INTRODUCTION AND OBJECTIVES: Multiparametric MRI (mpMRI) improves the detection of significant prostate cancer (PC) and extraprostatic extension (EPE). We combined pre-biopsy mpMRI data and clinical parameters to develop a risk model (RM) to predict individual side-specific risk of EPE on radical prostatectomy (RP).

METHODS: MRI and clinical parameters of 132 men who underwent mpMRI fusion-biopsy and RP were analysed as training set. The RM was validated prospectively in 132 consecutive patients. Multivariate regression analysis was used to determine EPE predictors for RM development. The calibration of the RM was analysed using a calibration plot. The accuracy was compared to digital rectal examination (DRE), ESUR MRI criteria for EPE alone and the nomogram for side-specific EPE prediction of Steuber et al., using receiver operating characteristics (ROC) in training and validation set. Differences between the ROC curves were analysed using Likelihood ratio tests.

RESULTS: Primary Gleason pattern on biopsy on specific side, ESUR MRI criteria of side-specific lesion, PSA-density, clinical T-stage, lesion volume in milliliter and capsule contact length in millimeter on MRI were significant EPE-predictors and were included in the RM (Figure a). The calibration plot of the RM showed that predicted and actual probabilities were close (slope 1.12)(Figure b). ROC area under the curve (AUC) for the RM was significantly larger in both sets (0.88 and 0.84), compared to DRE (0.69, $p=0.004$, 0.66, $p<0.001$) and the risk model of Steuber et al. (0.77, $p=0.009$, 0.71, $p=0.006$). Compared to ESUR criteria (AUC 0.87 and 0.80), the AUC was only significant larger in the validation set ($p=0.03$) (Figure c/d).

CONCLUSIONS: The RM, incorporating clinical and standardized MRI parameters performed significantly better compared to a renowned risk model, ESUR MRI criteria and clinical parameters alone. Thus, it provides accurate individual risk stratification of side-specific EPE of prostate cancers prior to RP.

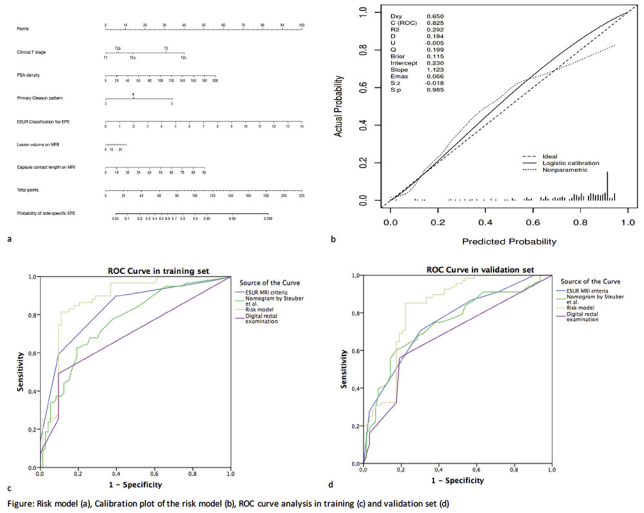

Figure: Risk model (a), Calibration plot of the risk model (b), ROC curve analysis in training (c) and validation set (d)

Source of Funding: None

MP03-08

IMPACT OF DYNAMIC CONTRAST-ENHANCED SEQUENCES IN PROSTATE CANCER DETECTION: BIPARAMETRIC VERSUS MULTIPARAMETRIC MRI INTERPRETED BY 5 RADIOLOGY RESIDENTS.

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WITHDRAWN

MP03-09

MRI-BASED NOMOGRAM PREDICTING THE PROBABILITY OF DIAGNOSING A CLINICALLY SIGNIFICANT PROSTATE CANCER WITH MRI-US FUSION BIOPSY

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INTRODUCTION AND OBJECTIVES: Identifying clinically significant prostate cancers is the main objective of prostate cancer diagnosis. The aim of this study was to develop, to internally validate and to calibrate a nomogram to predict the probability of detecting a clinically significant prostate cancer.

