

3.0T MRI-S Predicts and Confirms the Presence of Prostate Cancer - 2008

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Objective -To prospectively determine the accuracy of T2-weighted magnetic resonance (MR) imaging, dynamic contrast enhanced (DCE) MR imaging and quantitative three dimensional (3D) Proton MR spectroscopic imaging of the entire prostate, relevant to prostate cancer location. All determinants were validated with a biopsy for referencing purpose in a blinded research protocol.

Materials and Methods – This study was approved by the institutional review board (IRB) and informed consent was obtained from all patients. Two independent reviewers (an MR trained Urologist and an Interventional Radiologist) evaluated 200 patients for the presence of prostate cancer between 2008 and 2009. All men were evaluated on a General Electric 3.0 Tesla HD-X MRI scanner. T2-weighted MR Imaging, dynamic contrast enhanced MR imaging and 3D MR spectroscopic imaging was performed on all patients. Based on the imaging data presented, the two reviewers predicted the presence and location of prostate cancer. All men had biopsy correlation. The most common biopsy technique utilized was a standardized 12core sampling protocol. Both reviewers evaluated the prostate images to determine side of involvement, medial or lateral orientation as well as positioning from Apex to Base.

Results – 200 patients were evaluated for the presence of prostate cancer using a 3.0 T MR imaging scanner with H-1 spectroscopic analysis. 57% of men had a Gleason Score (GS) of 6, 33% had a GS of 7, while 10% had a GS of 8-10. There were no discernable functional or imaging discrepancy between GS of 6 or 7 cancers while GS of 8-10 were easily identifiable. All imaging utilized a concordance of T2-weighted images, DCE and Proton Spectroscopic analysis. In this scenario, a Creatine + Choline + Citrate ratio of $\geq 2:1.0$ was considered to be a cancer. Based on a concordance of T2-weighted images and the spectroscopic analysis, there was a positive predictive value (PPV) of 91% for cancer. When DCE was added, the PPV was noted in excess of 95%, suggesting the positive diagnostic role of tissue perfusion. While there was variation in the captured data, there was a concordance of suspicion for prostate cancer in T2-weighted images, DCE and spectroscopy in virtually all cases.

Conclusions – Compared to the use of T2-weighted MR imaging alone, the use of dynamic contrast enhanced MR imaging and 3D MR spectroscopic imaging facilitated significant improvement in prostate cancer detection accuracy as related to cancer location. Clearly, imaging will continue to enhance prostate cancer diagnostics particularly as related to an improved threshold as related to which patients are the best biopsy candidates as well as defining the future for targeted biopsies and focal therapy.