MR-targeted High-frequency TRUS-guided Biopsies: an Alternative to Fusion Biopsy?

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INTRODUCTION:

Clinically significant prostate cancer (csPCa) detection rate is improved by pre-biopsy MRI. MRI/ultrasound fusion biopsy shows some limitations in terms of procedure duration and lack of precision. In-bore MR-guided biopsy is not widely available. Very high frequency transrectal ultrasound (micro-ultrasound, MUS) could therefore compensate for these limitations.

METHODS:

Patients	Age (years)	PSA (ng/mL)
56	64 ±12	2-200, median 8

***Table 1*:** Patient population

- Micro-ultrasound biopsy was performed using **29 MHz Micro-Ultrasound System ExactVu™** (Exact Imaging, Markham, Canada).
- **MRI+/MUS+ lesions**: MRI lesions visualized with micro-ultrasound, targeted by micro-ultrasound guidance, no fusion
- **MRI+/MUS- lesions**: MRI lesions not visualised with micro-ultrasound, targeted with fusion imaging
- **MRI-/MRI+ lesions**: Micro-ultrasound lesions not seen on MRI, targeted with micro-ultrasound guidance

Lesion Type	Visualized by MRI	Visualized by MUS	Targeted with?
MRI+/MUS+	✓	✓	Micro-ultrasound (no fusion)
MRI+/MUS-	✓		Fusion imaging
MRI-/MUS+		✓	Micro-ultrasound (no fusion)

- Any cancer with **Gleason score ≥ 7** or **cancer length > 3mm** was considered csPCa

RESULTS:

- **58** MRI lesions in 56 patients including **52/58** (90%) **MRI+/MUS+** lesions
  - 19% (10/52): **PI-RADS 3**, **20%** (2/10) **csPCa**
  - 60% (31/52): **PI-RADS 4**, **68%** (21/31) **csPCa**
  - 21% (11/52): **PI-RADS 5**, **91%** (10/11) **csPCa**
- **6 MRI+/MUS-** lesions, 4 in peripheral zone, 5 **PI-RADS 3**
  - **csPCa not found** in the **MRI+/MUS-** group.
- **13 MRI-/MUS+** lesions
  - **31%** (4/13) **csPCa**, including 1 contralateral extension of index lesion and 3 remote nodules

	Number of Lesions		Lesions with csPCa	
MRI+/MUS+	52	PI-RADS 3	19% (10/52)	20% (2/10)	63% (33/52)
		PI-RADS 4	60% (31/52)	**68%** (21/31)	
		PI-RADS 5	21% (11/52)	**91%** (10/11)	
MRI+/MUS-	6	PI-RADS 3	83% (5/6)	0% (0/5)	0% (0/6)
		PI-RADS 5	17% (1/6)	0% (0/1)	
MRI-/MUS+	13	N/A	N/A	N/A	31% (4/13)

***Table 2*:** Number of lesions found, and number of lesions with clinically significant prostate cancer, according to MUS findings and PI-RADS score on MRI

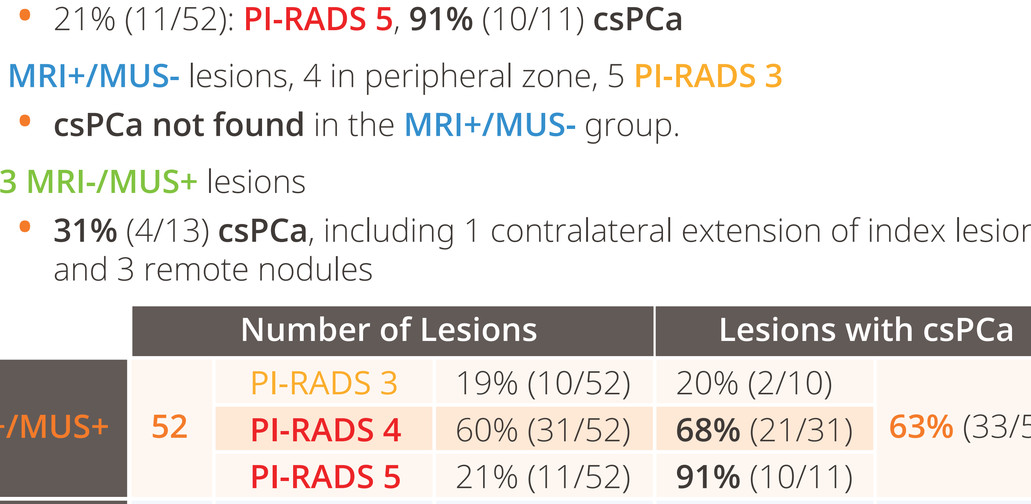

***Figure 4:* Percentage of lesions with clinically significant prostate cancer according to imaging modality.**
No csPCa was found in **MRI+/MUS-** lesions which where located in the PZ or the posterior lower TZ. All lesions could be targeted by the MUS transducer.

