

Multi-parametric MRI and subsequent MR/ultrasound fusion biopsy increases the detection of anteriorly located prostate cancers

D. Volkin¹, N. Yerram¹, B. Turkbey², A. Hoang¹, J. Nix¹, J. Kreucker³, A. Rastinehad¹, W.M. Linehan¹, P. Choyke², B. Wood⁴, P. Pinto¹

¹ National Cancer Institute, Bethesda, USA

² Molecular Imaging Program, NIH, Bethesda, USA

³ Philips Healthcare, Briarcliff Manor, USA

⁴ Center for Interventional Oncology, NIH, Bethesda, USA

Purpose: Anteriorly located prostate cancer is traditionally under-diagnosed using transrectal ultrasound (TRUS) biopsy, although it represents a significant proportion of all prostate cancers. We describe the detection rate of these tumors with the addition of MRI/US fusion guided biopsy (FGB) to standard TRUS biopsy.

Materials and Methods: Patients with a clinical suspicion of prostate cancer underwent 3T multiparametric MRI and suspicious lesions in the anterior prostate were identified. Patients then received a FGB of all suspicious lesions and a standard TRUS biopsy. We conducted a lesion based analysis comparing detection of anterior targets using FGB versus TRUS cores taken from the same anatomic location in the prostate. Lengths of cancer in the most involved core were compared between the two modalities. Patients with only anterior targets were analyzed separately.

Results: Of 499 patients undergoing FGB, 162 patients had a total of 241 anterior lesions. Mean age, PSA, and prostate volume in this group was 62 years, 12.7ng/dl, and 57mL, respectively. Sixty two (25.7%) of the anterior lesions found on MRI were positive for cancer on TRUS biopsy alone, while 97 (40.2%) were positive on FGB alone ($p=0.001$). In patients with highly and moderately suspicious lesions, FGB increased detection by 118 and 50 percent ($p=0.0001$, 0.017), respectively. In lesions that were positive on both FGB and TRUS biopsy, the most involved core was 112% longer on FGB (3.7mm vs. 1.6mm, $p<.01$).

Forty-two patients had only anterior lesions on mpMRI; 24 of them (57.1%) were found to have cancer on the FGB + TRUS biopsy platform. Six patients were positive on FGB only. Thirteen were positive on both modalities. However, 7 of 13 were upgraded by to a higher Gleason score by FGB. All 5 patients positive on TRUS biopsy only were active surveillance candidates.

Conclusion: FGB detects significantly more anterior cancers than TRUS biopsy alone and may be an effective tool for this subset of patients.