherapy by one radiation oncologist. Median patient age and PSA were 63 years (range 44.2 - 79.1 years) and 6.18 ng/ml (range 0.6 - 40 ng/ml). Employing the D'Amico risk grouping system, 131 (59.3%) patients presented with low-risk disease, 75 (33.9%) patients had intermediate-risk disease and 15 (7.3%) had high-risk disease. Biochemical failure was defined according to the Phoenix Definition (nadir +2 ng/mL) at last follow-up. Median follow-up was 20 months (range 6 - 51 months).

**Results:** The overall biochemical relapse-free survival estimate (BRFS) is 94.9% at four years. By risk group, the 4-year Kaplan-Meier estimates of BRFS were 98.1% for low-risk patients; 90.5% for intermediate-risk patients; and 87.5% for high-risk patients.

**Conclusions:** Cesium-131 monotherapy for clinically localized prostate cancer yields excellent biochemical control. Additional long-term follow-up will be ongoing.

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## 2385 Clinical Experience and Radiation Safety of the First-in-Class Alpha-Pharmaceutical, Alpharadin (radium-223) in Patients with Castration-Resistant Prostate Cancer (CRPC) and Bone Metastases

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