Does MRI/US fusion target biopsy overestimate the Gleason score (GS) of PCa?

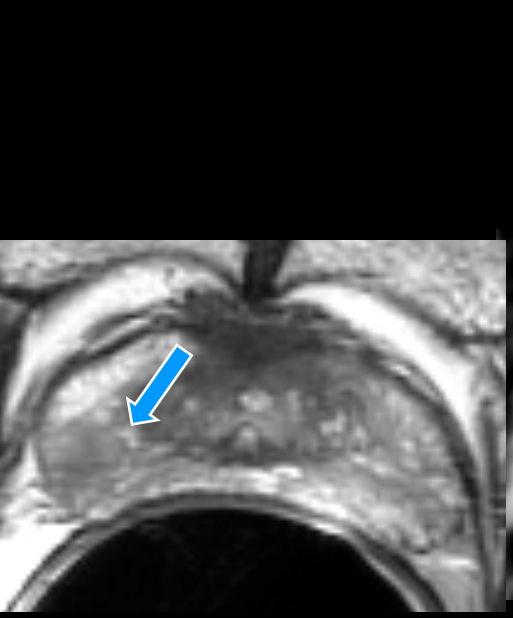
Jinxing Yu, MD

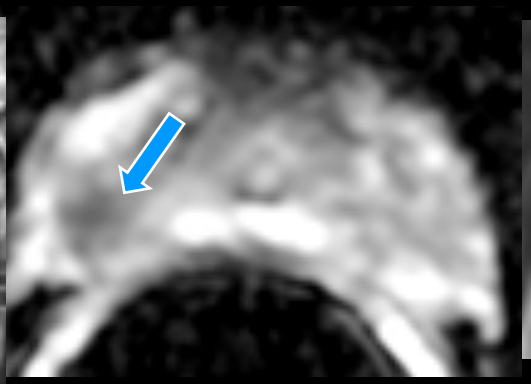
Professor of Radiology & Surgery
Director of Prostate Imaging & Intervention
Virginia Commonwealth University
Richmond

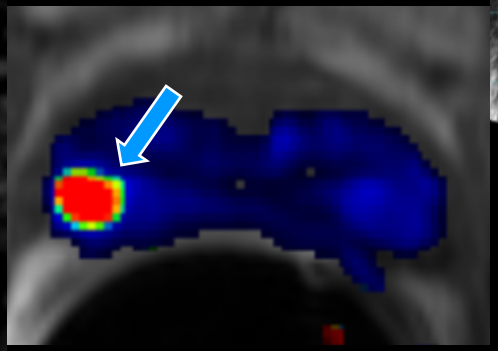
Introduction

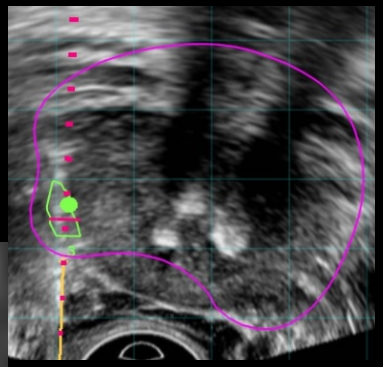
- Prior studies show that US-MR fusion Bx identify a higher Gleason score PCa than systematic TRUS Bx alone
  - While the efficacy of detecting clinically significant PCa using US-MR fusion Bx has shown improvement over non-fusion methods, some questions remain as to their accuracy and clinical utilization in diagnosing the severity of the disease
- Our concern, however, is that the high US-MR fusion Bx Gleason score, may be uncharacteristically high for the entire tumor and a poor representation of the most prevalent grade of underlying cancer
- This higher Gleason score could then dictate a treatment option more aggressive than need be
  - Potentially negative outcomes such as impotence or urinary incontinence among others

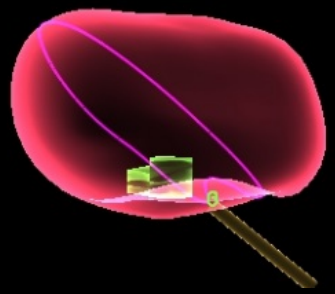
60 Years Old, PSA 7, lesion in the right PZ (PI-RADS 4), US/MRI Fusion Bx: PCa GS 7 (4 + 3)











Axial T2 ADC DCE US/MRI fusion

Radical prostatectomy: Prostate Cancer GS 7 (3 + 4)

Teaching Points

- It is true that MRI/US fusion target biopsy may overestimate the Gleason score of PCa
  - Target bx core needle only enters the lesion well visualized at MRI
  - But tumor may be present 1 cm around the visualized lesion at MRI
    - Sample larger area may help to decrease the overestimation
- Based on our unpublished research data, overestimating the final Gleason score of PCa by target biopsy is less compared to systematic TRUS Bx (14% vs. 19.6%)
- Therefore, US-MR fusion Bx presents a significant advantage over that of the TRUS Bx, in providing a final Gleason score that is more accurate and representative of the most prevalent underlying PCa
  - This finding may have important implications for treatment decision

References

- Verma S, Choyke PL, Eberhardt SC et al. The Current State of MR Imaging–targeted Biopsy Techniques for Detection of Prostate Cancer. Radiology 2017; 285:2, 343-356.
- Wegelin O, van Melick HH, Hooft L et al. Comparing three different techniques for magnetic resonance imaging-targeted prostate biopsies: a systematic review of in-bore versus magnetic resonance imaging-transrectal ultrasound fusion versus cognitive registration. Is there a preferred technique? Eur Urol 2017;71(4):517–531.
- Pinto PA, Chung PH, Rastinehad AR et al. Magnetic Resonance Imaging/Ultrasound Fusion Guided Prostate Biopsy Improves Cancer Detection Following Transrectal Ultrasound Biopsy and Correlates with Multiparametric Magnetic Resonance Imaging. The Journal of Urology, 2011, Vol.186(4), pp.1281-1285.
- Sonn GA, Natarajan S, Margolis D J.A. et al. Targeted Biopsy in the Detection of Prostate Cancer Using an Office BasedMagnetic Resonance Ultrasound Fusion Device. The Journal of Urology, January 2013, Vol.189(1), pp.86-92.
- Oberlin DT, Casalino DD, Miller FH et al. Diagnostic Value of Guided Biopsies: Fusion and Cognitive-registration Magnetic Resonance Imaging Versus Conventional Ultrasound Biopsy of the Prostate. Urology 2016; 92:75–79.
- Kardos SV, Pan S, Nawaf CB et al. MP17-08 MRI-FUSION PROSTATE BIOPSY IN FIRST-TIME BIOPSY COHORT YIELDS INCREASED DETECTION OF CLINICALLY SIGNIFICANT PROSTATE CANCER USING A SIMPLIFIED MRI GRADING SCALE, 2015. *The Journal of Urology*, 193(4), p.e179.
- Anastasiadis A.G., Lichy M.P., Nagele U et al. MRI-guided biopsy of the prostate increases diagnostic performance in men with elevated or increasing PSA levels after previous negative TRUS biopsies. Eur Urol 2006; 50: pp. 738-749.
- Siddiqui MM, Rais-Bahrami S, Turkbey B et al. Comparison of MR/ultrasound fusion-guided biopsy with ultrasound-guided biopsy for the diagnosis of prostate cancer. JAMA, 27 January 2015, Vol.313(4), pp.390-7.
- Parker, Chris. Active surveillance: towards a new paradigm in the management of early prostate cancer. Lancet Oncology, 2004, Vol.5(2), pp.101-106.