# Combining Prostate MRI and Micro-ultrasound to Omit Systematic Biopsy

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## Background

The diagnosis of prostate cancer often includes MRI-guided biopsy. Many surgeons perform targeted and systematic biopsies to compensate for registration errors between MRI and conventional ultrasound (5-7 mHz). However, the additional tissue trauma of systematic biopsies increases patient bleeding, infection, and even temporary erectile dysfunction. In addition, level one evidence shows that adding systematic biopsy to MRI targets increases indolent GG 1 cancer detection, courting over-treatment. A possible solution involves micro-ultrasound, which is capable of visualizing prostate cancer, enabling visual confirmation of target sampling. We sought to evaluate if an MRI + Micro-ultrasound targeted biopsy could omit systematic biopsy while maintaining high diagnostic accuracy.

### Methods

We retrospectively evaluated 155 men undergoing transperineal prostate biopsy at the University of Florida. Eighty-three men met inclusion criteria: MRI prior, micro-ultrasound guidance, targeted and systematic biopsy. The MRI target was visualized with micro-ultrasound and biopsied. We graded each region of interest (ROI) using PI-RADS and micro-ultrasound-based PRI-MUS scores (1-5 Likert scale similar to PI-RADS but based on Micro-ultrasound features). We considered cores containing Grade Group  $\geq 2$  (GG $\geq 2$ ) as clinically significant prostate cancer (csPCa). The primary endpoint was the GG $\geq 2$  cancer detection rate (CDR=GG $\geq 2$  targeted cores/GG $\geq 2$  all cores).

#### Results

Patients with PI-RADS and PRI-MUS scores  $\geq$ 3 had a targeted only CDR of 93.3%. Those with scores  $\geq$ 4 (dual imaging visible) had a CDR of 97.4%. Systematic without targeted cores had CDR of 61.5%. Only one patient (1.2%) had GG $\geq$ 2 detected on systematic biopsy alone. AUC values for PI-RADS, PRI-MUS, and dual imaging visible lesions were 0.72, 0.68, and 0.72, respectively (p=NS).

#### Conclusions

Only one patient with a dual imaging visible ROI had  $GG \ge 2$  detected on systematic biopsy but not in the ROI. Otherwise, >97% of csPCa were detected with targeted biopsies alone. In dual imaging visible ROIs, surgeons may consider omitting systematic biopsy. Prospective validation across multiple surgeons will strengthen our ability to omit systematic biopsy and improve patient diagnostics.

## **Figures and Tables**

Table 1: Cancer Detection Rates (GG  $\geq$ 2) for systematic and targeted ROIs stratified by PI-RADS and PRI-MUS Scores

PI-RADS and PRI-MUS Score				
≥2	≥3	≥4	5	

Systematic	61.5%	60.0%	61.6%	66.7%
Targets Only	90.4%	93.3%	97.4%	93.3%

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