Biopsy when suspicion of PCa
-when and how-

M. Pilar Laguna

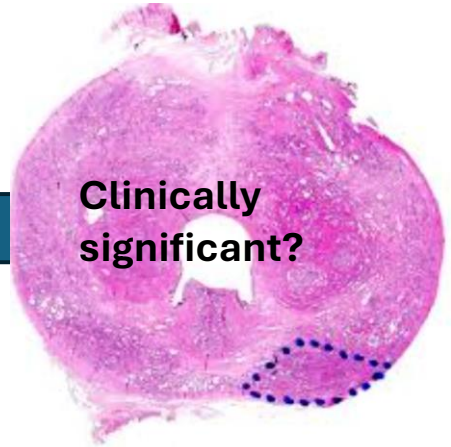
Istanbul Medipol University

Department of Urology

WE BRING UROLOGISTS TOGETHER

Prostate biopsy incidence

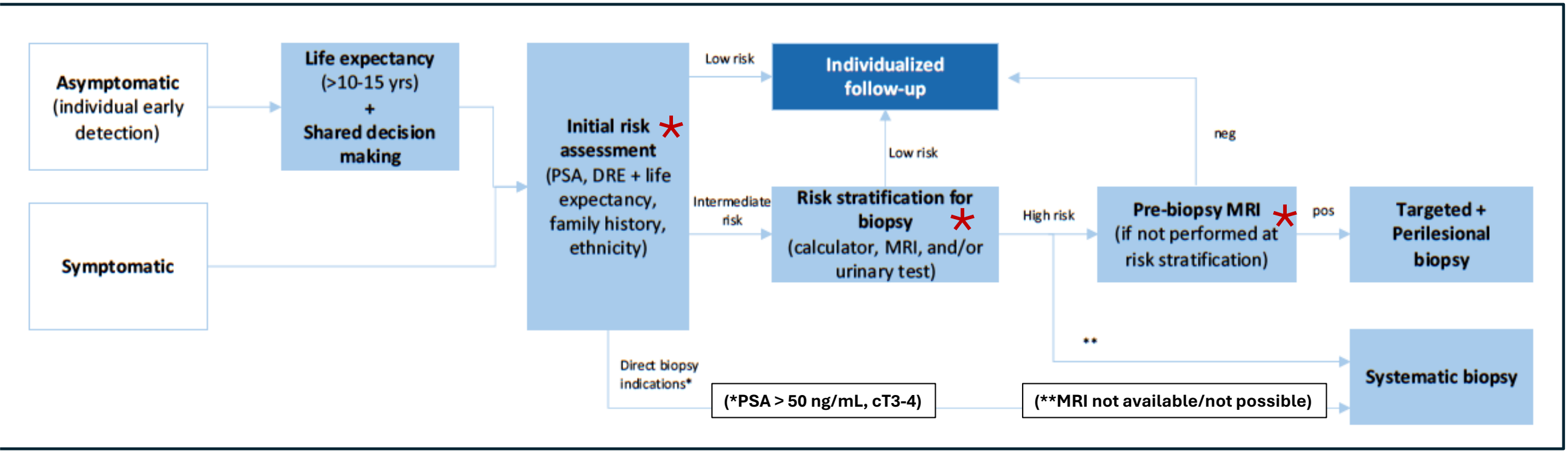
- One of the most commonly performed urological procedures .
- Systematic (± modifications) has been the gold standard
    - Increased number of cores
    - Saturation templates
- Problematic accuracy of the test and complications



2019 change in Guidelines recommendations

EAU Guideline 2024

Flow diagram deciding on prostate biopsy



The chosen diagnostic algorithm may be elected based on availability, expertise, and resources

Risk assessment

- Primary diagnostic tools (PSA, DRE, imaging)
- Family family history & PSA derivatives
- Life expectancy
- Risk calculators
  - Avoid MRI & biopsy in 22% to 37% of men
  - Depend on disease prevalence / frequent miscalibration.
    - ERSPC (http://www.prostatecancer-riskcalculator.com/seven-prostate-cancer-risk-calculators)
    - Prostate Cancer Prevention Trial (PCPT) (https://riskcalc.org/PCPTRC/).

Conditional pathways

- PSA+ MRI
- PSA + Risk calculators
- PSA + Risk calculators + MRI

(http://uroweb.org/guideline/prostate-cancer/)

