REFERENCES

METHODS:

• Biopsy histopathology confirmed cancer in 21 out of 43 patients with 9/21 (43%) diagnosed with clinically significant cancer (csPCa, Grade Group >3).

• Micro-ultrasound and mpMRI sensitivities were both 6/9 (78%) to csPCa.

• Negative Predictive Values for Micro-ultrasound and mpMRI to csPCa were 18/20 (90%) and 15/16 (94%) respectively.

RESULTS:

• Biopsy histopathology confirmed cancer in 21 out of 43 patients with 9/21 (43%) diagnosed with clinically significant cancer (csPCa, Grade Group >3).

• Micro-ultrasound and mpMRI sensitivities were both 6/9 (78%) to csPCa.

• Negative Predictive Values for Micro-ultrasound and mpMRI to csPCa were 18/20 (90%) and 15/16 (94%) respectively.

CONCLUSIONS:

• Micro-ultrasound provided equivalent sensitivity to mpMRI for csPCa, suggesting it may be a more cost-effective, single-specialty, diagnostic pathway for guiding prostate biopsies.

• Improved sensitivity to smaller and lower-risk disease suggests opportunities for micro-ultrasound in active surveillance and imaging-based monitoring of prostate cancer.

BACKGROUND:

Multiparametric Magnetic resonance imaging (mpMRI) of the prostate has recently been recommended in the French 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 biopsies of suspicious areas and enables the detailed visualization of cancer-related prostate tissue characteristics. This study compares the performance of mpMRI and micro-ultrasound for the detection of prostate cancer.

METHODS:

• 43 consecutive patients from our prospective biopsy database presenting with elevated PSA levels and an mpMRI prostate study were included.

• All biopsies were performed using the ExactiVu® (Exact Imaging, Markham, Canada) Micro-Ultrasound System.

• Each biopsy included micro-ultrasound targeted, mpMRI targeted, and systematic biopsy samples.

• mpMRI targets were cognitively sampled.

• The PRI-MUS® (prostate risk identification using micro-ultrasound) evidence-based protocol was used to characterize suspicious tissue under micro-ultrasound for targeting biopsy.

• Retrospectively, the posterior mid of the prostate should have been labeled as a PRI-MUS 5 due to the irregular shadowing present. PRI-MUS was positive with a PRI-RADS 5 in this case, and the biopsy revealed a Grade Group 3 lesion.

• For continuous variables, values are median [25th percentile – 75th percentile] for each modality.

Table 2: Patient level results for detection of all prostate cancers and clinically significant (Grade Group >3) cancers. Micro-ultrasound and mpMRI demonstrated the same sensitivity (67%), while micro-ultrasound was superior in specificity. Both modalities performed well in negative predictive value, although the mpMRI result was marginally higher.

<table>
<thead>
<tr>
<th>Modality</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>csPCa</td>
<td>6/9 (67%)</td>
<td>15/18 (33%)</td>
<td>6/28 (21%)</td>
<td>9/30 (30%)</td>
</tr>
<tr>
<td>Micro-Ultrasound</td>
<td>6/9 (67%)</td>
<td>16/14 (58%)</td>
<td>6/23 (26%)</td>
<td>9/16 (56%)</td>
</tr>
<tr>
<td>mpMRI</td>
<td>10/21 (48%)</td>
<td>9/22 (41%)</td>
<td>10/28 (36%)</td>
<td>9/16 (56%)</td>
</tr>
<tr>
<td>All PCa</td>
<td>13/22 (59%)</td>
<td>10/23 (43%)</td>
<td>13/22 (59%)</td>
<td>10/23 (43%)</td>
</tr>
</tbody>
</table>

Figure 4: csPCa diagnoses by modality. Most cancers were found through image-based targeting and of these most were identified by both modalities.

Table 1: Patient demographics, values are median [25th percentile – 75th percentile] for continuous variables.

<table>
<thead>
<tr>
<th>Modality</th>
<th>PSA (ng/mL)</th>
<th>Age (years)</th>
<th>Prior biopsy</th>
<th>Abnormal DRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic</td>
<td>9.2 (6.7-12.0)</td>
<td>67 (62-69)</td>
<td>9 (21%)</td>
<td>17 (40%)</td>
</tr>
<tr>
<td>Targeted</td>
<td>9.2 (6.7-12.0)</td>
<td>67 (62-69)</td>
<td>9 (21%)</td>
<td>17 (40%)</td>
</tr>
<tr>
<td>MRI only</td>
<td>9.2 (6.7-12.0)</td>
<td>67 (62-69)</td>
<td>9 (21%)</td>
<td>17 (40%)</td>
</tr>
<tr>
<td>Bath</td>
<td>9.2 (6.7-12.0)</td>
<td>67 (62-69)</td>
<td>9 (21%)</td>
<td>17 (40%)</td>
</tr>
<tr>
<td>Micro-US only</td>
<td>9.2 (6.7-12.0)</td>
<td>67 (62-69)</td>
<td>9 (21%)</td>
<td>17 (40%)</td>
</tr>
</tbody>
</table>

Figure 4: csPCa diagnoses by modality. Most cancers were found through image-based targeting and of these most were identified by both modalities.

Figure 1: False negative case for micro-ultrasound. Retrospectively, the posterior mid of the prostate should have been labeled as a PRI-MUS 5 due to the irregular shadowing present. PRI-MUS was positive with a PRI-RADS 5 in this case, and the biopsy revealed a Grade Group 3 lesion.

Figure 2: Lesion targeted by both MRI and micro-ultrasound at the Left Apex. This lesion was a PRI-MUS 4 and PRI-RADS 5, and biopsy revealed a Grade Group 2 cancer.

Figure 3: True negative case, both MRI and micro-ultrasound labeled this prostate as normal, and all biopsies were benign. Note the clear glandular structure throughout the micro-ultrasound image.

REFERENCES