

European Prostate Cancer Awareness Day

17 November 2020



Early Detection of Prostate Cancer: Role of MRI

Prof. Jelle Barentsz

Radboudumc Prostate MRI Reference Center

WHAT IS MULTI-PARAMETRIC MRI



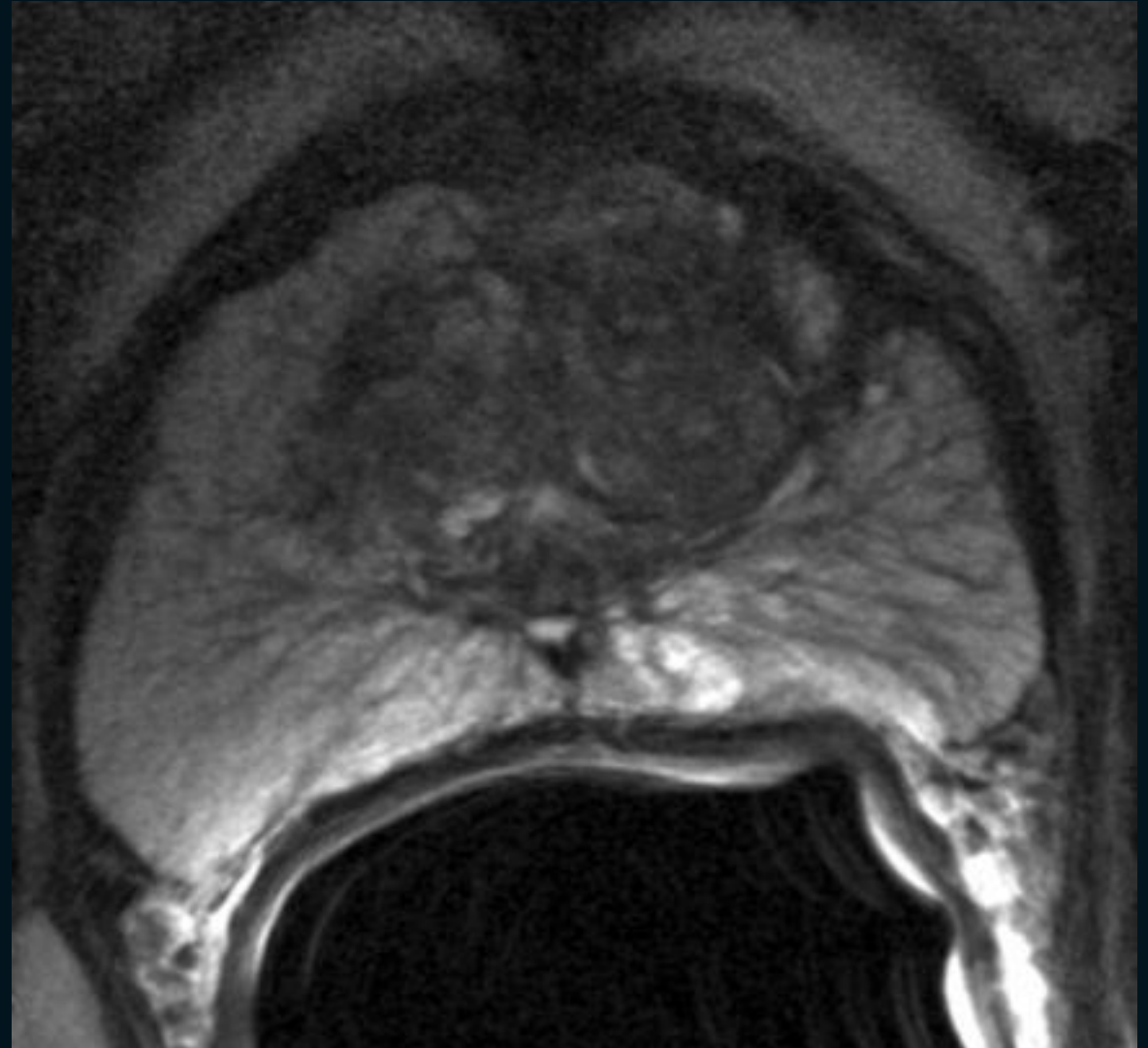
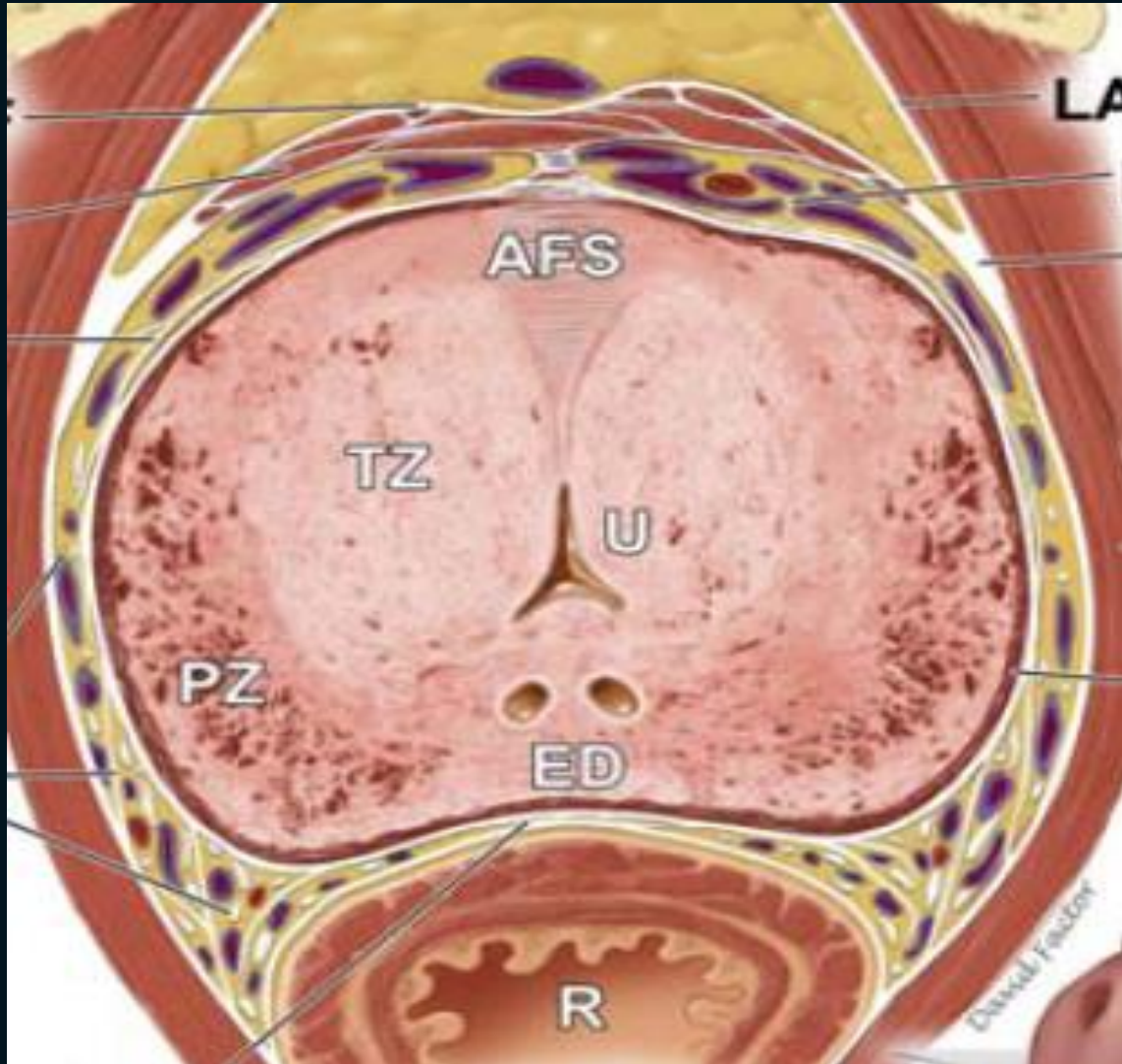
Integration of 3 techniques

