

N.N. Blohin Russian National Medical Research Center of Oncology

Preoperative staging of prostate cancer. Which modality of multiparametric MRI is the most sensitive and specific?

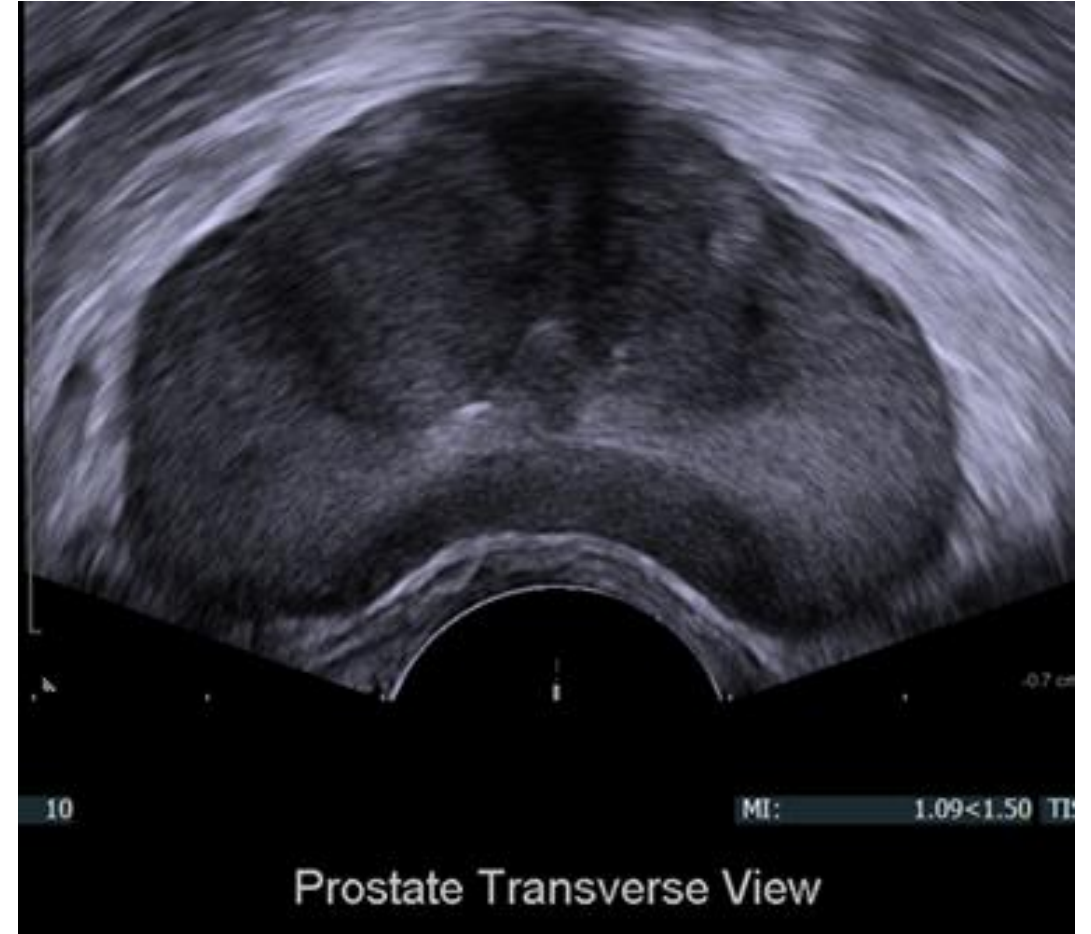
Kossov F., Olimov B., Kapustin V., Abdullin I., Kamolov B., Panov V., I. Tyurin

Background

- Local staging of prostate cancer (PCa) is a one of the main condition for choosing between radical prostatectomy (RP) and non-surgical methods (salvage radiation therapy).
- The increase of tumor spread beyond the capsule (pseudocapsule) of the prostate associate with the high risk of local recurrence after the RP
- The sensitivity of routine diagnostic techniques (TRUS, CT and morphological routine MRI) does not allow to reliably estimate the local staging.



