Role of **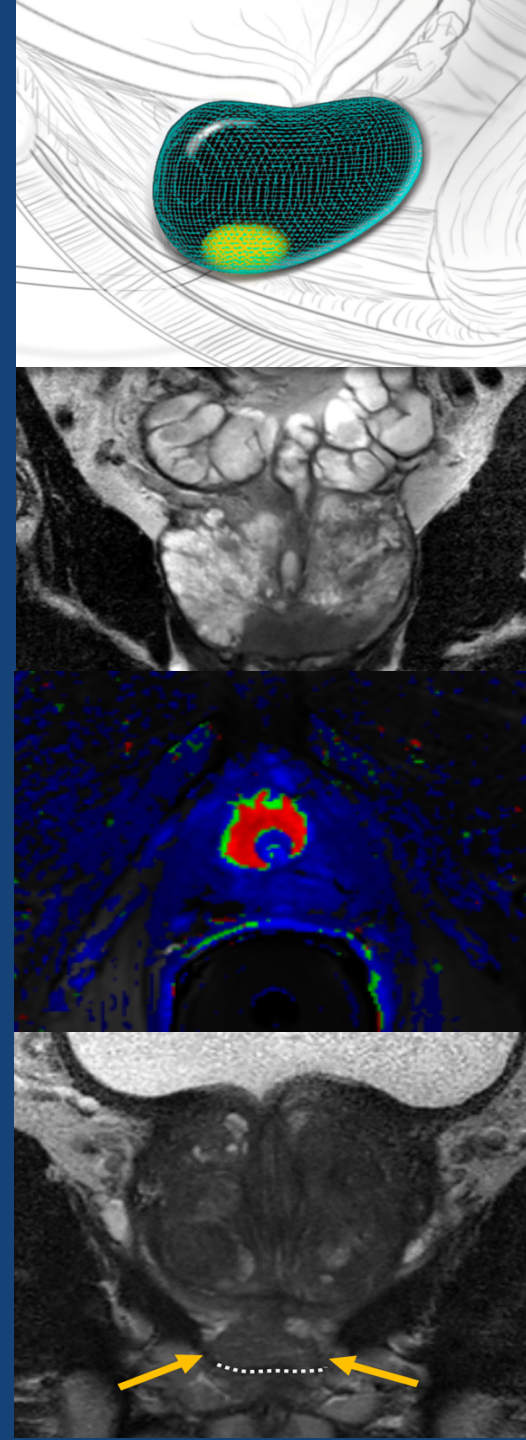mpMRI Structured Report** in Preoperative Detection of **Men at Risk for Positive Apical Surgical Margins** During Radical Prostatectomy

