P027 Avoiding false-positive MRI results in prostate cancer-suspected men: A step forward towards reducing overdiagnosis

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Introduction & Objectives: Prostate MRI studies show PPV's of 15%, 50% and 75% of significant cancers in PI-RADS 3 to PI-RADS 5 lesions, respectively. The substantial number of false-positive (FP) MRI findings leads to overdiagnosis of non-significant cancers and unnecessary biopsies. Risk assessment by the combination of PI-RADS scoring and clinical parameters is insufficient to avoid FP findings. To better understand the FPs, the 2019 ISUP consensus guidelines recommend to report on benign histopathology in prostate biopsies. PI-RADS 3-5 scores have overlapping histopathology findings of atrophy and inflammation with significant cancer. However, false-positive MR imaging features have not extensively been investigated. The objective of this explorative study is to identify benign characteristics in MRI-positive lesions (PI-RADS 3-5) to allow a better understanding of MRI false positivity.

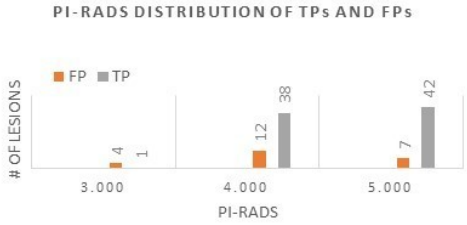
Materials & Methods: From our institutional prospective database, a cohort of intermediate risk patients with a global biopsy ISUP Gleason Grade (bGG) of 2 and MRI prior to RALP were retrospectively included. 104 PIRADS3-5 lesions were found on MRI and were correlated/registered to the histopathology findings on RALP histology specimens. MRI lesion was considered true positive (TP) when corresponding, totally or partially, to the cancerous finding (ISUP GG ≥1). For FP findings, ADC median values were extracted. K^{trans} maps were calculated when DCE scans were available.

Results: In our preliminary dataset, 23 out of 104 lesions were classified as FP. 13 of the 23 FPs correlated to atrophy in histopathology and appeared as hypointense on T2w, mild diffusion restriction on DWI and moderate enhancement in DCE, imitating cancerous tissue MRI signals [Figure 1]. For atrophy, ADC_{mean} value was (1.10 ± 0.23) x 10^{-3} mm^2/s and K^{trans}_{mean} was (0.24 ± 0.05) min^{-1}, while for TPs lesions ADC_{mean} value was (1.00 ± 0.23) x 10^{-3} mm^2/s and K^{trans}_{mean} was (0.23 ± 0.09) min^{-1}.

A]

PIRADS	Atrophy	BPH	Inflammation	Healthy
3	2	1	0	1
4	8	0	0	4
5	3	0	1	3

B]



C]

	ADC [$x10^{-3}\ mm^2/s$]	Ktrans [min^{-1}]
Atrophy	1,10 ± 0,23	0,24 ± 0,05
GG ≥ 3	1,00 ± 0,23	0,23 ± 0,09

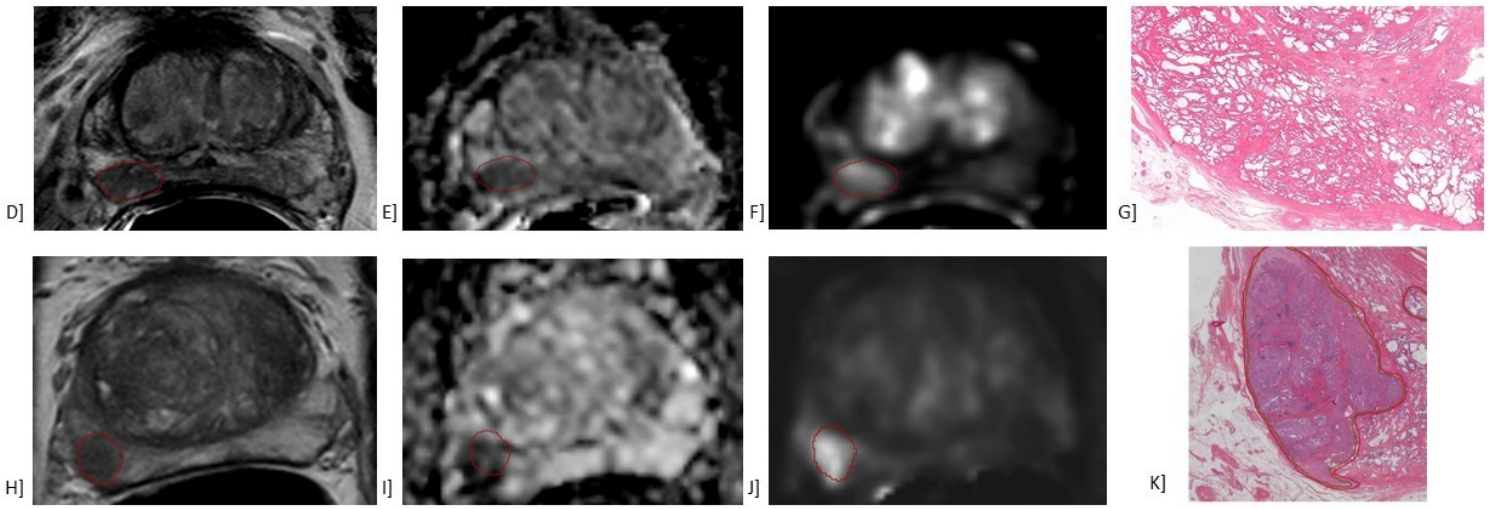


Figure 1: [A] FP findings in pathology. [B] PI-RADS distribution of TP and FP. [C] Mean and standard deviation of ADC and ktrans values for atrophy and GG ≥3 lesions .[D-F] identified MRI-positive lesion in the right peripheral zone on T2w (D), ADC reconstruction (E), and k-trans (F) (PI-RADS 4) was associated with atrophy in whole specimen histology (F), and was classified as a false-positive lesion. [H-K] identified MRI-positive lesion in the right peripheral zone on T2w (H), ADC reconstruction (I), and k-trans (J) (PI-RADS 4) was associated with Gleason 4 growth pattern in whole specimen histology (F), and was classified as a true-positive lesion.

Conclusions: Based on the current definitions, the PI-RADS classification appears not to have the ability to lower false-positives in this small and preliminary dataset of prostate cancer men who underwent RALP. Moreover, ADC and K^{trans}_{mean} values overlap for atrophy and GG ≥3 lesions. Therefore, a deeper analysis into quantitative MRI features is needed to better differentiate between TP and FP, potentially leading to less overdiagnosis or the need to biopsy.