Digital rectal examination (DRE)




Transrectal ultrasound (TRUS)

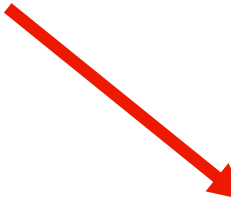
Role of 3.0 T multiparametric MRI in local staging in prostate cancer and clinical implications for radiation oncology

F. Couñago · M. Recio · E. del Cerro · L. Cerezo ·
A. Díaz Gavela · F. J. Marcos · R. Murillo ·
J. M. Rodríguez Luna · I. J. Thuissard · J. L. R. Martín

The overall accuracy of local staging



DRE and TRUS
9.0 % (3/33)



mpMRI
78.7 % (37/47).

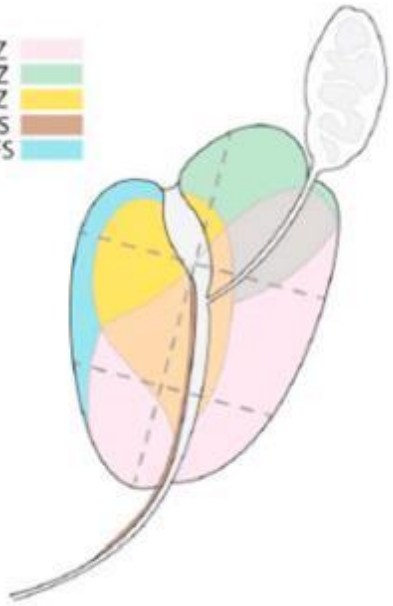


Staging and Treatment Planning of Prostate Cancer

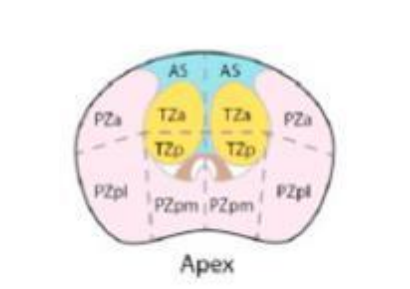
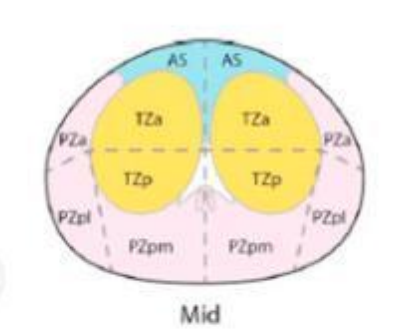
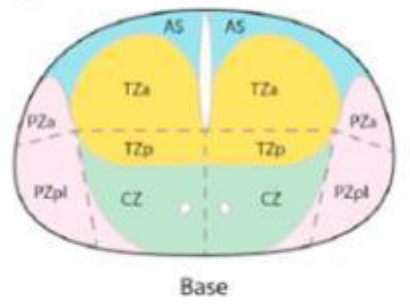
Role of mpMRI in staging Prostate Cancer

Even before it was being studied for localizing prostate cancer and guiding prostate biopsies, mpMRI was used for staging prostate cancer.³⁶ mpMRI has utility for assessing the presence/absence of significant cancer, prediction of organ confined disease (OC), prediction of extraprostatic (EPE)/extracapsular extension (ECE) of cancer, and assessment of seminal vesicle invasion. [Note: although EPE is often considered the preferred terminology for extraprostatic extension of prostate cancer due to the lack of a true capsule on the prostate, others use ECE; due to this, EPE and ECE may be used interchangeably]. Results of the mpMRI can be integrated into currently available clinical staging systems for risk stratification.

