P073 Initial results comparing high resolution micro-ultrasound with multiparametric magnetic resonance imaging for prostate cancer detection

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Introduction & Objectives: Prostate cancer is the most common cancer in men worldwide. Detection technologies have improved in recent decades and as a result, more patients are diagnosed at early stages of the disease. Multiparametric Magnetic resonance imaging (mpMRI) of the prostate has recently been recommended in the French and European guidelines for men suspected of harboring prostate cancer. However, MRI quality is inconsistent outside of large expert centers, and adds significant cost and complexity due to the multi-specialty, multi-visit nature of the pathway. A novel high resolution 29 MHz micro-ultrasound offers real time targeting of suspicious areas. The 70-micron resolution provides a 300% improvement in resolution over conventional ultrasound and enables the detailed visualization of cancer related prostate tissue characteristics visible. This study compares the performance of mpMRI and micro-ultrasound for the detection of prostate cancer.

Materials & Methods: 55 consecutive patients from our prospective biopsy database presenting with elevated PSA levels (range: 4.2 – 40 ng/mL, median 8.5 ng/mL) and an available mpMRI prostate study were included. Micro-ultrasound biopsy was performed using the ExactVu^{TM} (Exact Imaging, Markham, Canada) micro-ultrasound system and included micro-ultrasound targeted, mpMRI targeted, and systematic biopsy samples. mpMRI targets were cognitively sampled.

Results: Biopsy histopathology confirmed cancer in 27 out of 55 patients with 15/27 (55.6%) diagnosed with clinically significant cancer (ISUP>1). For clinically significant cancer, micro-ultrasound provided a sensitivity of 14/15 (93.3%) while mpMRI provided a sensitivity of 13/15 (86.7%). Micro-ultrasound's negative predictive value, specificity value, and positive predictive value were calculated as 11/12 (91.7%), 11/40 (27.5%), and 14/43 (32.6 %), respectively. These values for mpMRI were calculated as 16/18 (88.9%), 16/40 (40.0%) and 13/37 (35.1%). For all cancer, micro-ultrasound provided a sensitivity of 24/27 (88.9%) while mpMRI provided a sensitivity of 20/27 (74.1%). Micro-ultrasound's negative predictive value, specificity value, and positive predictive value were calculated as 9/12 (75.0%), 9/28 (32.1%), and 24/43 (55.8%), respectively. These values for mpMRI were calculated as 11/18 (61.1 %), 11/28 (39.3 %), and 20/37 (54.1%).

Conclusions: For both clinically significant prostate cancer and low-risk disease, micro-ultrasound provided an improved sensitivity compared to mpMRI, suggesting it may be a more cost-effective, single specialty, diagnostic pathway for guiding prostate biopsies. There are also possible opportunities in the area of active surveillance and longitudinal imaging-based monitoring of prostate cancer patients.