Prostate MRI = multi-parametric MRI

ANATOMY

T2-Weighted
Imaging (T2W)

ANATOMY: T2W



ANATOMY: T2W



Lower SI: PCa + hematoma + prostatitis + BPH

Prostate MRI = multi-parametric MRI

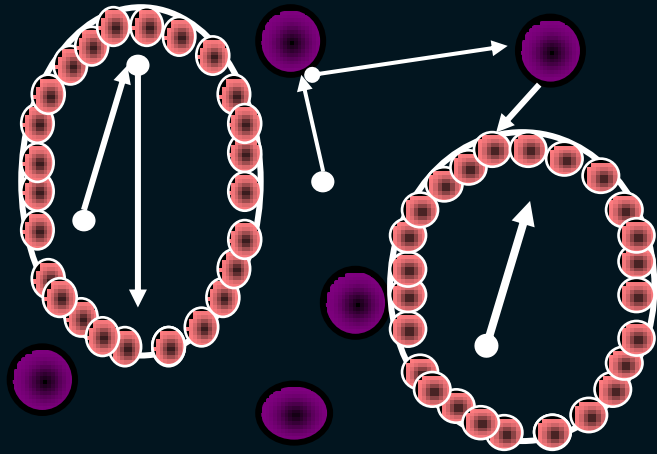
ANATOMY

T2-Weighted
Imaging (T2W)

BIOLOGY

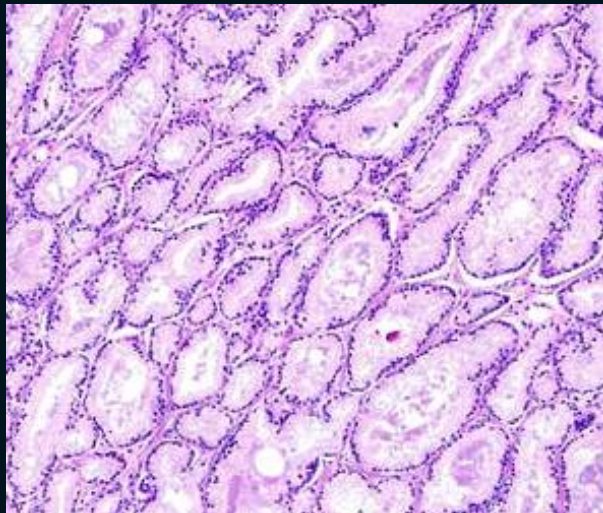
Diffusion Weighed
Imaging (DWI)

BIOLOGY (Cell Density): DWI

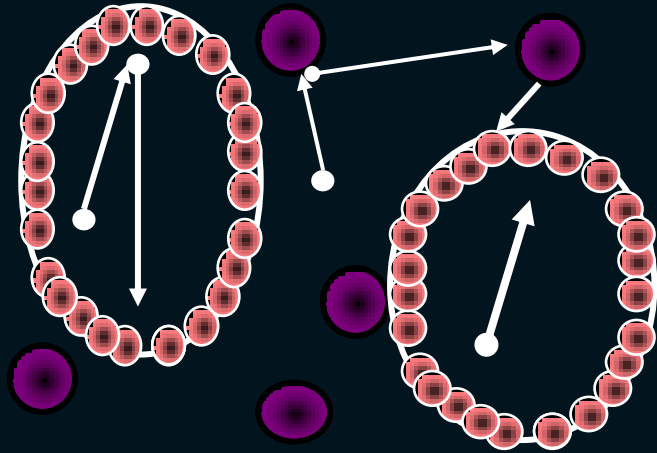


Glandular tissue

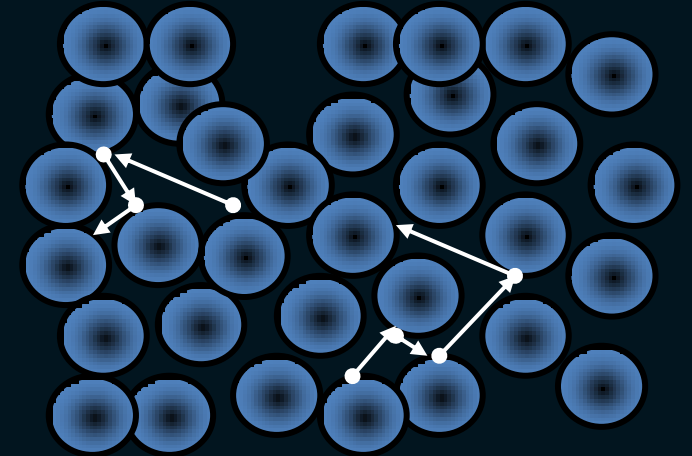
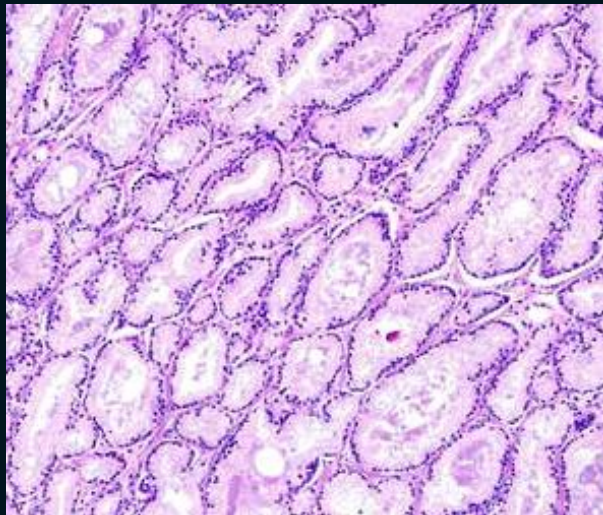
Gleason 1-2: low-grade



