Man vs. Machine: Comparative Effectiveness of Cognitive Targeted and Image-Fusion Targeted Transperineal Prostate Biopsy

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INTRODUCTION

- Targeted prostate biopsy can be performed using visual-estimation (cognitive) targeting or MRI-ultrasound fusion platforms.
- We aimed to compare cancer detection of these two approaches performed by a large number of surgeons of varying expertise.

METHODS

- A prospective prostate cancer diagnosis registry identified 603 men who had undergone cognitive or image-fusion targeted transperineal biopsy for PI-RADS v2 score of >/=3; a score of 3 required PSA-density >/=0.12ng/mL/mL (April 2017 - July 2019).
- Image-fusion was performed using the BiopSee® platform (Medcom) which utilises elastic registration.
- Propensity score matching (1:1) was performed by age, PSA, PSA-density, prostate volume, number of target lesions, operator grade, PI-RADS score and number of cores (caliper=0.25).
- Operator experience included senior urologists, trainee urologists or others (e.g. nurse practitioners).
- Detection rates of clinically significant (cs) and insignificant (ci) prostate cancer (PCa) were compared both overall and in subsets using Fisher's Exact test.
- The threshold of csPCa used was Gleason >/=3+4.
- The number of cores taken was compared using the Mann-Whitney U test.

Age	**66.7 years (60.5 – 72)**
PSA	**7.5ng/mL (5.5 – 10.8)**
Prostate Volume	**43mL (32-59)**
PSA-density	**0.17 ng/mL/mL (0.11-0.28)**

Table 1. Overall Baseline Demographics (Median (IQR))

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Senior urologists detect more clinically significant prostate cancer using image-fusion targeted transperineal biopsy

More cores are taken when biopsies are performed cognitively

RESULTS

- Targeted transperineal prostate biopsy was performed for 845 lesions (cognitive: 261, image-fusion: 584) in 603 patients (cognitive: 185, image-fusion: 418).
- There was no overall difference in cs or ciPCa detection rates between cognitive and image-fusion targeting (242 pairs; p=1.00).
- Significantly more cores were taken when biopsies were performed cognitively (6; IQR: 5-8)) than using image-fusion (6; IQR: 4-6)) (p<0.0001).
- Senior urologists had a significantly higher detection rate of csPCa using image-fusion targeted biopsy (cognitive: 27.8%, image-fusion: 55.6%; 54 pairs; p=0.006).
- There was no significant difference when biopsies were conducted by trainee urologists (143 pairs; p=0.1) or other operators (17 pairs; p=0.73).
- There was no difference between cognitive and image-fusion for prostates <40mL (107 pairs; p=0.49), 40-80mL (94 pairs; p=1.00) or >80mL (20 pairs; p=0.73).
- Similarly, there was no difference when there was one target lesion (109 pairs; p=0.54) or two or more target lesions (133 pairs; p=0.54).

CONCLUSIONS

- We found no difference in overall cancer detection rates between cognitive targeted and image-fusion targeted transperineal biopsy, although in our series more cores were taken using cognitive targeting.
- Senior urologists had a significantly higher csPCa detection rate using image-fusion targeting.
- Choice of biopsy technique should be dependent on operator experience.