A 66 years old caucasian man

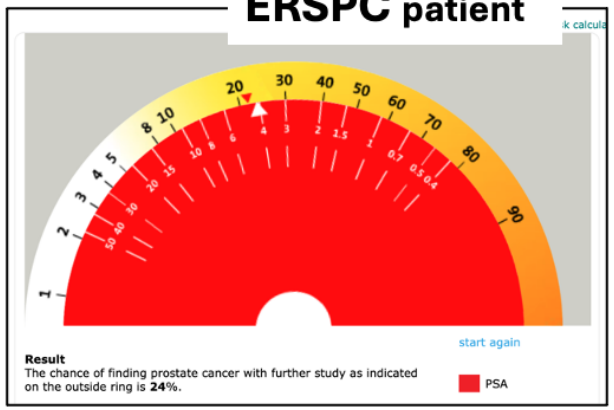
PSA 4.5ng/mL

No comorbidity

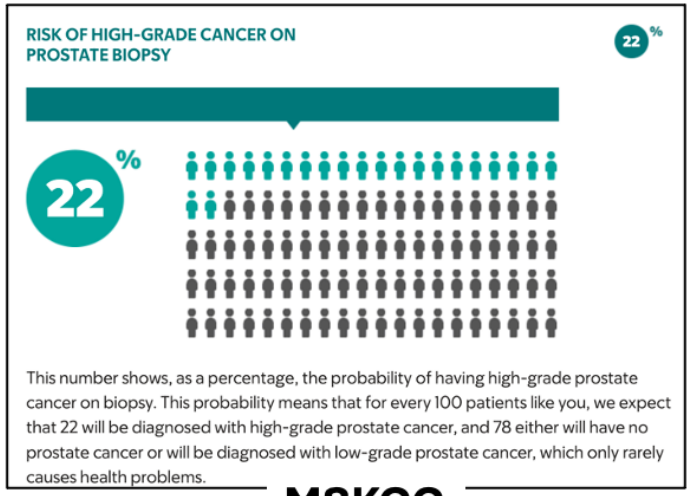
No family history of PCa

Biopsy naive

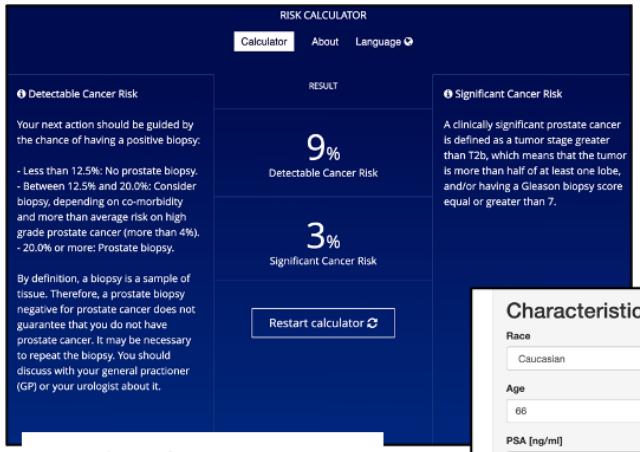
ERSPC patient



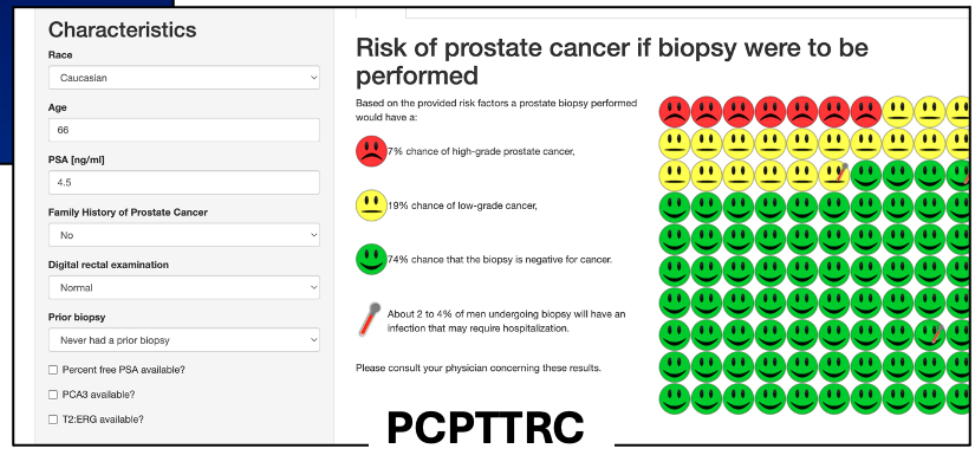
MSKCC



ERSPC physician

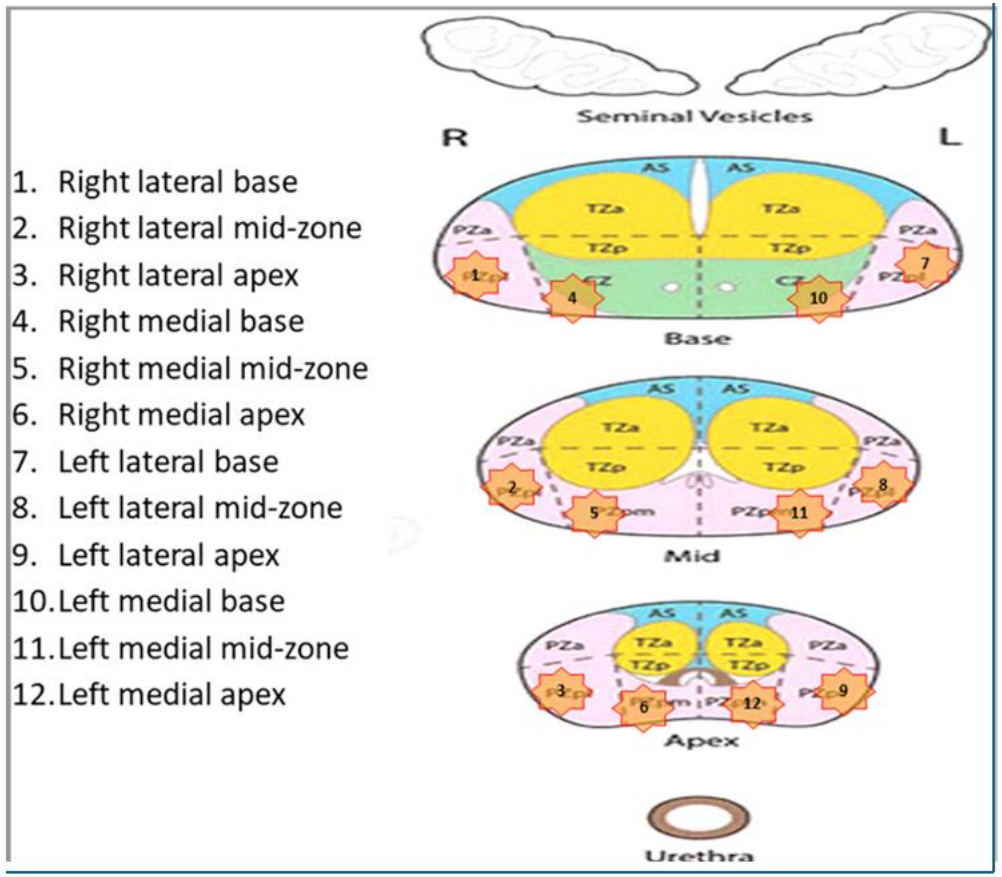


PCPTTRC



If mpMRI not available ….TRUS systematic biopsy

- Sampling bilateral (10-12 cores) from apex to base as far posterior and lateral as possible