Daniel N. Costa, Patrick Arraj, Debora Recchimuzzi, Claus G. Roehrborn, Jeffrey Cadeddu, Vitaly Margulis, Alberto Diaz de Leon, Yin Xi, Liwei Jia, Ivan Pedrosa, Aditya Bagrodia
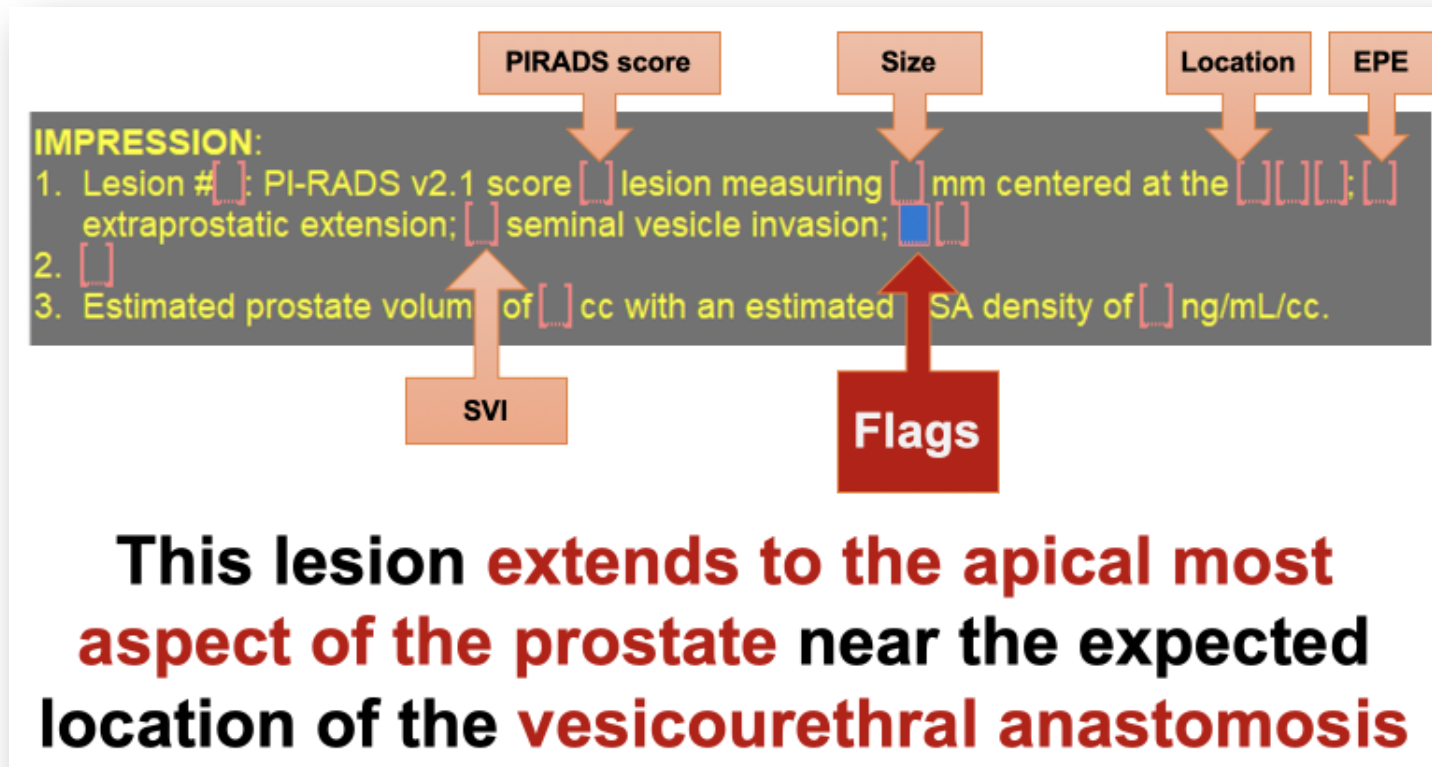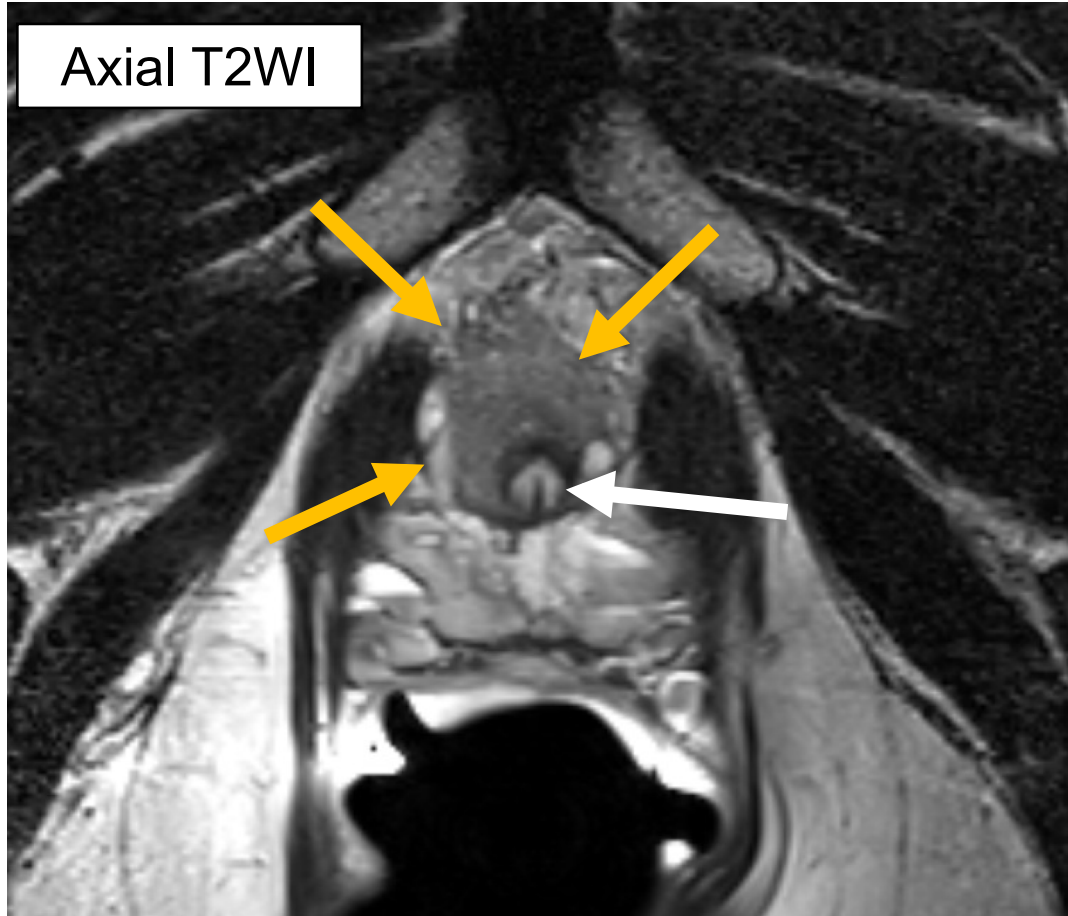
Disclosures