PZ
CZ
TZ
US
AFS



Seminal Vesicles
R L



Urethra

Dominant sequences¹

PI-RADS v.2



TZ

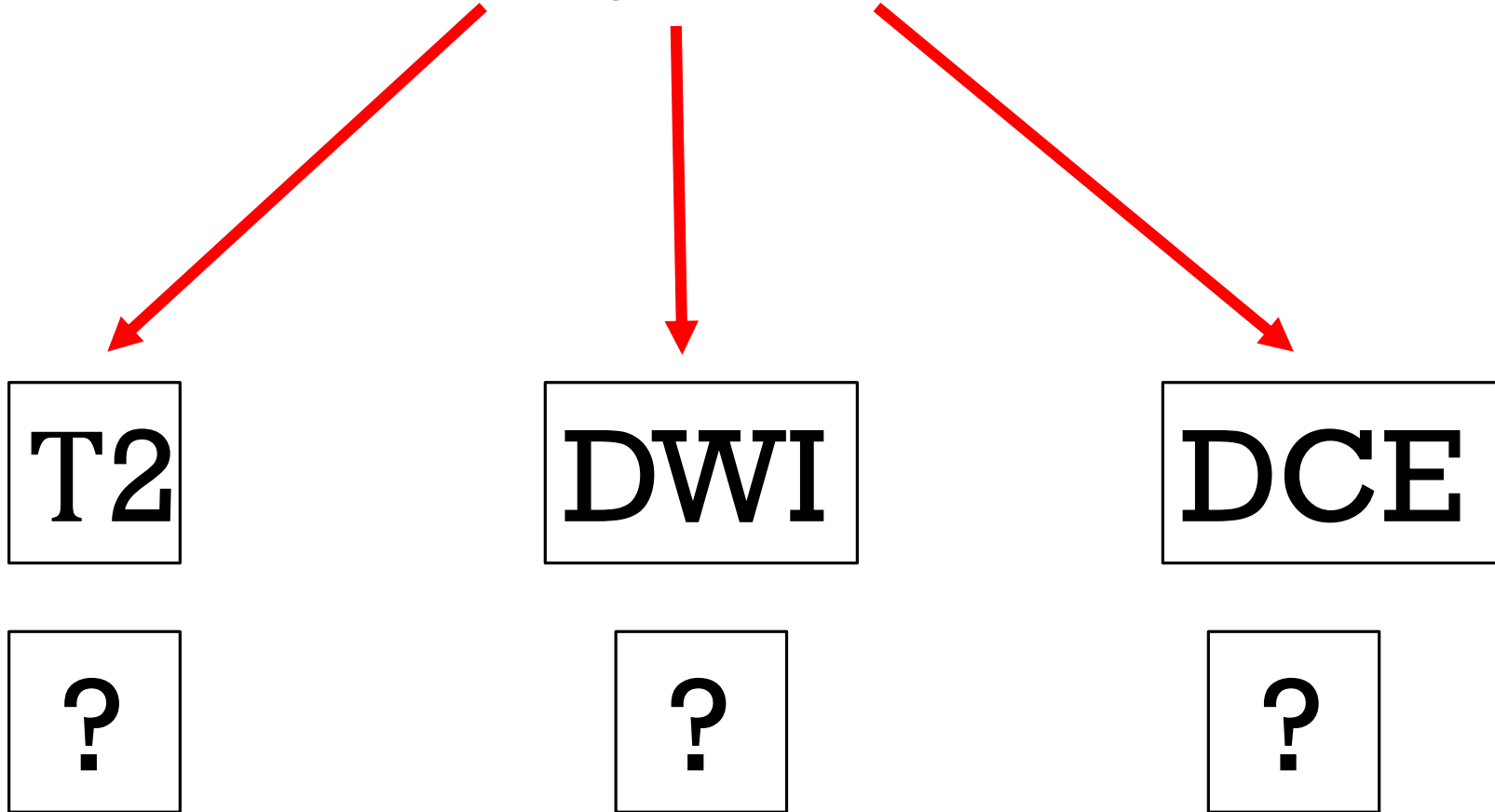
PZ



T2 WI

DWI

mpMRI



Materials and methods

- Preoperative mpMRI 112 men with a histologically verified PCa diagnosis were performed.
- The median age = 66 years (52 to 84 years old)
- The RP was performed in the next 2 weeks after the mpMRI.
- The statistical model based on binary logistic regression in comparison for mpMRI data and postoperative histopathology was used .