Technique	Sensitivity	Specificity
TRUS Systematic (Grey scale)	39%-52%	81%-82%
Systematic TRUS + Hypoechoic	41%-96%	23%-82%
Target Doppler TRUS	40%	35%

Accuracy of 59%
False negative 30-45%
Systematic errors
Advanced mp US not better than mpMRI
High-resolution micro-US …. future?

mpMRI targeted or systematic biopsy

PRECISION

The NEW ENGLAND JOURNAL of MEDICINE
ESTABLISHED IN 1812 MAY 10, 2018 VOL. 378 NO. 19

MRI-Targeted or Standard Biopsy for Prostate-Cancer Diagnosis

V. Kasivisvanathan, A.S. Rannikko, M. Borghi, V. Panebianco, L.A. Mynderse, M.H. Vaarala, A. Briganti, L. Budäus, G. Hellawell, R.G. Hindley, M.J. Roobol, S. Eggener, M. Ghei, A. Villers, F. Bladou, G.M. Villeirs, J. Virdi, S. Boxler, G. Robert, P.B. Singh, W. Venderink, B.A. Hadaschik, A. Ruffion, J.C. Hu, D. Margolis, S. Crouzet, L. Klotz, S.S. Taneja, P. Pinto, I. Gill, C. Allen, F. Giganti, A. Freeman, S. Morris, S. Punwani, N.R. Williams, C. Brew-Graves, J. Deeks, Y. Takwoingi, M. Emberton, and C.M. Moore, for the PRECISION Study Group Collaborators*

PRECISE

JAMA Oncology | Original Investigation

Comparison of Multiparametric Magnetic Resonance Imaging–Targeted Biopsy With Systematic Transrectal Ultrasonography Biopsy for Biopsy-Naive Men at Risk for Prostate Cancer
A Phase 3 Randomized Clinical Trial

2021;7(4):534-542

Laurence Klotz, CM, MD; Joseph Chin, MD; Peter C. Black, MD; Antonio Finelli, MD; Maurice Anidjar, MD; Franck Bladou, MD; Ashley Mercado, MD; Mark Levental, MD; Sangeet Ghai, MD; Silvia D. Chang, MD; Laurent Milot, MD; Chirag Patel, MD; Zahra Kassam, MD; Caroline Moore, MD; Veeru Kasivisvanathan, MD; Andrew Loblaw, MD; Marlene Kebabdjian, BSc; Craig C. Earle, MD; Greg R. Pond, PhD; Masoom A. Haider, MD

4M

Head-to-head Comparison of Transrectal Ultrasound-guided Prostate Biopsy Versus Multiparametric Prostate Resonance Imaging with Subsequent Magnetic Resonance-guided Biopsy in Biopsy-naïve Men with Elevated Prostate-specific Antigen: A Large Prospective Multicenter Clinical Study

Marloes van der Leest[a], Erik Cornel[b], Bas Israël[a], Rianne Hendriks[c], Anwar R. Padhani[d], Martijn Hoogenboom[a], Patrik Zamecnik[a], Dirk Bakker[b], Anglita Yanti Setiasti[e], Jeroen Veltman[f], Huib van den Hout[f], Hans van der Lelij[g], Inge van Oort[c], Sjoerd Klaver[h], Frans Debruyne[i], Michiel Sedelaar[c], Gerjon Hannink[j], Maroeska Rovers[j], Christina Hulsbergen-van de Kaa[c,†], Jelle O. Barentsz[a,†,]*

EUROPEAN UROLOGY 75 (2019) 570–578

MR-FIRST

Use of prostate systematic and targeted biopsy on the basis of multiparametric MRI in biopsy-naive patients (MRI-FIRST): a prospective, multicentre, paired diagnostic study

*Olivier Rouvière, Philippe Puech, Raphaële Renard-Penna, Michel Claudon, Catherine Roy, Florence Mège-Lechevallier, Myriam Decaussin-Petrucci, Marine Dubreuil-Chambardel, Laurent Magaud, Laurent Remontet, Alain Ruffion, Marc Colombel, Sébastien Crouzet, Anne-Marie Schott, Laurent Lemaitre, Muriel Rabilloud, Nicolas Grenier, for the MRI-FIRST Investigators**

www.thelancet.com/oncology Vol 20 January 2019

PROMISE

Diagnostic accuracy of multi-parametric MRI and TRUS biopsy in prostate cancer (PROMIS): a paired validating confirmatory study

Hashim U Ahmed, Ahmed El-Shater Bosaily*, Louise C Brown*, Rhian Gabe, Richard Kaplan, Mahesh K Parmar, Yolanda Collaco-Moraes, Katie Ward, Richard G Hindley, Alex Freeman, Alex P Kirkham, Robert Oldroyd, Chris Parker, Mark Emberton, and the PROMIS study group†*