None

Introduction

- **Positive Surgical Margins (PSMs)** are an undesirable surgical outcome

- mpMRI has been used for detection and staging, and to a lesser extent, surgical planning

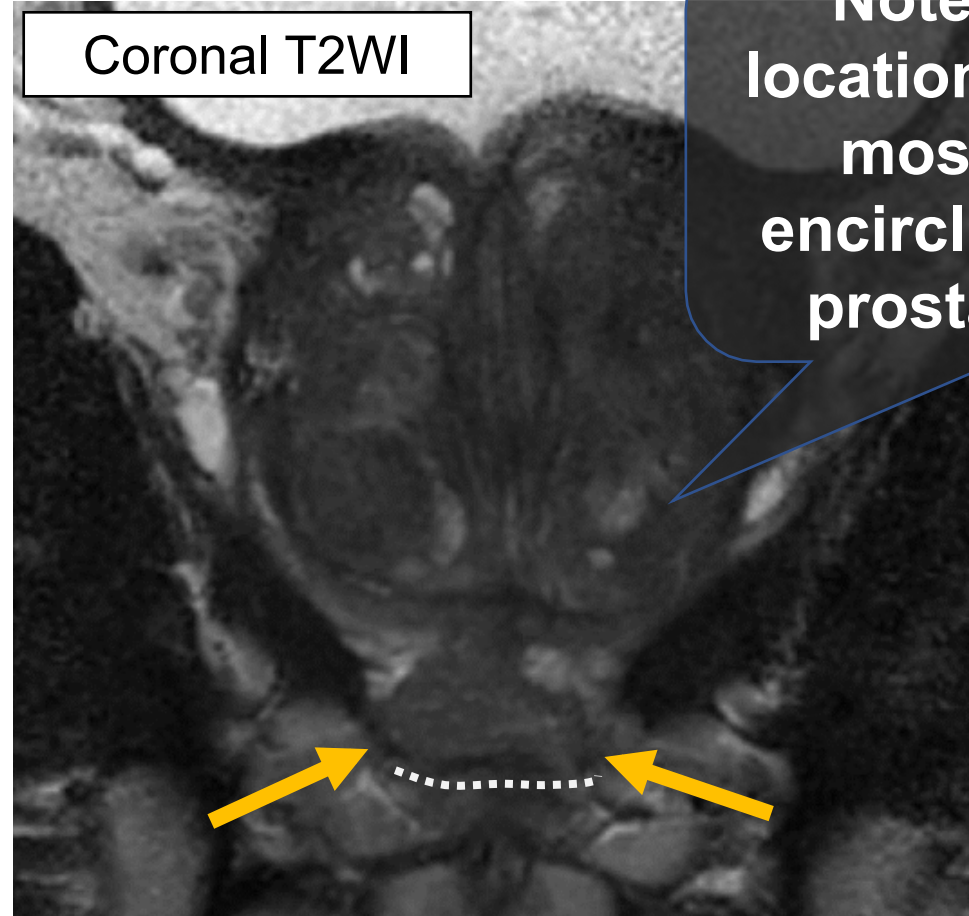- **Apical Lesions** are at greater risk for PSMs due to location