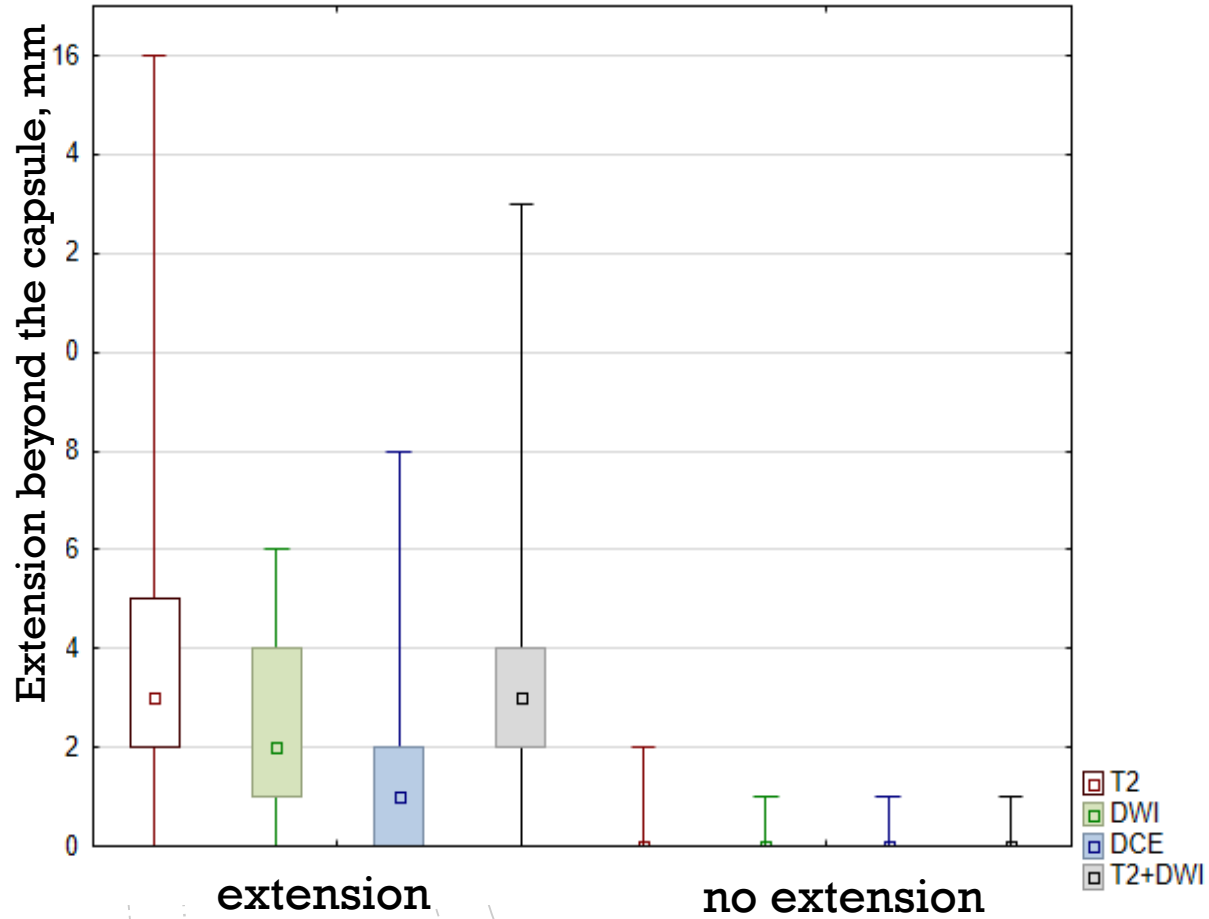
Parameters		Sensitivity	Specificity	Accuracy	NPV	PPV	
Localized PCa		92,3%	86,6%	89%	89,3%	85,0%	
EPE		87,5%	92,6%	91%	94,3%	84,0%	
SVI		85,0%	95,0%	90%	96,7%	80,9%	
Stage	T2a	T2b	T2c	T3a	T3b	T4	Total
Number of patients	25	10	33	42	21	3	112