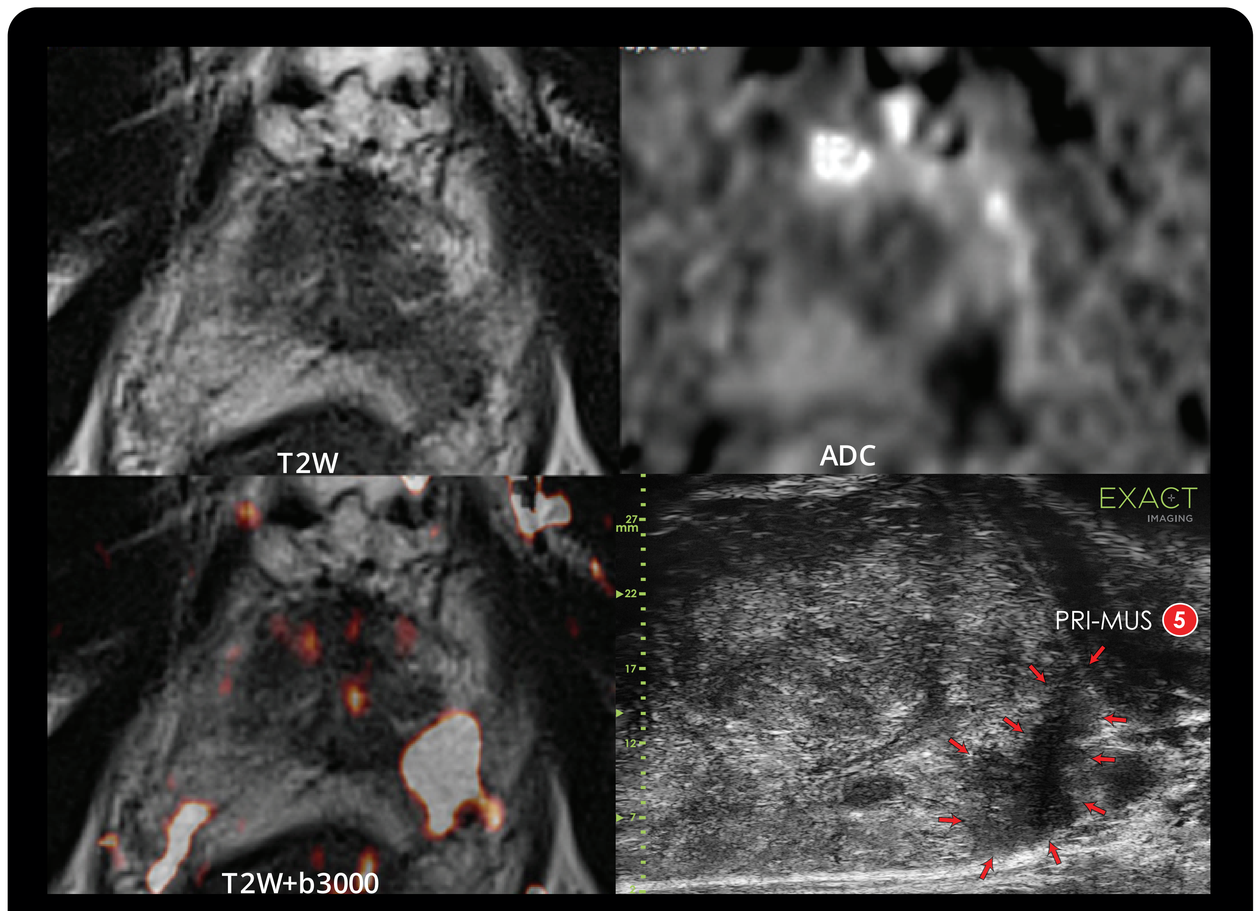

***Figure 1:* PI-RADS 5** lesion visualized by both MUS - highly hypoechoic **PRI-MUS 5** lesion and mpMRI. The Lesion, however, appeared larger on MUS. Pathology results indicated **Gleason 7** (4+3) lesion at the Right Apex, MCCL **9mm**, cribriform 10%.