Introduction

- Inclusion of a **'flag'** in our structured report to increase awareness

67-year-old man, PSA 8, pre-biopsy MRI

FINAL PATHOLOGIC DIAGNOSIS
A. Left pelvic lymph nodes, dissection:
-Seven lymph nodes, negative for tumor (0/7)

B. Right pelvic lymph nodes, dissection:
-Fourteen lymph nodes, negative for tumor (0/14)

C. Prostate, robotic-assisted prostatectomy:
-Prostatic adenocarcinoma, Gleason score 3+4=7 (Grade Group 2)
-pT2, N0, MX, see attached CAP template
-No extraprostatic extension or lymphovascular invasion identified
-Tumor extends to right apical margin

> Despite being an organ-confined, not so large lesion, **surgical margins were positive**

Objective

- To determine and compare the **incidence of PSM in men with vs without lesions flagged as at-risk for apical PSM** during prospective mpMRI interpretation

Materials and Methods

- **Design**: Single-center, retrospective review of prospectively generated data

- **Eligibility:** Treatment-naïve men with abnormal 3T mpMRI (PIRADS v2 score ≥3) between **Jan/2016-Dec/2018** followed by RP within 6mo from MRI

- **Reference standard: SM status** (negative, positive) on whole-mount histopathology

- **Logistic regression with propensity score-weighting to compare the rate of PSM** in the two groups (**flagged** vs **non-flagged** men) adjusted for confounding variables

Results

- n = 428 men
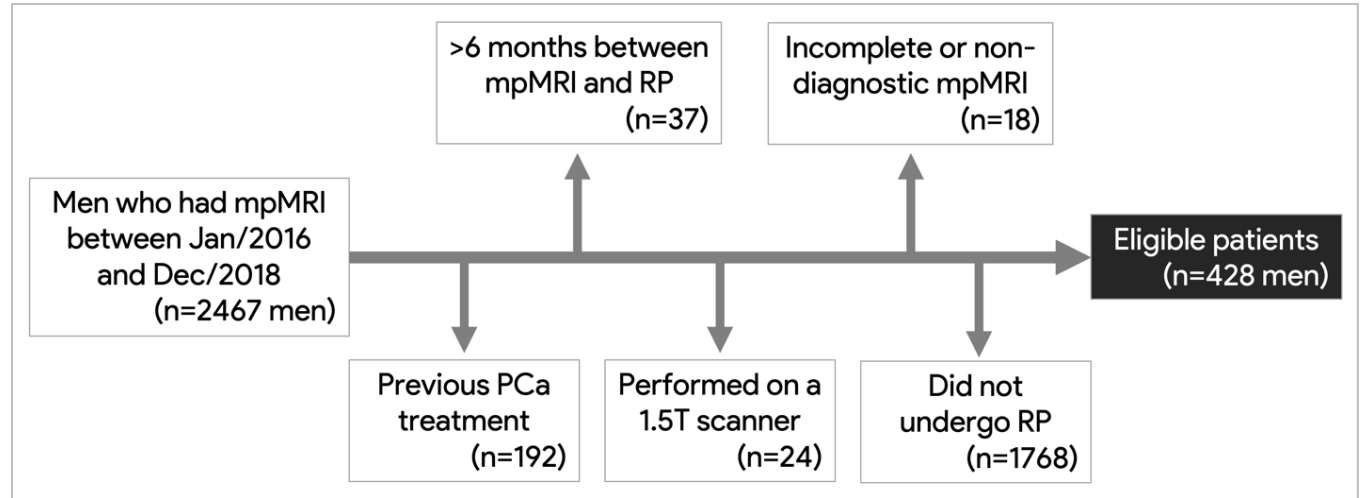
- A **higher proportion of PSM was noted in flagged** (56% [51/91]) **compared to non-flagged apical lesions** (31%, 41/133; OR: 2.318, 95% CI: 1.571-3.420)