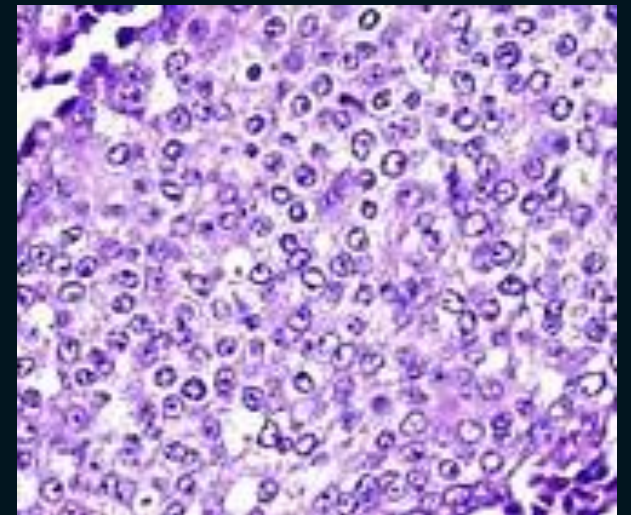
Cell Density: DWI



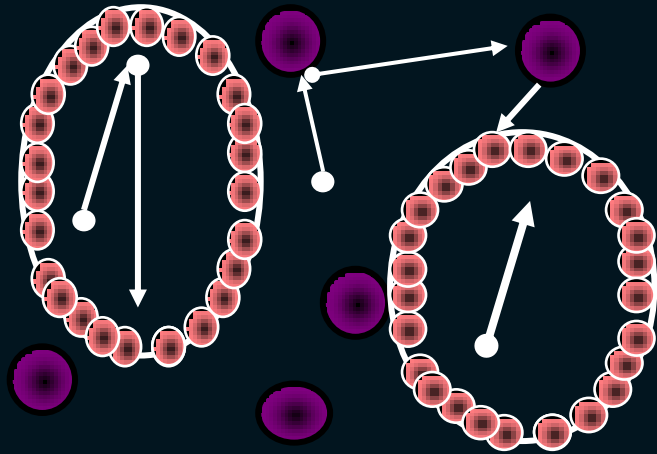
Glandular tissue
Gleason 1-2: low-grade



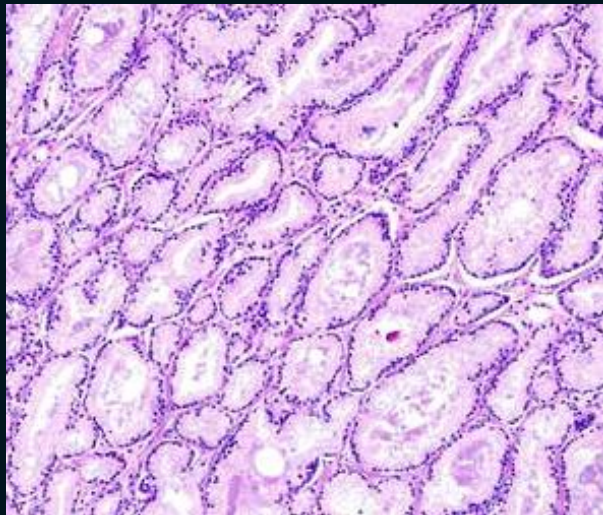
Tightly packed cells
Gleason 5: high-grade



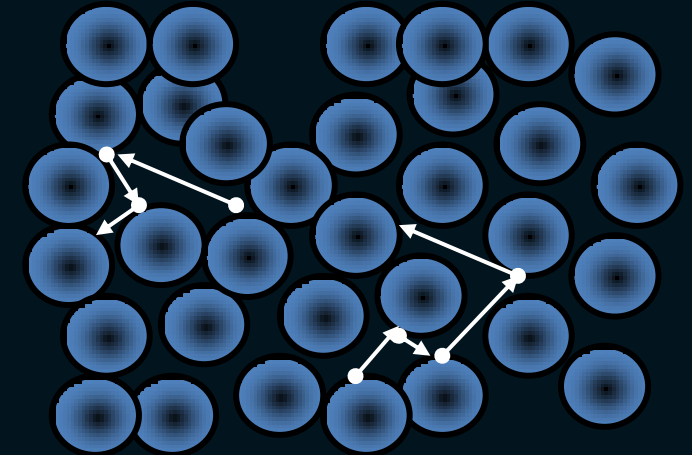
Cell Density: DWI



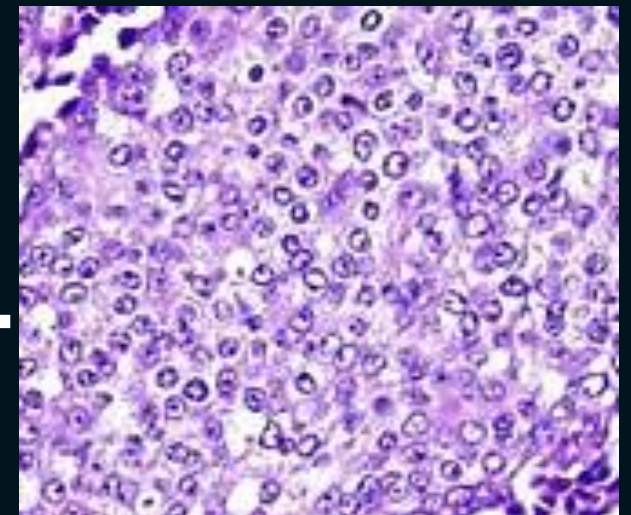
Glandular tissue
Gleason 1-2: low-grade



ADC: Velocity Map



Tightly packed cells
Gleason 5: high-grade



Prostate MRI = multi-parametric MRI

ANATOMY

T2-Weighted
Imaging (T2W)