Lancet 2017; 389: 815–22

Cochrane Library
Trusted evidence.
Informed decisions.
Better health.
Cochrane Database of Systematic Reviews

[Diagnostic Test Accuracy Review]

rostate MRI, with or without MRI-targeted biopsy, and systematic iopsy for detecting prostate cancer

2019

Frank-Jan H Drost[1,2], Daniël F Osses[1,2], Daan Nieboer[2], Ewout W Steyerberg[3], Chris H Bangma[2], Monique J Roobol[2], Ivo G Schoots[1]

Study (no of included pax)	Comparison	Inclusion	Objectives	Outcomes
PRECISION (n 500, RCT non-inferiority)	Systematic biopsy vs MRI targeted Bx	Bx-naïve with suspicion, PSA ≤ 20ng/mL	Detection of PCa in PI-RADS ≥ 3 lesion	• mpMRI-TBx detects increasing % of cs PCa (with less cores) and fewer ci PCa than SBx • Around 27-49% of men avoid biopsy when pre-biopsy mpMRI is used to biopsy decision (***mpMRI pathway***) with only 5% of cs cancers missed • MRI pathway the most favourable diagnostic accuracy in cs PCa detection
PRECISE (n 423, RCT non-inferiority)	Systematic B (12 cores) vs MRI targeted Bx	Biopsy-naïve with suspicion and ≥5% chance of GG2 in PCPTRAC	Detection of cs PCa (GG ≥2) in both arms	
MR-FIRST4 (n 251, paired study)	Sytematic Bx + MRI targeted Bx (3 cores of PIRADS≥3)	Biopsy-naïve ≤T2c, PSA ≤ 20ng/mL	Detection of csISUP grade ≥2	
4M (n 626, head to head study)	mpMRI-MRGBx (in bore) with TRUS-Bx	B- naïve PSA ≥ 3ng/mL	Detection of csPCa (GG≥2)	
PROMIS (n 576, paired & validation study)	mpMRI-TRUS Bx (*index PIRADS-3*)+ TRUS-B (*standard*)+ TP-Bx mapping x 5mm (*reference*)	B-naïve PSA ≤ 15ng/mL	Precision of mpMRI in diagnostic of csPCa (Gleason≥ 4+3 / any Gleason 1-2 ≥ 6 mm)	

cs: clinically significant; B: biopsy ; mpMRGB : mpMRI guided biopsy

Pathway recommended in the 2024 EAU Guideline

Detection of clinically significant prostate cancer (ISUP grade 2 and higher)					
		PSA-density risk groups			
PI-RADS risk categories	Prevalence ISUP ≥ 2 PCa	Low < 0.10	Intermediate-low 0.10–015	Intermediate-high 0.15–0.20	High ≥ 0.20
Risk-adapted matrix table for biopsy decision management					
PI-RADS 1–2	6% (3-18%)	No biopsy	No biopsy	No biopsy	Consider biopsy
PI-RADS 3	16% (4-29%)	No biopsy	Consider biopsy	Highly consider biopsy	Perform biopsy
PI-RADS 4–5	62% (31-77%)	Perform biopsy	Perform biopsy	Perform biopsy	Perform biopsy

Remaining Questions

- ***Combination of biopsies (mpMRI-TBx & Systematic biopsy)?***

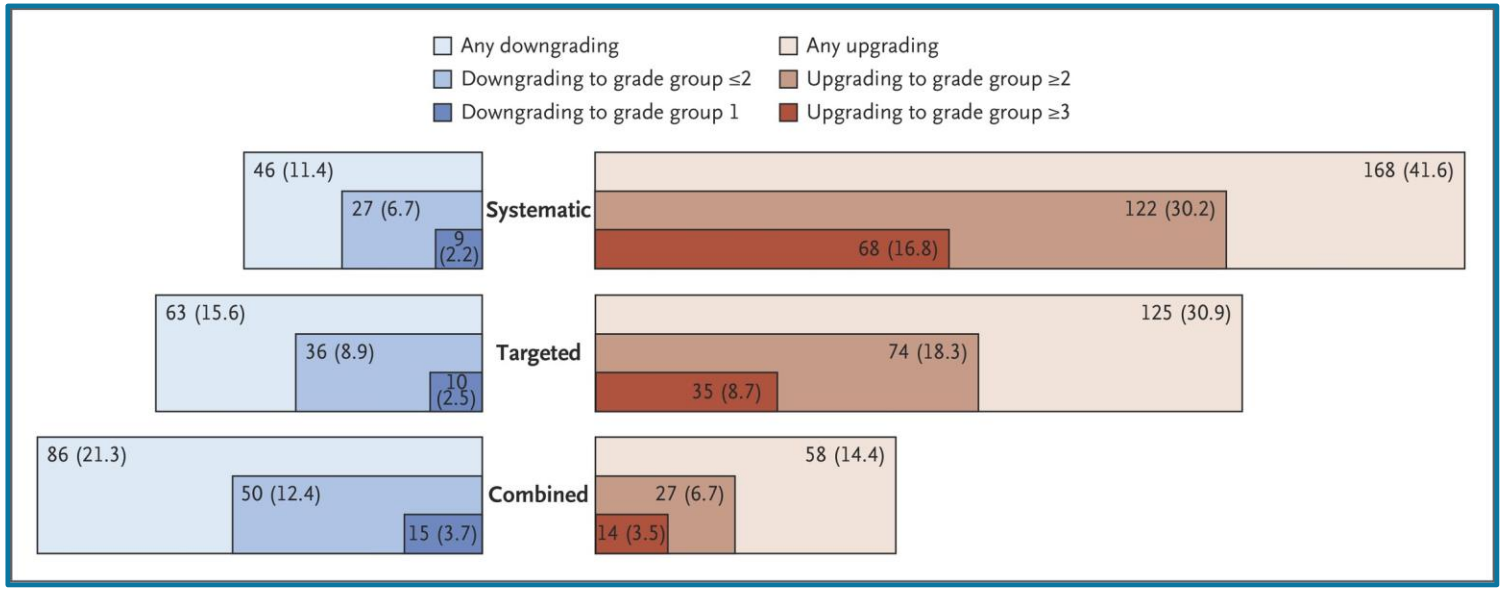
- Omitting SBx will miss ≈16% of all ISUP ≥2 and 18% of all ISUP ≥3 groups