METHODS: Prospectively collected data from 3 tertiary referral center series of 478 consecutive patients who underwent MRI-US fusion biopsy using the UroStation (Koelis, France) were used to build the nomogram. A logistic regression model is created to identify predictors of PCa diagnosis with MRI-US fusion biopsy. Predictive accuracy was quantified using the concordance index (CI). Internal validation with 200 bootstrap resampling and calibration plot were performed.

RESULTS: Mean age was 66.3 yrs (± 7.98) and mean PSA levels were 9.8 ng/mL (± 7.98). The overall PCa detection rate was 57.4%. Age, PSA serum levels, PIRADS score at MRI report, number of targeted and number of systematic cores taken were included in the model (Figure 1). Predictive accuracy was 0.81. On internal validation the CI was 0.81 and predicted probability was well calibrated (Figure 2).Limitations include the lack of external validation and the absence of patients with races different by Caucasian in the development cohort.

CONCLUSIONS: Predicting the risk of a clinically significant PCa is the goal of physicians. This nomogram provides a high accuracy in predicting the probability of diagnosing a clinically significant PCa with MRI-US fusion biopsy. The ease to use makes this nomogram a clinical tool for both patients and physicians.

Figure 1

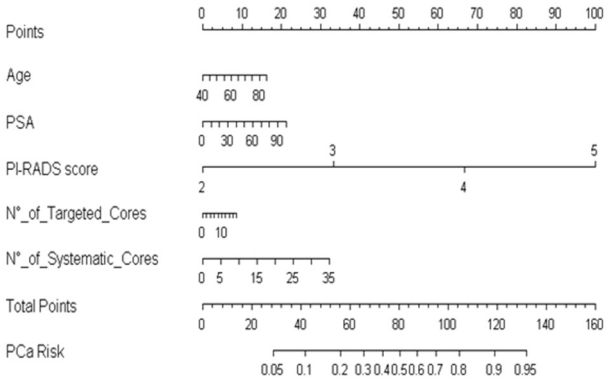
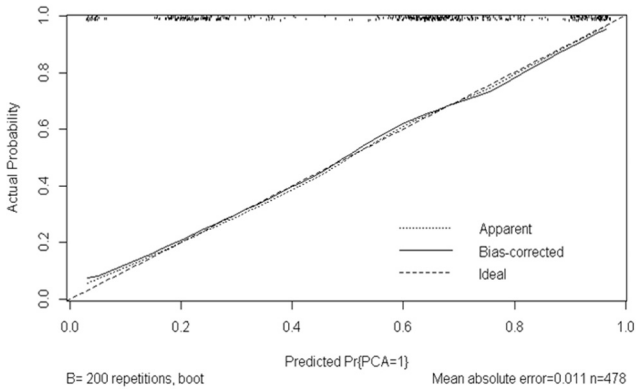


Figure 2



Source of Funding: none

MP03-10

CONTEMPORARY ASSESSMENT OF THE PREDICTIVE VALUE OF MULTIPARAMETRIC MRI FOR INDEX LESION LOCALIZATION IN PROSTATE CANCER

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INTRODUCTION AND OBJECTIVES: In the setting of active surveillance and focal therapy for prostate cancer (PCa), precise localization of the index lesion is crucial to ensure good oncological outcomes. Our objective was to assess the accuracy of multiparametric MRI (mp-MRI) for index lesion localization.

METHODS: We conducted a retrospective bi-centric study including 405 patients operated by radical prostatectomy from 2010 to 2015 and having been assessed preoperatively by mp-MRI in two national referral centres for PCa management.Pre-operative mp-MRI sequences included T2-weighted, diffusion weighted, and dynamic contrast enhanced and were acquired from 1,5 (n=344) or 3 Tesla (n=61) with external phased array coils. The MRI index lesion was defined as the lesion with the highest PI-RADS score. The pathological index lesion was defined as the lesion with the greatest Gleason score. If there were multiple lesions with the same PI-RADS or Gleason score, the largest one was considered as the index lesion. A neighbouring method, dividing the prostate in 12 sectors, was applied to determine the concordance between mp-MRI findings and pathology reports for index lesion localization.