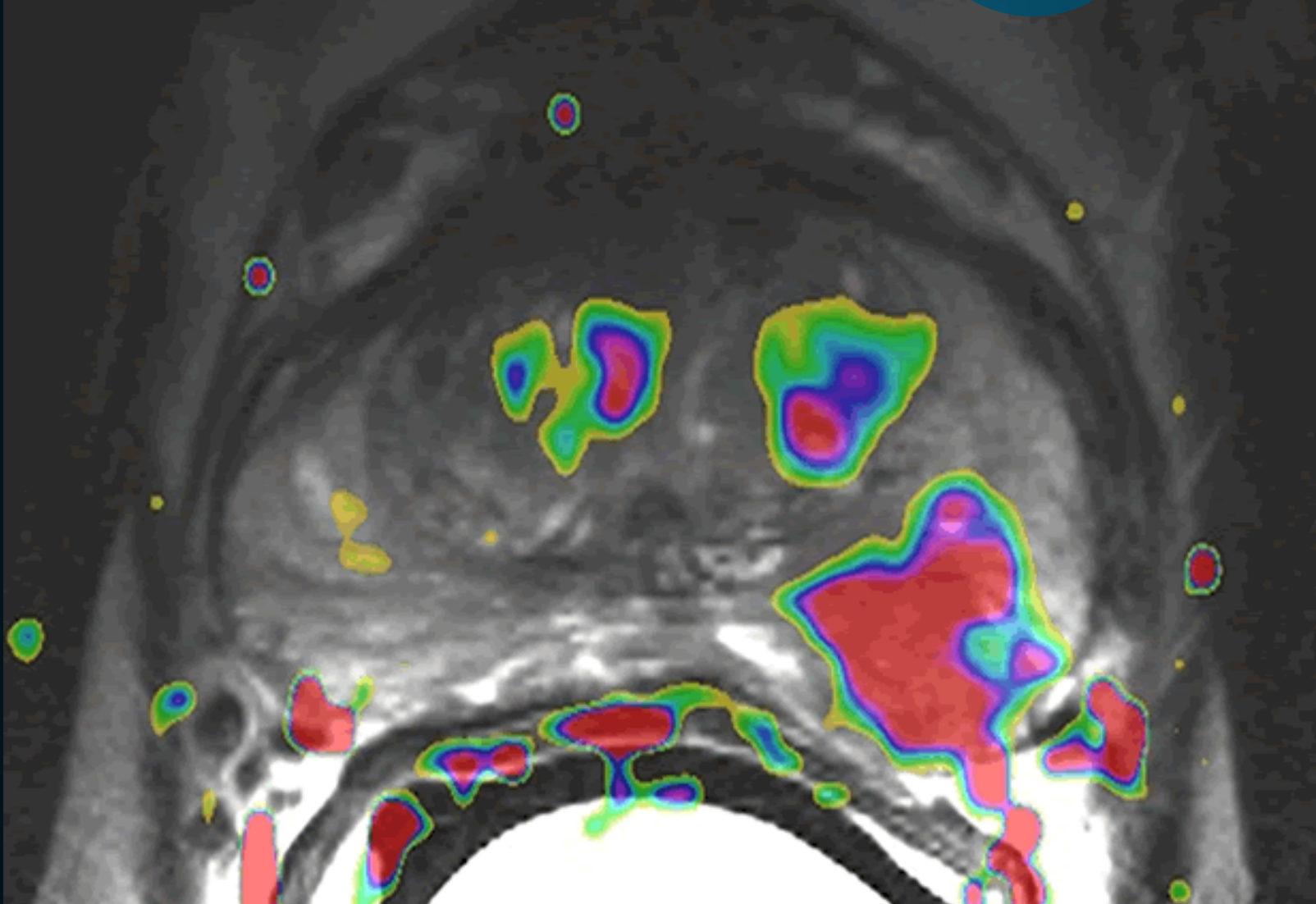
BIOLOGY

Diffusion Weighed
Imaging (DWI)

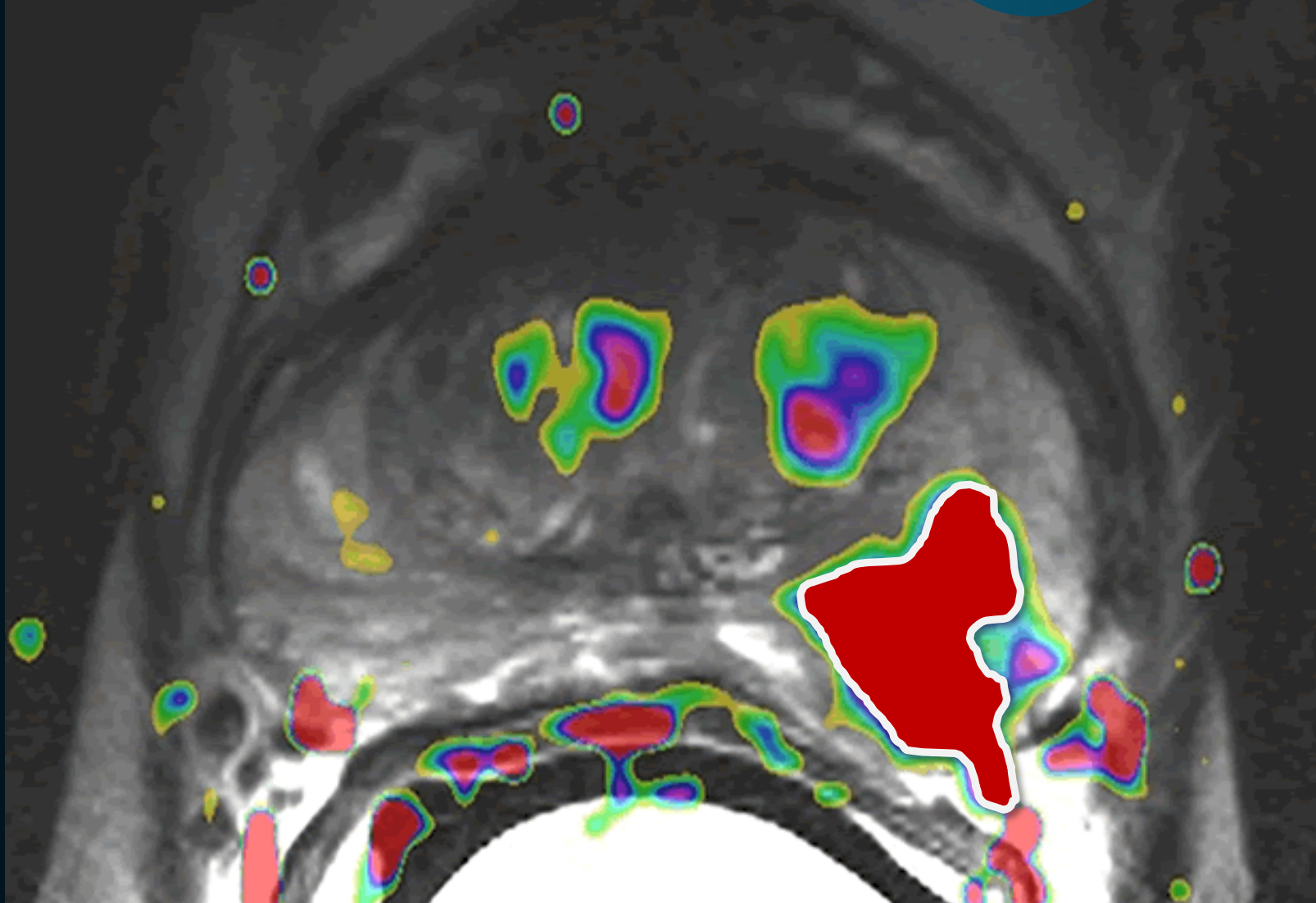
VASCULARITY

Dynamic Contrast
enhanced

VASCULARITY: T2W



VASCULARITY: T2W



WHY

PROSTATE MRI?