T2

T3a

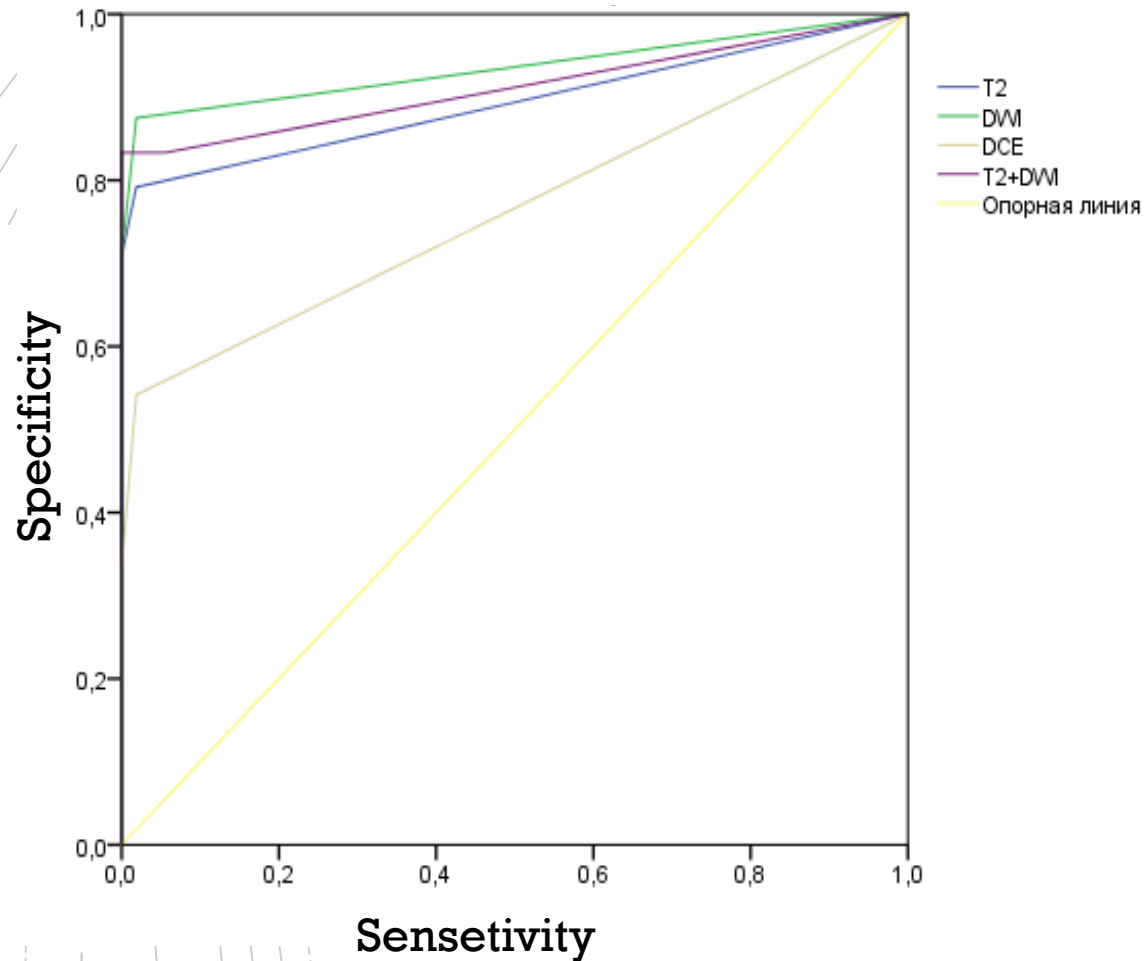
T3b

Median; Box: 25%-75%; Whisker: Min-Max



Comparison of the definition of prostate cancer spread beyond the capsule of the prostate for different types of images (T2, DWI, DCE, T2 + DWI) when using of Mann-Whitney U-test ($p=0.001$).