- A higher proportion of PSMs was also noted in flagged apical lesions compared to non-flagged lesions when all margins (oPSM) in the latter group were taken into consideration (31% [105/337]; OR: 1.978, 95% CI: 1.496-2.616)

Results

		Flagged		Non-flagged		All	
		n	%	n	%	n	%
Margin	Negative	40	44%	232	69%	272	64%
	Positive	51	56%	105	31%	156	36%
T stage	2	36	40%	180	53%	216	50%
	3a	35	38%	110	33%	145	34%
	3b	20	22%	45	13%	65	15%
	4	0	0%	2	1%	2	0%
Grade group	1	3		17	5%	20	5%
	2	44	48%	182	54%	226	53%
	3	21	23%	76	23%	97	23%
	4		7%	20	6%	26	6%
	5	17	19%	42	12%	59	14%

Significantly higher incidence of PSM in flagged cases

Results

- Other **variables associated with higher PSM rate**: PSA, PSA density, lesion size, apical location, PIRADS score, grade group and pT stage

		Surgical margins				p-value[2]
		Negative	**Positive (aPSM)**	**Positive (oPSM)**	All	
n		63.6% (272/428)	35.7% (153/428)	36.4% (156/428)	100% (428/428)	NA
Age[1], years		63.8 ± 7.5	63.9 ± 7.1	63.9 ± 7	63.8 ± 7.3	0.6500
PSA[1], ng/mL		8.0 ± 6.3	12.7 ± 28.6	12.6 ± 28.3	9.7 ± 17.9	0.0023
Prostate volume[1], cc		43.9 ± 22.1	43.2 ± 20.1	43 ± 20	43.6 ± 21.5	0.7470
PSA density[1], ng/mL/cc		0.2 ± 0.2	0.3 ± 0.5	0.3 ± 0.5	0.2 ± 0.3	0.0070
Index lesion size[1,3], mm		14.4 ± 6.5	21.2 ±12.7	21.1±12.6	16.9 ± 9.7	<0.0001
Apical location	No	51.5% (140/272)	41.8% (64/153)	41% (64/156)	47.7% (204/428)	0.0485
	Yes	48.5% (132/272)	58.2% (89/153)	59% (92/156)	52.3% (224/428)	
PI-RADS version 2 score	3	4.8% (13/272)	2.6% (4/153)	2.6% (4/156)	4% (17/428)	<0.0001
	4	51.5% (140/272)	30.1% (46/153)	30.8% (48/156)	43.9% (188/428)	
	5	43.8% (119/272)	67.3% (103/153)	66.7% (104/156)	51.2% (219/428)	
NS approach	No	43.8% (119/272)	49% (75/153)	49.4% (77/156)	46.7% (200/428)	0.2664
	Yes	56.3% (153/272)	51% (78/153)	50.6% (79/156)	54.2% (232/428)	
Grade group	1	7% (19/272)	0.7% (1/153)	0.6% (1/156)	4.7% (20/428)	<0.0001
	2	57% (155/272)	45.1% (69/153)	45.5% (71/156)	52.8% (226/428)	
	3	20.6% (56/272)	26.1% (40/153)	26.3% (41/156)	22.7% (97/428)	
	4	5.9% (16/272)	6.5% (10/153)	6.4% (10/156)	6.1% (26/428)	
	5	9.6% (26/272)	21.6% (33/153)	21.2% (33/156)	13.8% (59/428)	
pT stage	2	59.6% (162/272)	35.3% (54/153)	34.6% (54/156)	50.5% (216/428)	<0.0001
	3a	32% (87/272)	36.6% (56/153)	37.2% (58/156)	33.9% (145/428)	
	3b	8.5% (23/272)	28.1% (43/153)	28.2% (44/156)	15.7% (67/428)	

Limitations

- **Retrospective**, **single-center** study (however used prospective data)

- **Subjective** nature of the flag (need for assessing inter-reader agreement)

- Did not assess **if surgeons used flag** to modify surgical approach (lack of supporting data at the time of implementation)

Conclusion

- **Standardized language** in the structured reports for mpMRI of the prostate **helps the preoperative identification of patients at risk for apical positive surgical margins**

- This should facilitate appropriate **patient counseling** and optimize **treatment decisions**