Four Level 1A Evidence Papers → MRI before biopsy



THE LANCET
Oncology
 Available online 21 November 2018
 In Press, Corrected Proof

Articles

Use of prostate systematic and targeted biopsy on the basis of multiparametric MRI (MRI-FIRST): a diagnostic study

Prof Olivier Rouvière MD a

ORIGINAL ARTICLE

MRI-Targeted or Standard Biopsy for Prostate-Cancer Diagnosis

V. Kasivisvanathan, A.S. Rann, M.H. Vaarala, A. Briganti, L. B. S. Eggener, M. Ghej, A. Villers, F. P.B. Singh, W. Venderink, B. S. Crouzet, L. Klotz, S.S. Taneja, S. Morris, S. Punwani, N.R. W. M. Emberton, and C.M. Moore

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

eu
 European Association of Urology

Platinum Priority – Prostate Cancer
 Editorial by XXX on pp. x–y of this issue

Head-to-head Comparison of Transrectal Ultrasound-guided Prostate Biopsy Versus Magnetic Resonance Imaging with Subsequent Magnet
in Biopsy-naïve Men with Elevated
A Large Prospective Multicenter C

Marloes van der Leest^a, Erik Cornel^b, Bas Israël^a, Martijn Hoogenboom^a, Patrik Zamecnik^a, Dirk B. Jeroen Veltman^f, Huib van den Hout^f, Hans van a Frans Debruyneⁱ, Michiel Sedelaar^c, Gerjon Hanna Christina Hulsbergen-van de Kaa^{e,i}, Jelle O. Baren

EUROPEAN UROLOGY
 eju

Cochrane Library
 Cochrane Database of Systematic Reviews

Prostate MRI, with or without MRI-targeted biopsy, and systematic biopsy for detecting prostate cancer (Review)

Drost F J H, Ooster D F, Nieboer D, Steyerberg EW, Bangma CH, Roobol MJ, Schoots IG

Copyright © 2018 Cochrane. All rights reserved. This is a Cochrane Review. For more information on this review, please visit www.cochrane.org. Art. No. CD012603.

Cochrane Analysis

20 studies; 5219 patients



Cochrane Database of Systematic Reviews

Prostate MRI, with or without MRI-targeted biopsy, and systematic biopsy for detecting prostate cancer (Review)

Drost FJH, Osses DF, Nieboer D, Steyerberg EW, Bangma CH, Roobol MJ, Schoots IG

Drost FJH, Osses DF, Nieboer D, Steyerberg EW, Bangma CH, Roobol MJ, Schoots IG.
Prostate MRI, with or without MRI-targeted biopsy, and systematic biopsy for detecting prostate cancer.
Cochrane Database of Systematic Reviews 2019, Issue 4. Art. No.: CD012663.
DOI: 10.1002/14651858.CD012663.pub2.

Cochrane Analysis

20 studies; 5219 patients

33% avoid biopsy



**Cochrane
Library**

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miss 8%

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reduced overdiagnosis
(28% → 17%)



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20 studies; 5219 patients

miss 8%

33% avoid biopsy

reduced overdiagnosis
(28% → 17%)

equal significant cancers
(28% → 29%)



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DOI: 10.1002/14651858.CD012663.pub2.

“4M” Nijmegen

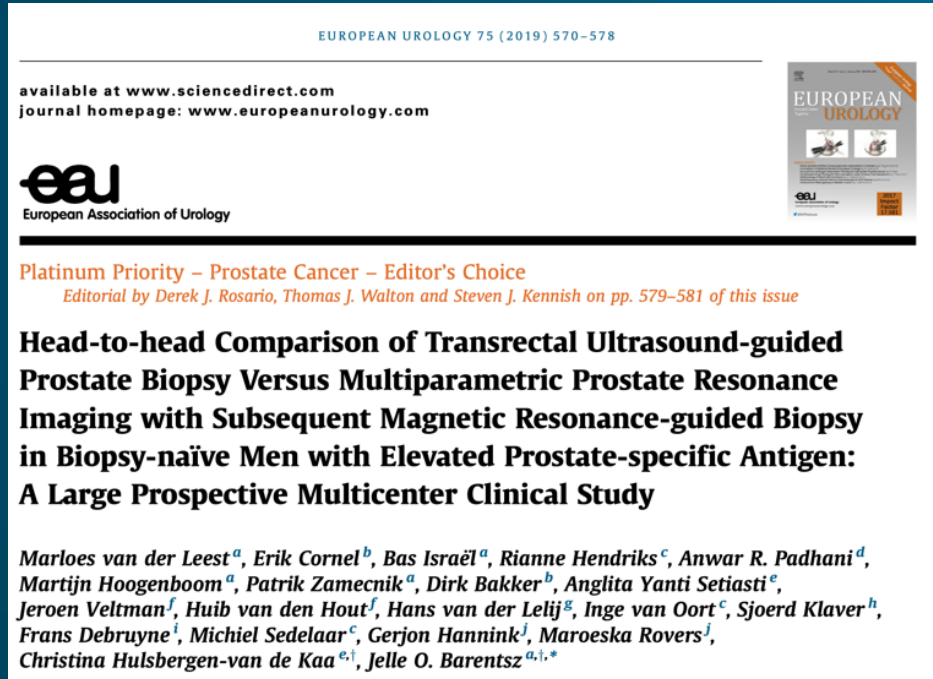
Head-to-Head 625 patients

miss 3%

49% avoid biopsy

reduced overdiagnosis
(25% → 14%)

equal significant cancers
(23% → 25%)



EAU guidelines 2019

Guidelines

Back <

> Individual Guidelines

> Oncology Guidelines

> Non-Oncology

Guidelines

> Rapid Reaction

Recommendations: EAU

COVID-19

> Discontinued Topics

> General Topics

> Compilations of all

Guidelines

> Ordering the EAU

Guidelines

Home > Prostate Cancer

Prostate Cancer

Full Text
Guidelines

Summary of
Changes

Scientific
Publications
&
Appendices

Pocket
Guidelines

Archive

Panel

Choose language

 View

>

N. Mottet (Chair), P. Cornford (Vice-chair), R.C.N. van den Bergh, E. Briers (Patient Representative), M. De Santis, S. Fanti, S. Gillesen, J. Grummet, A.M. Henry, T.B. Lam, M.D. Mason, T.H. van der Kwast, H.G. van der Poel, O. Rouvière, I.G. Schoots, D. Tilki, T. Wiegel
Guidelines Associates: T. Van den Broeck, M. Cumberbatch, N. Fossati, G. Gandaglia, N. Grivas, M. Lardas, M. Liew, L. Moris, D.E. Oprea-Lager, P.-P.M. Willemse