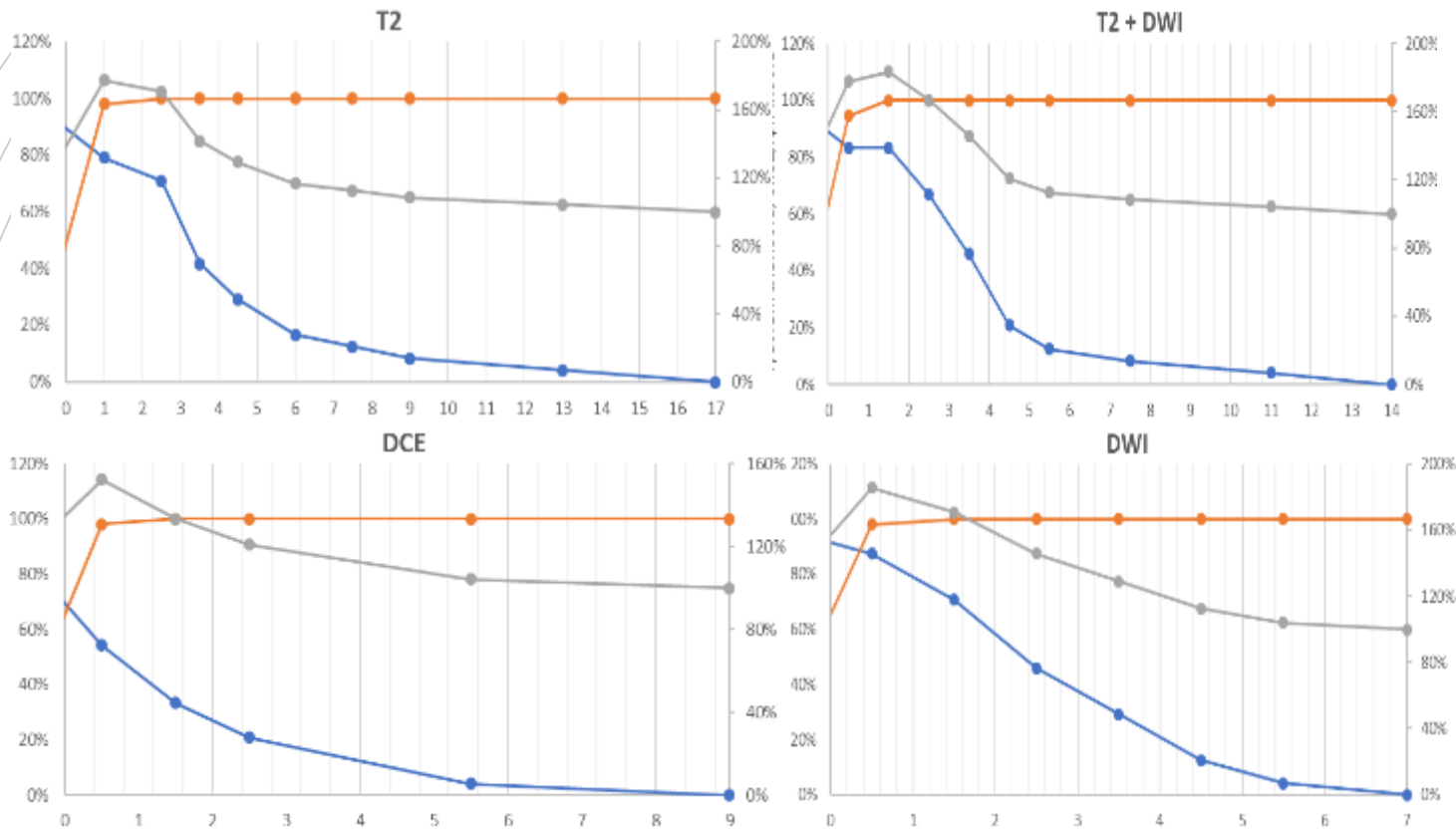
ROC curves



Parameter	AUC
T2	0,893
<u>DWI</u>	<u>0,935</u>
DCE	0,765
<u>DWI + T2</u>	<u>0,912</u>

ROC curves of the used images (T2, DWI, DCE, T2 + DWI) in assessing the sensitivity and specificity of the extracapsular extension for each of them.

Results

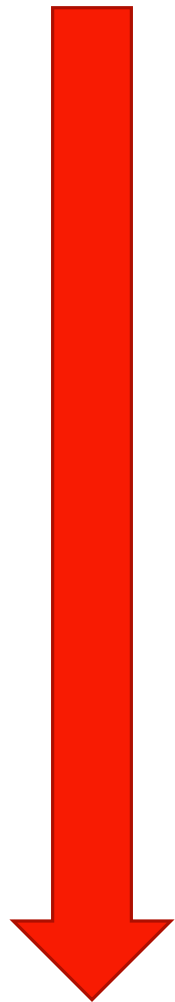


— Sensitivity
— Specificity
— Sensitivity + Specificity

Parameter	Sensitivity	Specificity	Extension beyond the capsule, mm
T2	79,2 %	98,1 %	1
DWI	87,5 %	98,1 %	0,5
DCE	54,2 %	98,1 %	0,5
T2+DWI	83,3 %	100,0 %	1,5

Comparative results in detection of extracapsular extension between binary model and radiologist

	Binary model	Radiologist
Sensitivity	91.7%	87.5%
Specificity	98.1%	92.6%
PPV	95.7%	84.0%
NPV	96.4%	94.3%
Accuracy	96.2%	91.0%