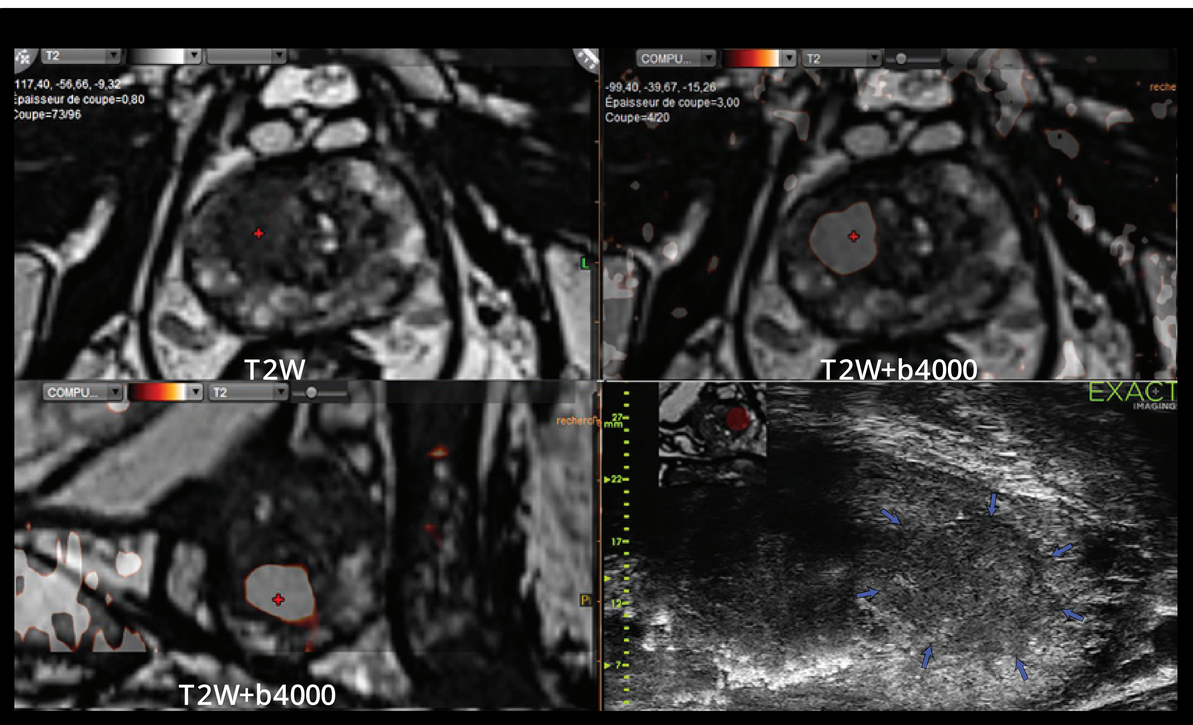

***Figure 2*:** **PI-RADS 4** lesion in the Transition Zone, visualized by both mpMRI and MUS. Pathology results revealed a **Gleason 6** (3+3), MCCL **9mm** lesion.

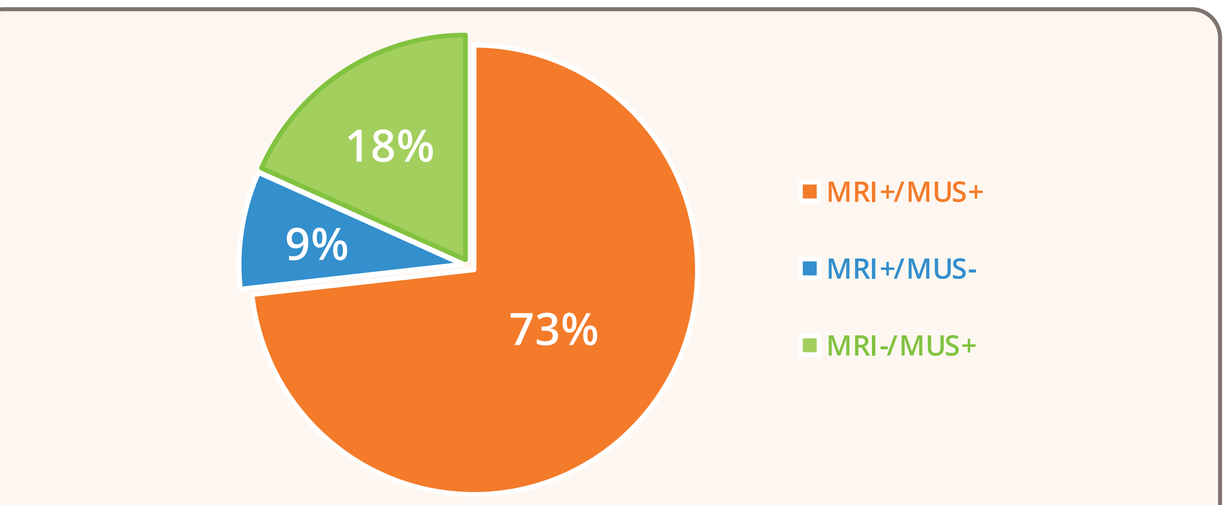

***Figure 3:* Lesions biopsied according to results of imaging findings.**
58 lesions were found by MRI in 56 patients. 52 of those lesions were also found by MUS. An additional 13 lesions were found by MUS that had not been visualized by MRI.

CONCLUSIONS:

- **Micro-ultrasound can localize PI-RADS>2 focal lesions**, may be an alternative to MRI/US fusion
- **Micro-ultrasound** may aid in **postponing biopsy** for **MRI+/MUS- PI-RADS 3** lesions (all **negative** for **csPCa**)

REFERENCES

1. Ghai S, Eure G, Fradet V, et al: ***Assessing Cancer Risk on Novel 29 MHz Micro-Ultrasound Images of the Prostate: Creation of the Micro-Ultrasound Protocol for Prostate Risk Identification***. J. Urol. 2016; 196: 562–569.