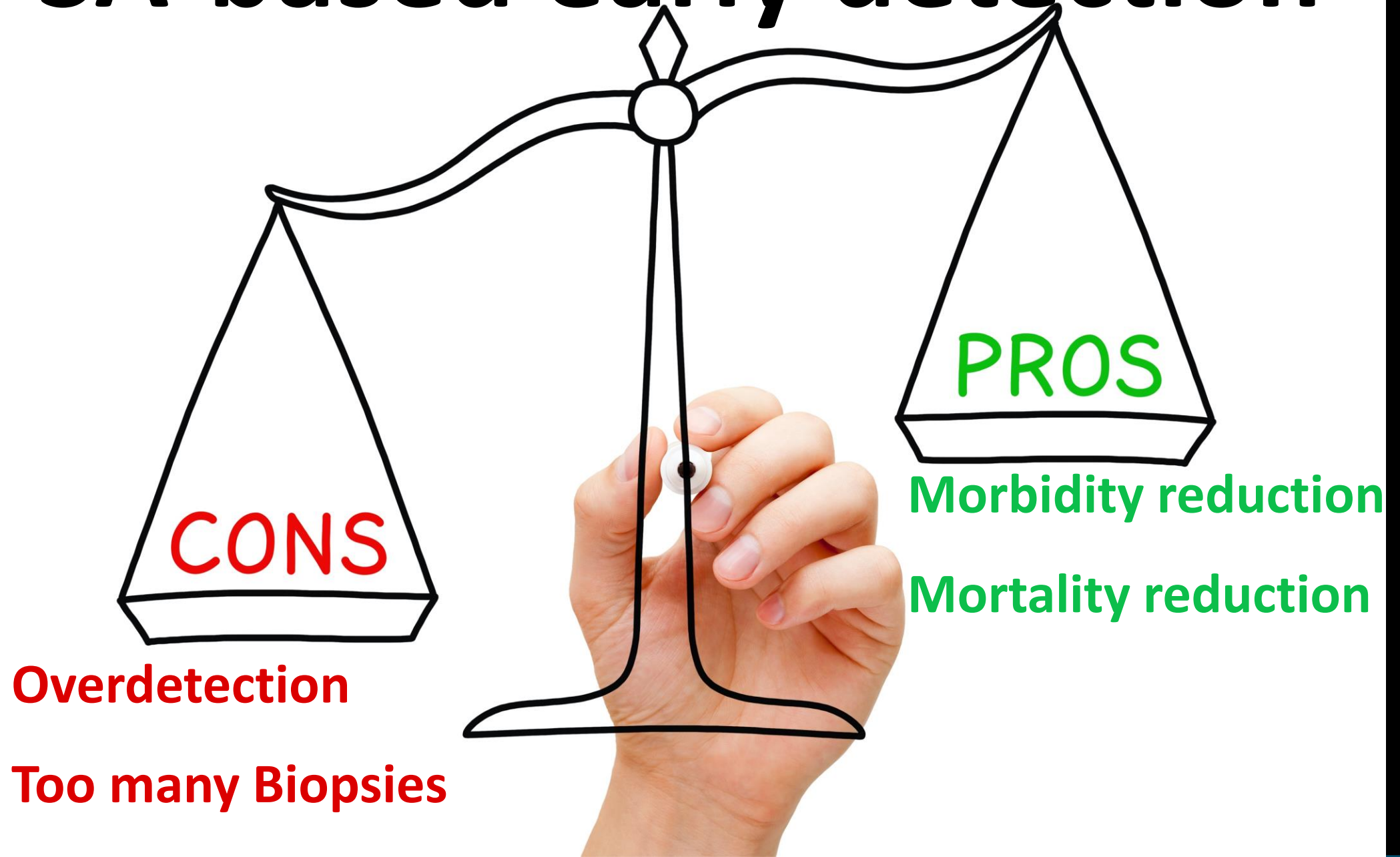
Perform prostate-MRI before biopsy

ROLE OF MRI IN EARLY DETECTION?

A photograph of a paved road blocked by a red and white striped barrier. A small green plant is growing through the center of the barrier. The background shows a grassy field and trees under a clear sky. The text "NO PSA-based screening" is overlaid in large white letters with a green outline.

NO
PSA-based
screening

PSA-based early detection



PSA





PSA

+

RC-MRI

PSA

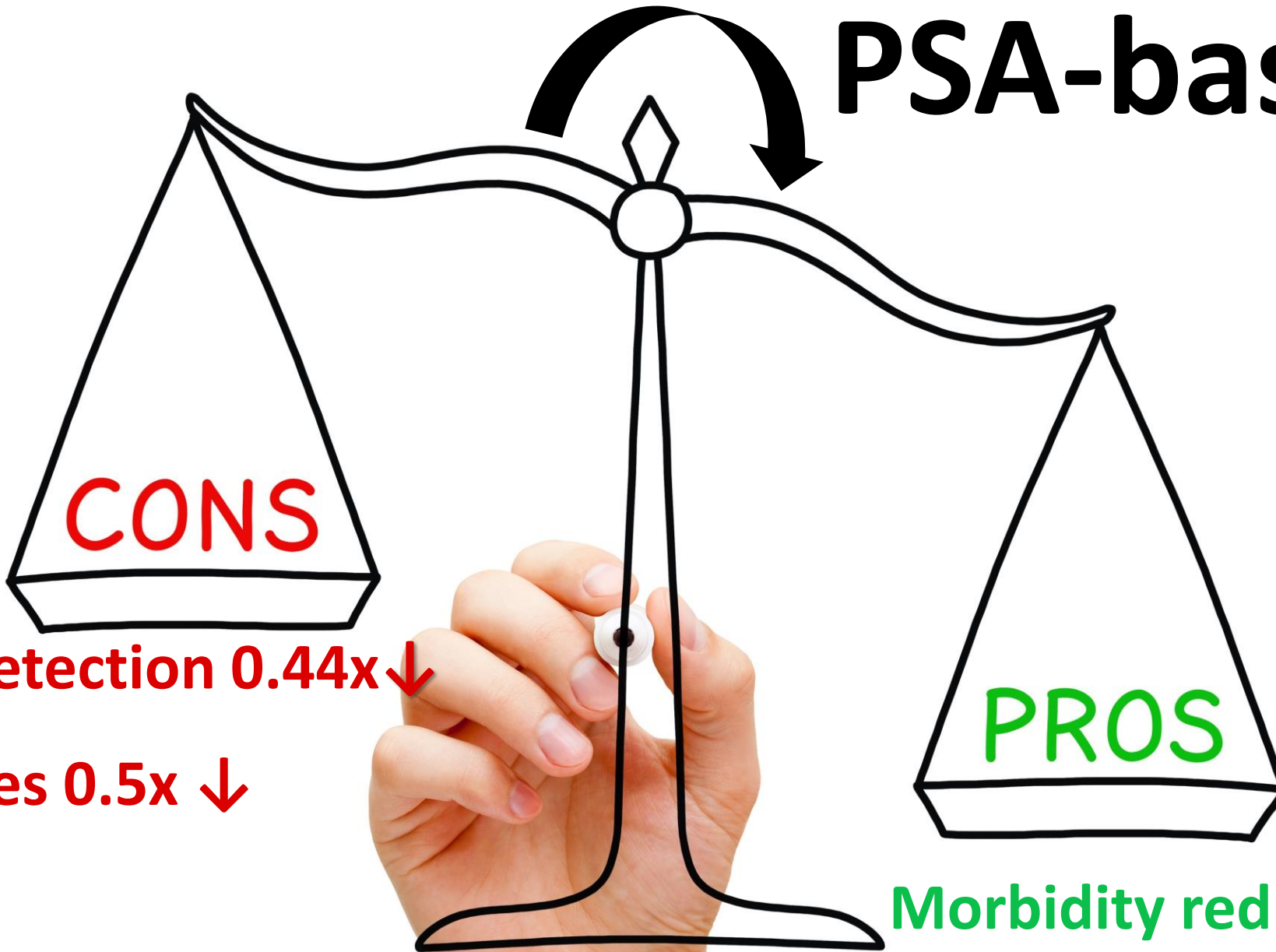


MRI

Prostate: PSA, FPSA and ratio

Mammogram

PSA-based



Overdetection 0.44x ↓

Biopsies 0.5x ↓

Morbidity reduction

Mortality reduction

A black and white photograph of a road blocked by a large fallen tree trunk. The road is paved and has a white dashed line down the center. The tree trunk is large and textured, lying horizontally across the road. In the background, there are trees and a bright light source, possibly the sun, creating a lens flare effect. The foreground shows the asphalt of the road and the white dashed line.