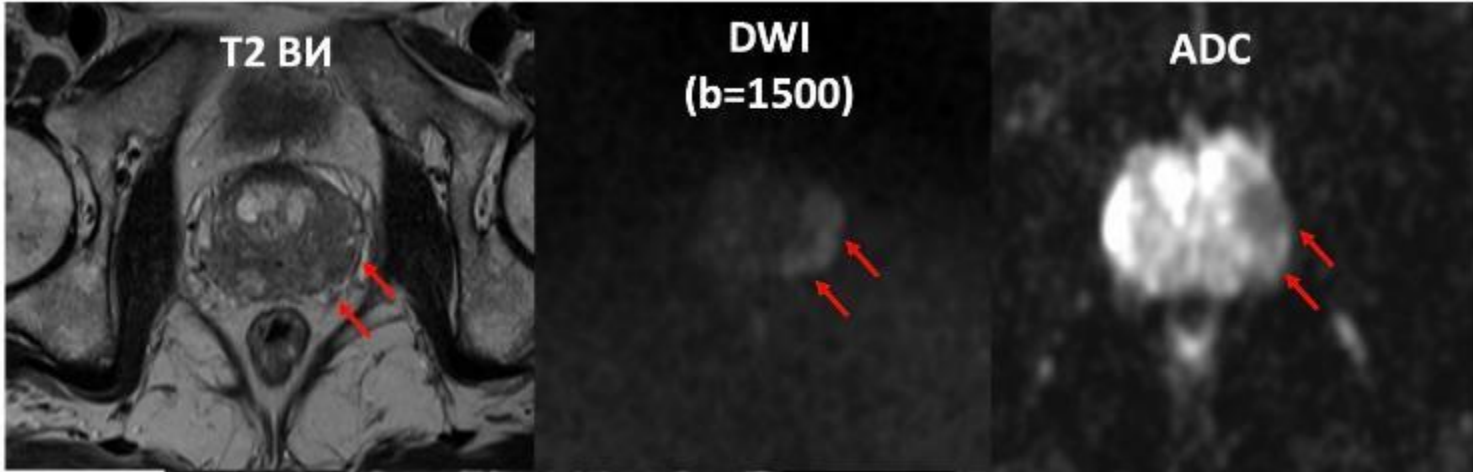


DWI

DWI + T2 WI

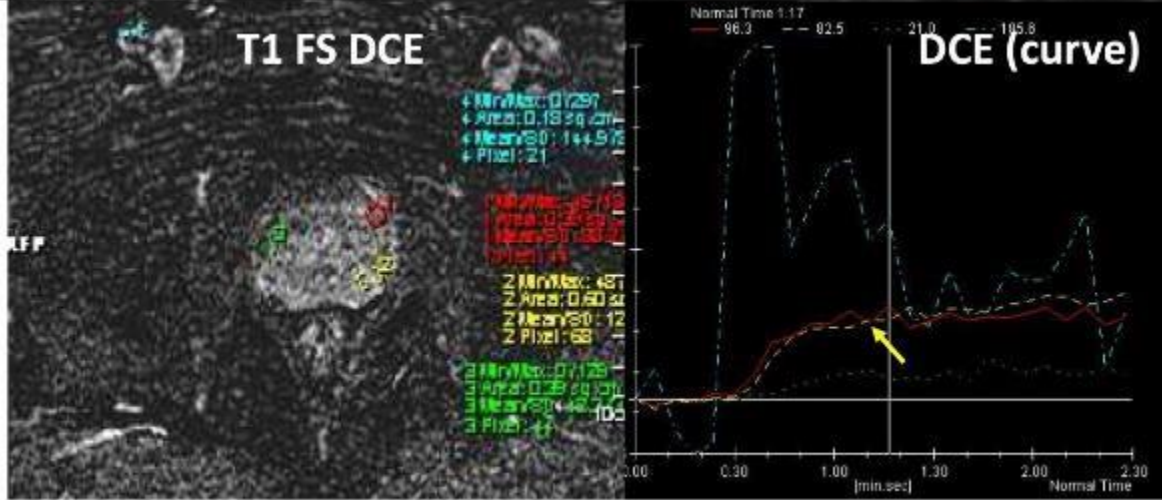
T2WI

DCE

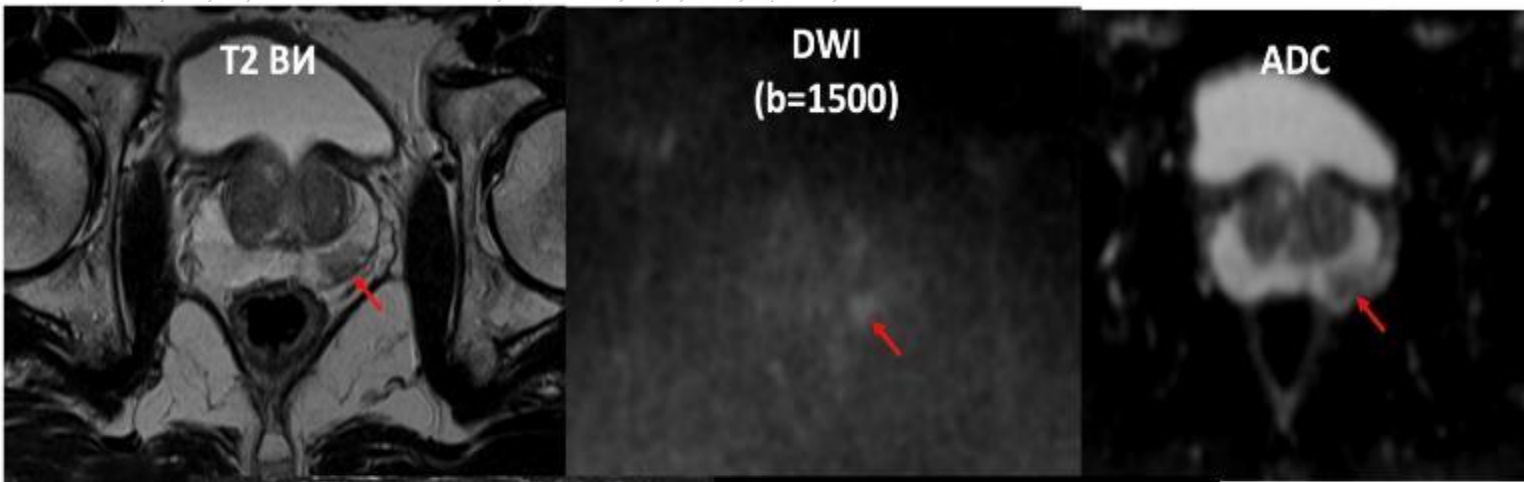


Patient A., 62 years, PSA = 8,3 ng/ml
 Primary biopsy - Gleason 8 (4+4).

MRI: PIRADS 5; ECE +; SVI -



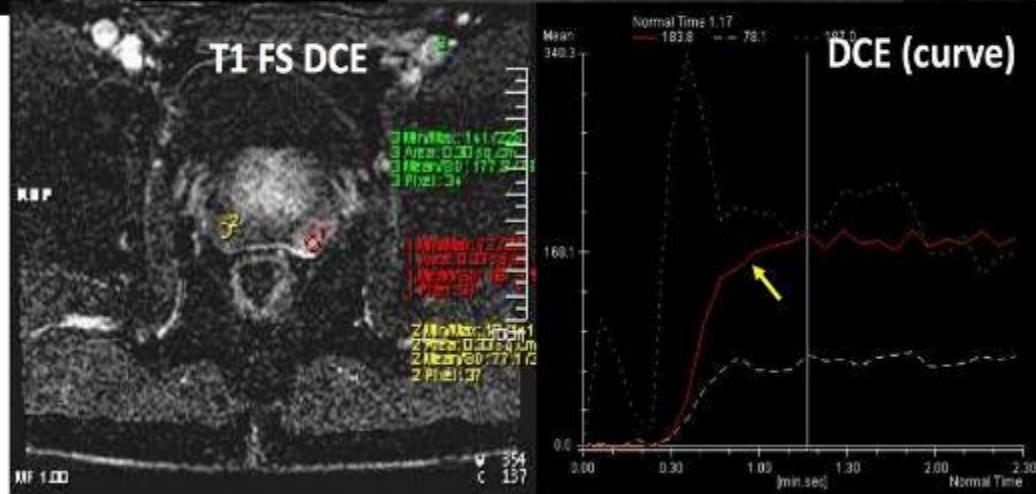
Pathohistological report after RP:
 Gleason 8 (4+4)
 pT3a pN0(0/12) R0.



Patient B., 75 years, PSA = 10,5 ng/ml
 Primary biopsy - Gleason 7 (3+4).

MRI: PIRADS 4; ECE -; SVI -

Pathohistological report after RP:
 Gleason 7 (3+4)
 pT2a pN0(0/12) R0.



Conclusion

- Data of mpMRI have high sensitivity, specificity, total accuracy rate, as well as high rates of NPV and PPV in the local staging of prostate cancer.
- According to the statistical model based on binary logistic regression the greatest contribution to the decision of the presence or absence of extracapsular extension of prostate cancer based on DWI.
- DWI is dominant sequences in assessing of T-stage of prostate cancer.

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Thank you for your attention!!!

e-mail: fil-doc@yandex.ru