RESULTS: Out of the 405 patients, 385 (95%) had an index lesion identified on the mp-MRI and 20 (5%) had a normal mp-MRI. On pathology reports, the Gleason score was 6 in 113 (28%), 7 in 252 (62%) and $\geq$ 8 in 40 (10%) of the patients. The index lesion diameter was greater than 10mm in 336 (83%) patients. For index lesion detection, mp-MRI had a sensitivity of 63%, a specificity of 67% and a positive predictive value of 66%. Increased sensitivity was obtained for larger tumors on mp-MRI ($>$10mm, 194/275; 71%) and greater biopsy Gleason score tumors ($\geq$7, 147/202; 73%). In multivariate analysis, the detection of the index lesion by mp-MRI was significantly improved when the biopsy Gleason score was $\geq$ 7 (4+3) (p=0.001), the index lesion mp-MRI size was $>$ 10mm (p$<$0.001) and the prostate weight was $\leq$ 50g (p=0.017).

CONCLUSIONS: In this contemporary assessment, mp-MRI failed to localize the index lesion in up to 40% of cases. Larger tumor sizes on mp-MRI and higher Gleason scores on biopsy cores were associated with significantly higher sensitivity of mp-MRI for index lesion localization.

Table: Odds ratios for index lesion detection by multiparametric magnetic resonance imaging

	UNIVARIATE ANALYSIS			MULTIVARIATE ANALYSIS		
	Odds ratio	95% Confidence Intervals	P	Odds ratio	95% Confidence Intervals	P
PROSTATE WEIGHT			0.010			0.017
≤ 50g	1			1		
> 50g	0.56	0.37-0.87		0.58	0.36 – 0.90	
GLEASON OF BIOPSY			0.001			0.001
≤ 7 (3+4)	1			1		
≥ 7 (4+3)	3.39	1.71-7.45		3.51	1.73-7.86	
MRI INDEX LESION DIAMETER			<0.001			<0.001
≤ 10 mm	1			1		
> 10 mm	2.7	1.76-4.16		2.66	1.72-4.15	
PSA DENSITY	9.87	2.10-59.04	0.007			
TUMOUR FOCALITY			0.012			
Single	1					
no lesion	0.013	0.001-0.094				
Multifocal	1.05	0.68-1.62				
SEMINAL VESICLE INVASION			0.147			
0	1					
1	0.26	0.03-1.15				
PI-RADS SCORE			<0.001			
0-3	1					
4	9.37	3.14-37.05				
5	14.14	4.91-54.68				
MRI cT-STAGE			<0.001			
cT1 / cT2	1					
cT3	3.79	2.13-7.19				
RADIOLOGIST EXPERIENCE (year)			0.133			
> 10 y	1					
< 2 y	1.5	0.90-2.56				

Source of Funding: none

MP03-11

INSTITUTIONAL LEARNING CURVE ASSOCIATED WITH IMPLEMENTATION OF A MR/US FUSION BIOPSY PROGRAM USING PIRADS VERSION 2: FACTORS THAT INFLUENCE SUCCESS

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INTRODUCTION AND OBJECTIVES: MR/US fusion biopsy (FB) is a promising modality for detection of clinically significant prostate cancer (csPCa), defined as Gleason $>$=7 in patients who have had a prior negative biopsy. The purpose of this study is to assess the learning curve with adoption of FB using PI-RADS Version 2 (v2) for detecting csPCa and to identify patient and technical factors that predict success.

METHODS: A total of 113 consecutive patients with at least one prior negative biopsy and a multiparametric MRI (mpMRI) exam of the prostate with a PIRADS 3 or greater index lesion underwent FB at a single academic center previously naive to FB technology. Outcomes are detection rates for Gleason 6 cancer, csPCa, and any cancer. The following 22 covariates were analyzed: age, body mass index (BMI), PSA, prostate volume (MRI-estimated), prostate volume (US-estimated), PSAD (MRI-estimated), PSAD (US-estimated), time interval since the last negative SB, number of prior negative systematic biopsies, number of targeted biopsy cores of the index lesion, size of index lesion, PI-RADS v2 score, number of suspicious lesions on mpMRI, institution experience, surgeon, obesity, digital rectal exam (DRE), atypical small acinar proliferation (ASAP) on prior biopsy, high-grade prostatic intraepithelial neoplasia (HGPIN) on prior biopsy, and location of index lesion (zone, region, and sector). Multiple logistic regression with model selection was used to select covariates having significant effects on the outcome.