Challenges

- To optimize Reading

Challenges

- Optimize reading: PI-RADS

Eur Radiol (2012) 22:746–757

DOI 10.1007/s00330-011-2377-y

UROGENITAL

ESUR prostate MR guidelines 2012

Jelle O. Barentsz • Jonathan Richenberg •

Richard Clements • Peter Choyke • Sadhna Verma •

Geert Villeirs • Olivier Rouviere • Vibeke Logager •

Jurgen J. Fütterer

A black and white photograph of a road blocked by a large fallen tree trunk. The road is paved and has a dashed white line down the center. The tree trunk is large and textured, lying horizontally across the road. In the background, there are trees and foliage. The scene is dimly lit, possibly at dusk or dawn.

Challenges

- To optimize reading
- To enable good quality MRI

Challenges

- Reduce workload: structured report
- Maintain/improve image quality: QC

European Radiology (2020) 30:5404–5416

<https://doi.org/10.1007/s00330-020-06929-z>

UROGENITAL



ESUR/ESUI consensus statements on multi-parametric MRI for the detection of clinically significant prostate cancer: quality requirements for image acquisition, interpretation and radiologists' training

Maarten de Rooij¹ • Bas Israël^{1,2} • Marcia Tummers³ • Hashim U. Ahmed^{4,5} • Tristan Barrett⁶ • Francesco Giganti^{7,8} • Bernd Hamm⁹ • Vibeke Løgager¹⁰ • Anwar Padhani¹¹ • Valeria Panebianco¹² • Philippe Puech¹³ • Jonathan Richenberg¹⁴ • Olivier Rouvière^{15,16} • Georg Salomon¹⁷ • Ivo Schoots^{18,19} • Jeroen Veltman²⁰ • Geert Villeirs²¹ • Jochen Walz²² • Jelle O. Barentsz¹

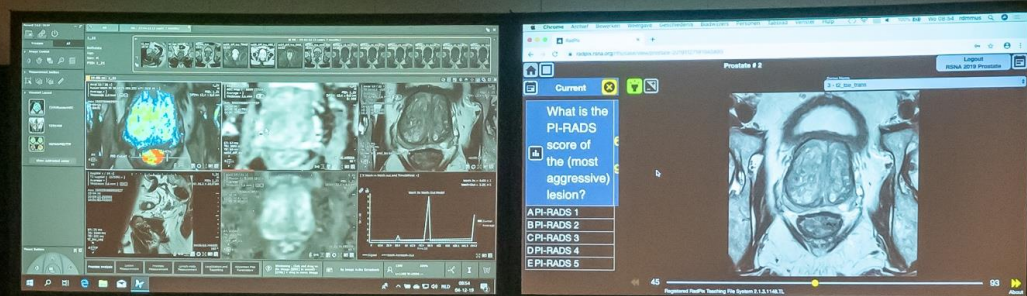
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Challenges

- To optimize reading
- To enable good quality MRI
- To focus on learning/certification