- ***Absolute value of adding SBx to TBx in detection ISUP 2= 4-5.2%; in ISUP 3 = 1.2-2.8%***

- TBx + SBx = lowest upgrade at RP

- Systematic biopsy to be added when planning AS/ FT

Up and downgrading in whole mounted section. histopathology (404 pat RP)

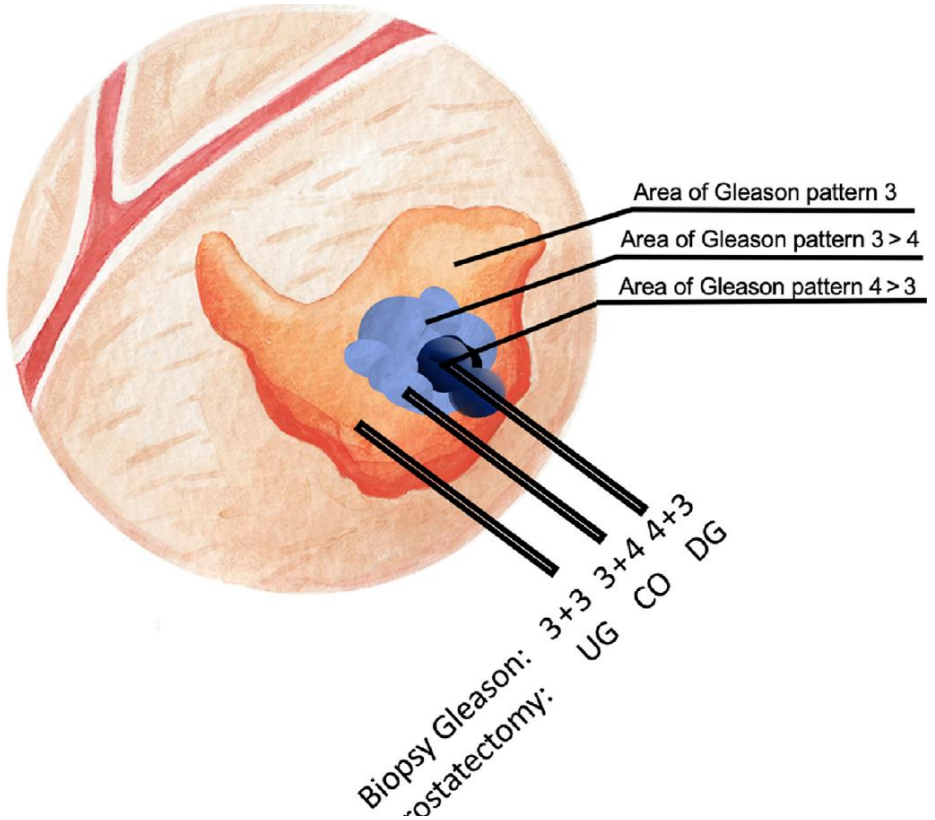


(Neale A et a. BJUI 2020; 126/ Ploussard G. et al. J Clin Med, 2020; 9/ Brisbane WG et al. Eur Urol, 2022; 82/ Ahdoot M at al,N Engl J Med, 220; 382)

Remaining Questions

- ***How many cores of the PI-RADS lesion?***
  - 3-6 transrectal cores (no solid data on number for trasperineal-Bx)
  - At leas 4 cores in PI-RADS 3; in lesion > 10 mm, 2 cores

- ***Perilesional (regional) biopsy?***
  - 90% of the cs cancers found between 10 mm of the he ROI .
  - Additional cores (n=6) in affected quadrant detect 97% of cs Cancer.

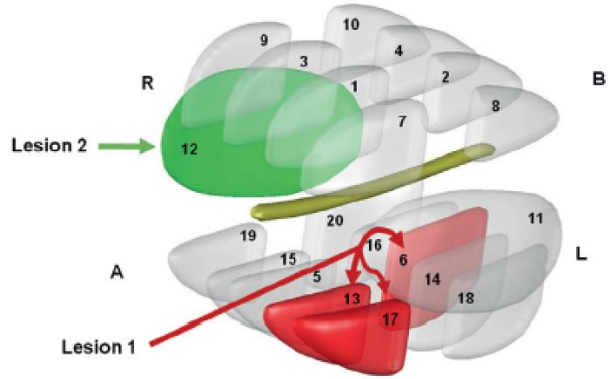


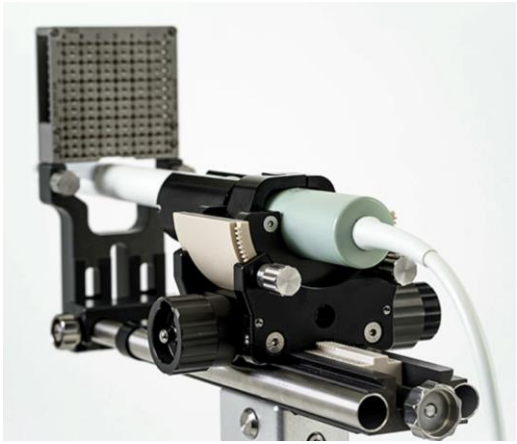
(Neale A et a. BJUI 2020; 126/ Ploussard G. et al. J Clin Med, 2020; 9/ Brisbane WG et al. Eur urol, 2022; 82)

Perineal templates

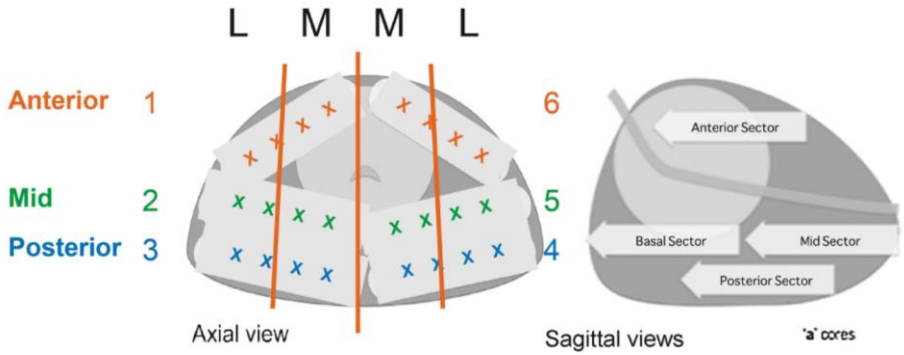
- Adress the inefficient sampling of TRUS systematic biopsy (anesthesia, perineal grid & biplanar transducer)

Transperineal template biopsy





Ginsburg TP biopsy protocol



18-75 sampling cores every 5 mm
Detection of 95% cancers
Increased detection of cs cancer
8.5% Hematuria and 12% AUR

24-38 systematic cores targeting PZ; avoids transition and periurethral zones
Increase to 62% cancer detection (Δ +18% TRUS)
Detection of 75% of cs cancers
Reduces AUR to 1.7%

(Devetzis K et al. Research and Reports in Urology, 2021; 13)

PREVENT

EUROPEAN UROLOGY 86 (2024) 61–68

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Prostate Cancer – Editor's choice

Transperineal Versus Transrectal Magnetic Resonance Imaging–targeted and Systematic Prostate Biopsy to Prevent Infectious Complications: The PREVENT Randomized Trial

Jim C. Hu[a,], Melissa Assel[b], Mohamad E. Allaf[c], Behfar Ehdaie[d], Andrew J. Vickers[b], Andrew J. Cohen[c], Benjamin T. Ristau[e], David A. Green[f], Misop Han[c], Michael E. Rezaee[c], Christian P. Pavlovich[c], Jeffrey S. Montgomery[g], Keith J. Kowalczyk[h], Ashley E. Ross[i], Shilajit D. Kundu[i], Hiten D. Patel[i], Gerald J. Wang[f], John N. Graham[j], Jonathan E. Shoag[k], Ahmed Ghazi[c], Nirmish Singla[c], Michael A. Gorin[l], Anthony J. Schaeffer[i], Edward M. Schaeffer[i]*

PERFECT

EUROPEAN UROLOGY ONCOLOGY 7 (2024) 1080–1087

available at www.sciencedirect.com
journal homepage: euoncology.europeanurology.com

European Association of Urology

Transperineal Versus Transrectal Magnetic Resonance Imaging–targeted Biopsies for Prostate Cancer Diagnosis: Final Results of the Randomized PERFECT trial (CCAFU-PR1)

Guillaume Ploussard[a,], Eric Barret[b], Gaëlle Fiard[c], Louis Lenfant[d], Bernard Malavaud[e], Gianluca Giannarini[f], Christophe Almeras[g], Richard Aziza[e], Raphaële Renard-Penna[d], Jean-Luc Descotes[h], François Rozet[b], Jean-Baptiste Beauval[i], Ambroise Salin[a], Morgan Rouprêt[d]*

ProBE-PC

Vol. 212, 21-31, July 2024
Printed in U.S.A.

THE JOURNAL of UROLOGY®
www.auajournals.org/journal/juro

Clinically Significant Prostate Cancer Detection Following Transrectal and Transperineal Biopsy: Results of the Prostate Biopsy Efficacy and Complications Randomized Clinical Trial

Badar M. Mian,[1] Paul J. Feustel,[2] Asef Aziz,[1] Ronald P. Kaufman Jr,[1] Adrien Bernstein,[1] and Hugh A. G. Fisher[1]

Vol. 211, 205-213, February 2024
Printed in U.S.A.

THE JOURNAL of UROLOGY®
www.auajournals.org/journal/juro

Complications Following Transrectal and Transperineal Prostate Biopsy: Results of the ProBE-PC Randomized Clinical Trial

Badar M. Mian,[1] Paul J. Feustel,[2] Asef Aziz,[1] Ronald P. Kaufman Jr,[1] Adrien Bernstein,[1] Svetlana Avulova,[1] and Hugh A.G. Fisher[1]

MRI guided TRUS fusion: Transperineal or Transrectal?

Main outcome detection rates of csPCa (ISUP ≥ 2)
Secondary objectives: detection of ciPCa (ISUP 1), complications and pain.

	PREVENT	ProBE-PC	PERFECT
Overall PCa detection	TR 72% / TP 70%	TR 72% / TP 70.4%	TR 54.2% /TP 47.2%
cs PCa (ISUP ≥ 2) *	TR 50% / TP 53%	TR 47% / TP 43.2%	-
Composite complications	TR 2.8% / TP 1.4%	TR 4.3% / TP 4.9 %	TR 40.5% / TP 35.7%
Infectious complications	TR 4% / TP 0%	TR 2.6% / TP 2.7%	TR 2.3% / TP 2.3%
Sepsis	Both groups 0	Both groups 0	TR 0.8% / TP 0%
Urinary retention	TR 0.3% / TP 1.1%	TR 0.3% / TP 0.3%	TR 3.1% TP 2.34%

* No statistical difference in detection of ISUP≥ 3

(Zattoni F et al. Eur Urol , 2024; 7: 1303)

EUROPEAN UROLOGY ONCOLOGY 7 (2024) 1303–1312

available at www.sciencedirect.com
journal homepage: euoncology.europeanurology.com

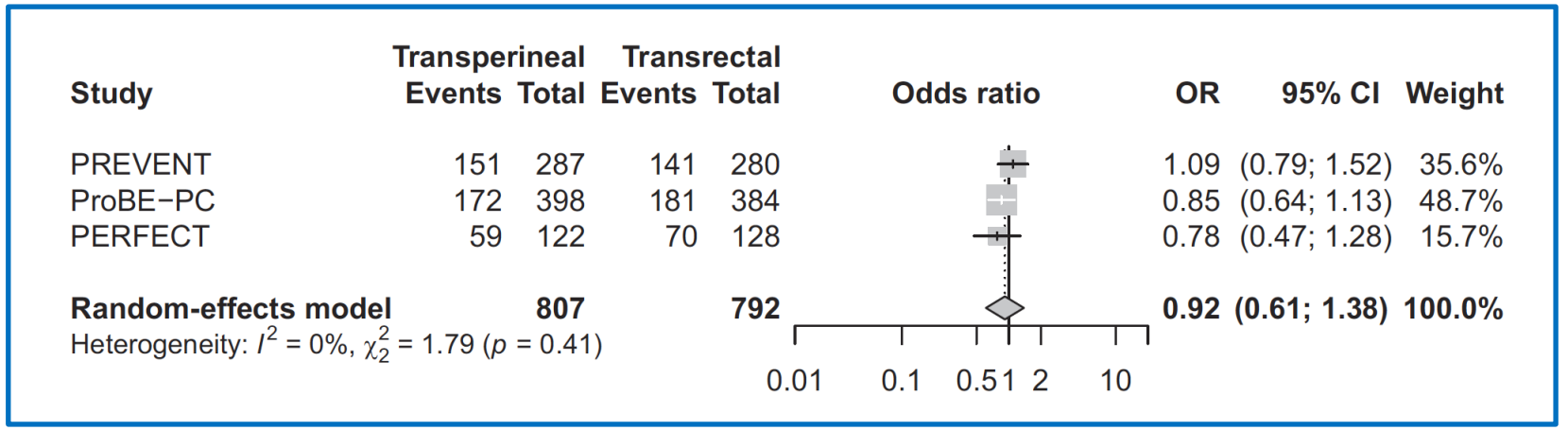
European Association of Urology

Review

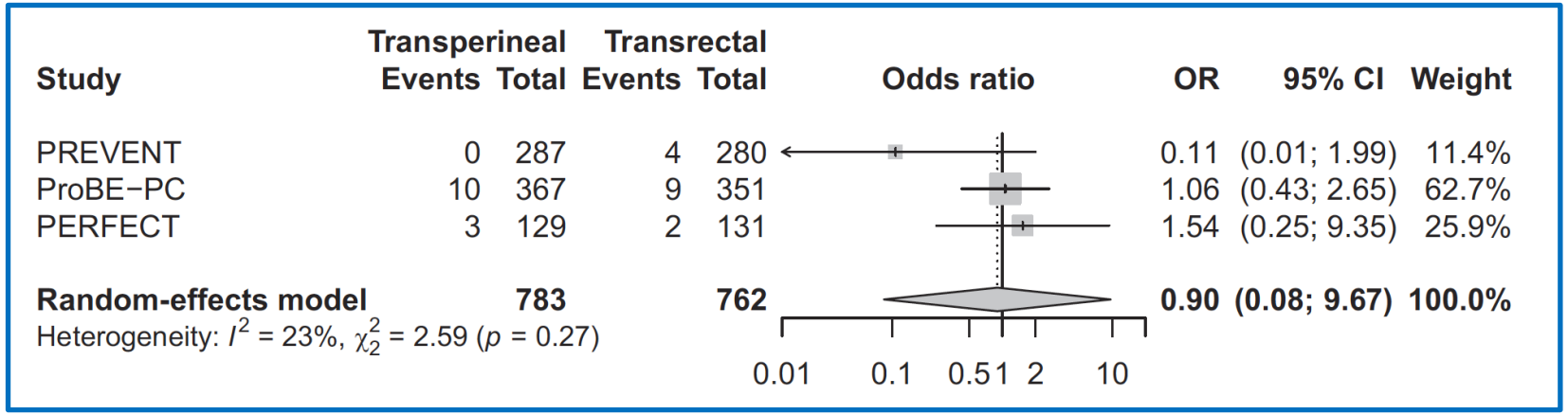
Transperineal Versus Transrectal Magnetic Resonance Imaging–targeted Prostate Biopsy: A Systematic Review and Meta-analysis of Prospective Studies

Fabio Zattoni [a,b,], Pawel Rajwa [c,d], Marcin Miszczyk [c,e], Tamás Fazekas [c,f], Filippo Carletti [a], Salvatore Carrozza [a], Francesca Sattin [a], Giuseppe Reitano [a], Simone Botti [a], Akihiro Matsukawa [c,g], Fabrizio Dal Moro [a], R. Jeffrey Karnes [h], Alberto Briganti [i], Giacomo Novara [a], Shahrokh F. Shariat [c,j,k,l,m,n,o,p], Guillaume Ploussard [q], Giorgio Gandaglia [i]*

csPCa detection of MRI-TBx comparing TR and TP



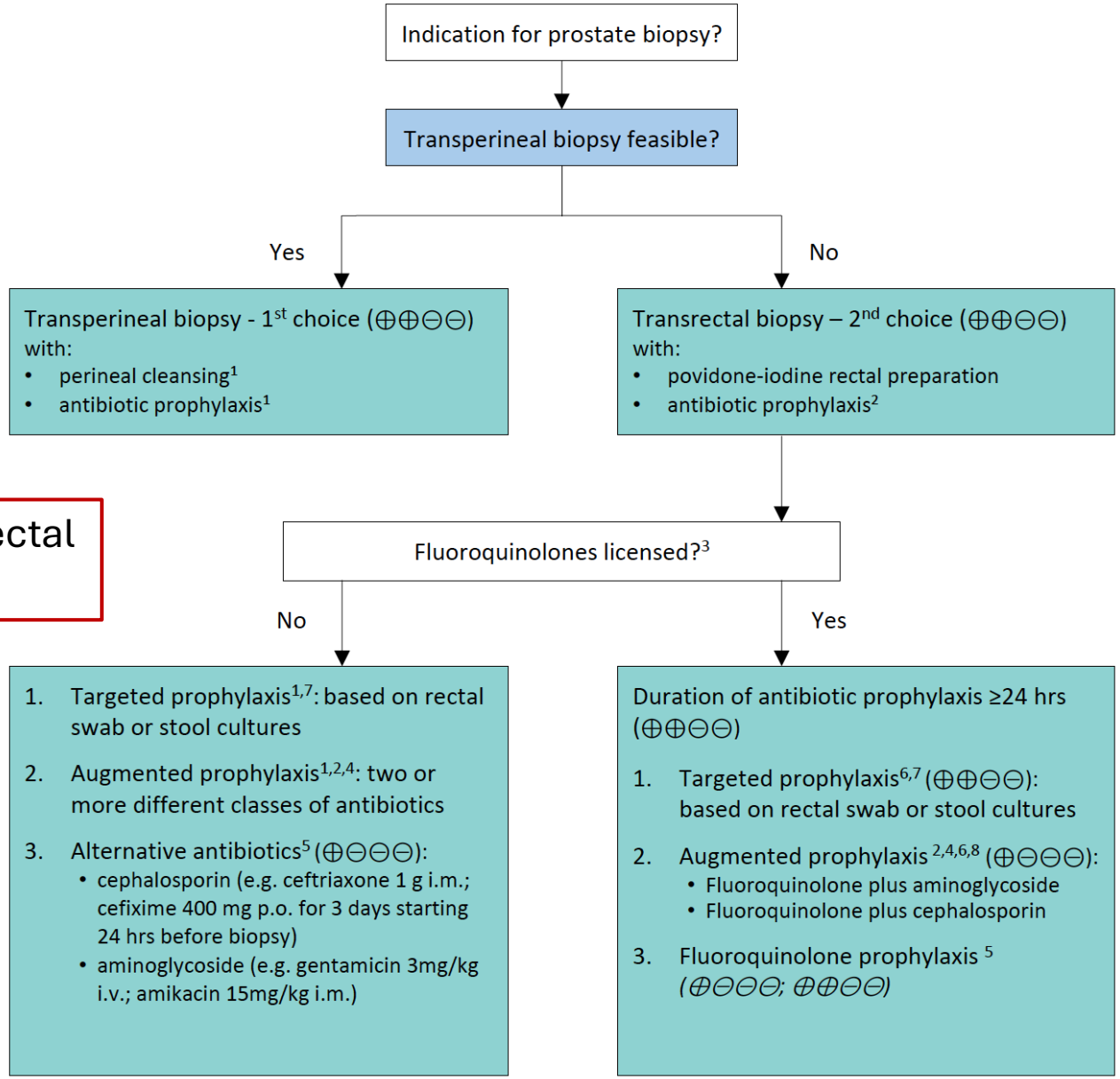
Infections of MRI-TBx comparing the TR and TP



- In posterior lesions higher detection in the TR group (59% vs 44%; p = 0.04)
- Anterior lesions higher but not significant, detection rates in the TP
- Severe pain and discomfort slightly higher for TP-TBx (diversity in anaesthetic practices)

Approach and peri-biopsy care
EAU 2024

FQR organisms found in 10–30% of rectal swab culture before Prostate biopsy



1. *Two systematic reviews including non-RCTs and three RCTs + 1 SR of RCT describe comparable rates of post-transperineal biopsy without antb) and Transrectal biopsy with antibiotics prophylaxis.*
2. *Be informed about local antimicrobial resistance.*

In conclusion...

- If prostate mpMRI is available, the most effective and clinically sound management is to follow the MRI-pathway (pre-biopsy mpMRI as decision-maker).

- If pre-biopsy mpMRI is not feasible, sytematic biopsy with at least 10-12 cores.

- TP-TBx and TR-TBx show similar PCa detection, comparable rates of infections, urinary retention, and of biopsy-associated pain. Major advantage of the TP is the avoidance of antibiotic prophylaxis to minimize antibiotic resistance.

- TP-TBx is preferable over TR-TBx and strongly recommended when AS or FT are foreseen.