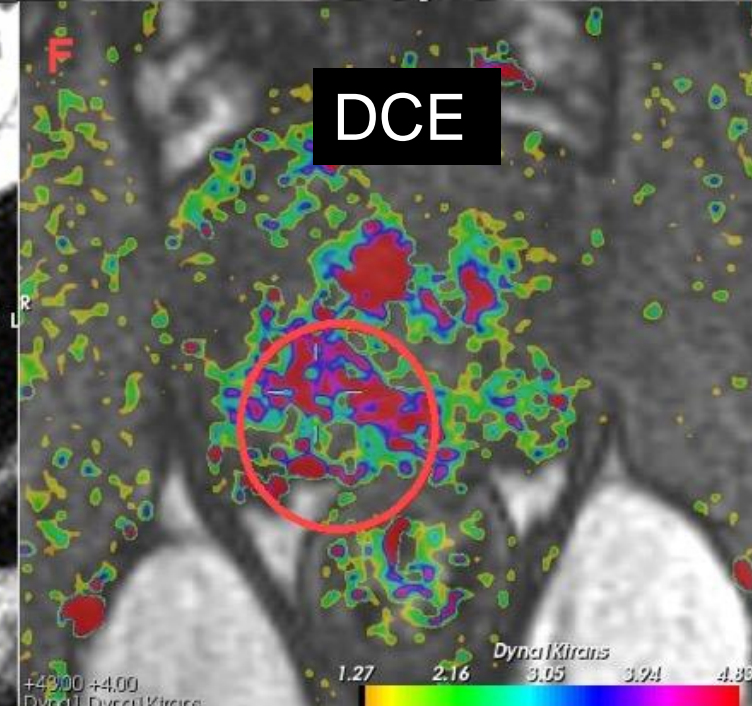
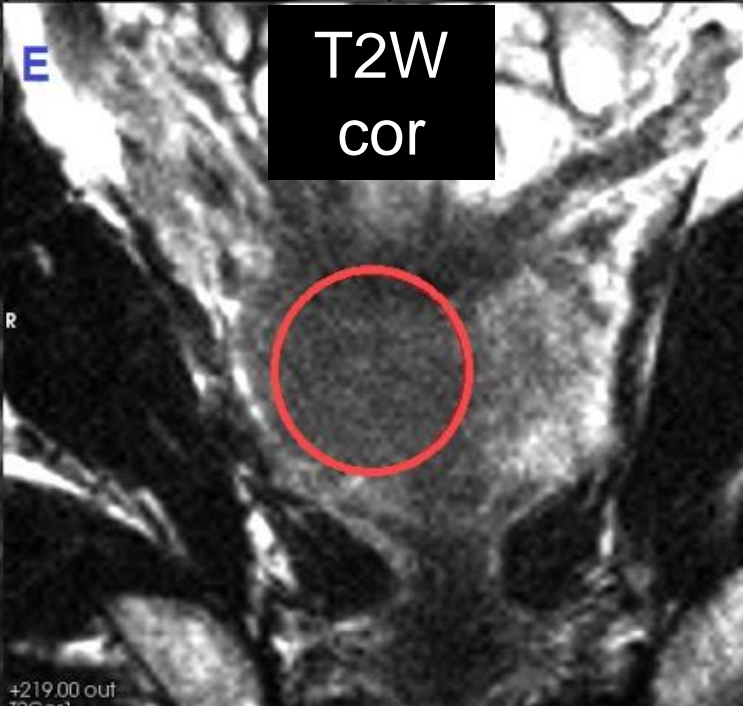
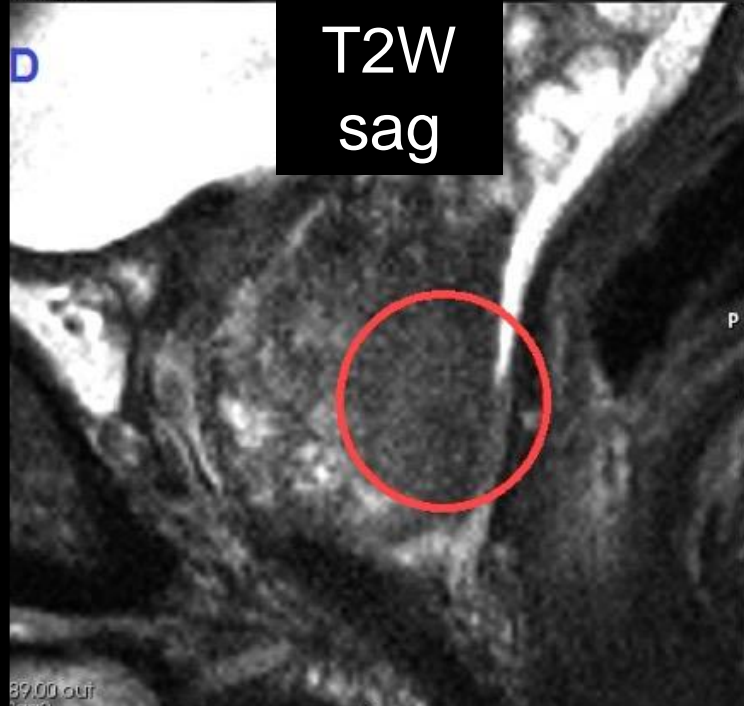
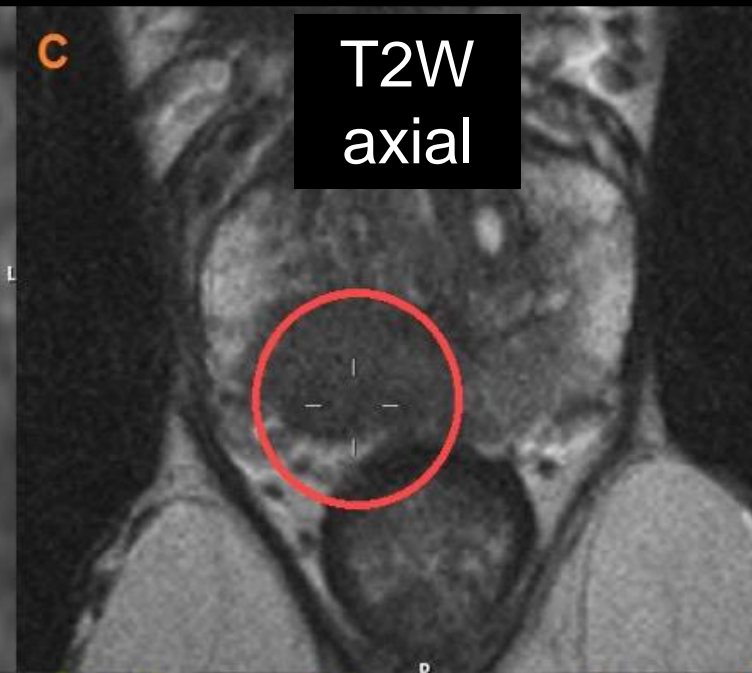
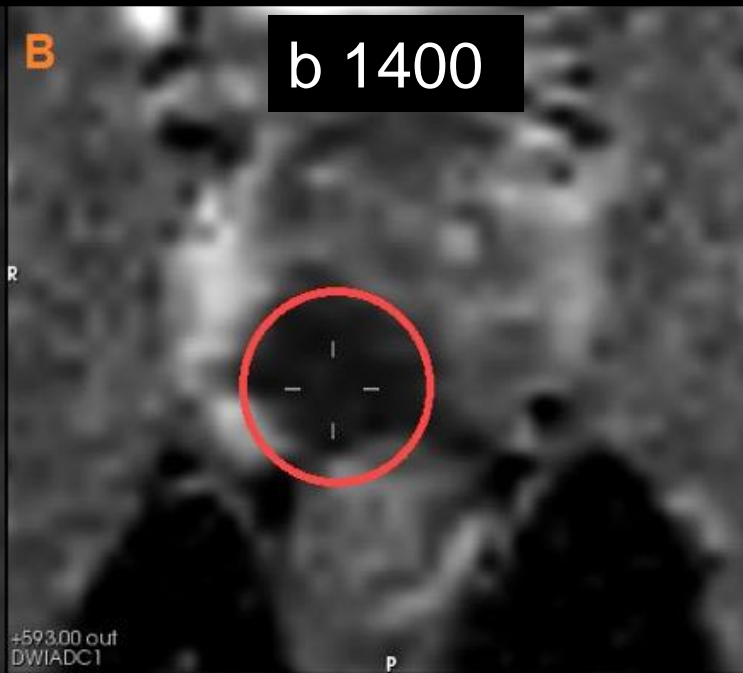
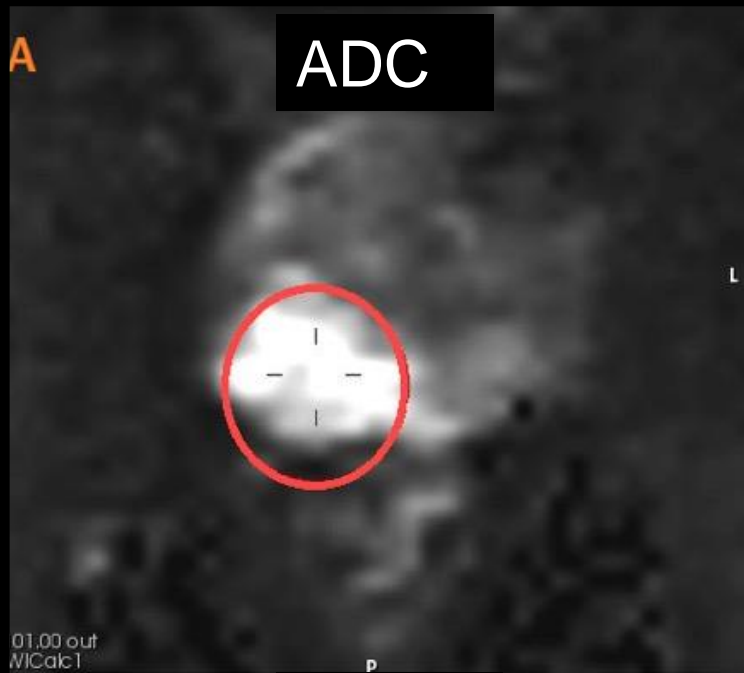
Focus on learning/certification:

Hands-on (PI-RADS) Courses

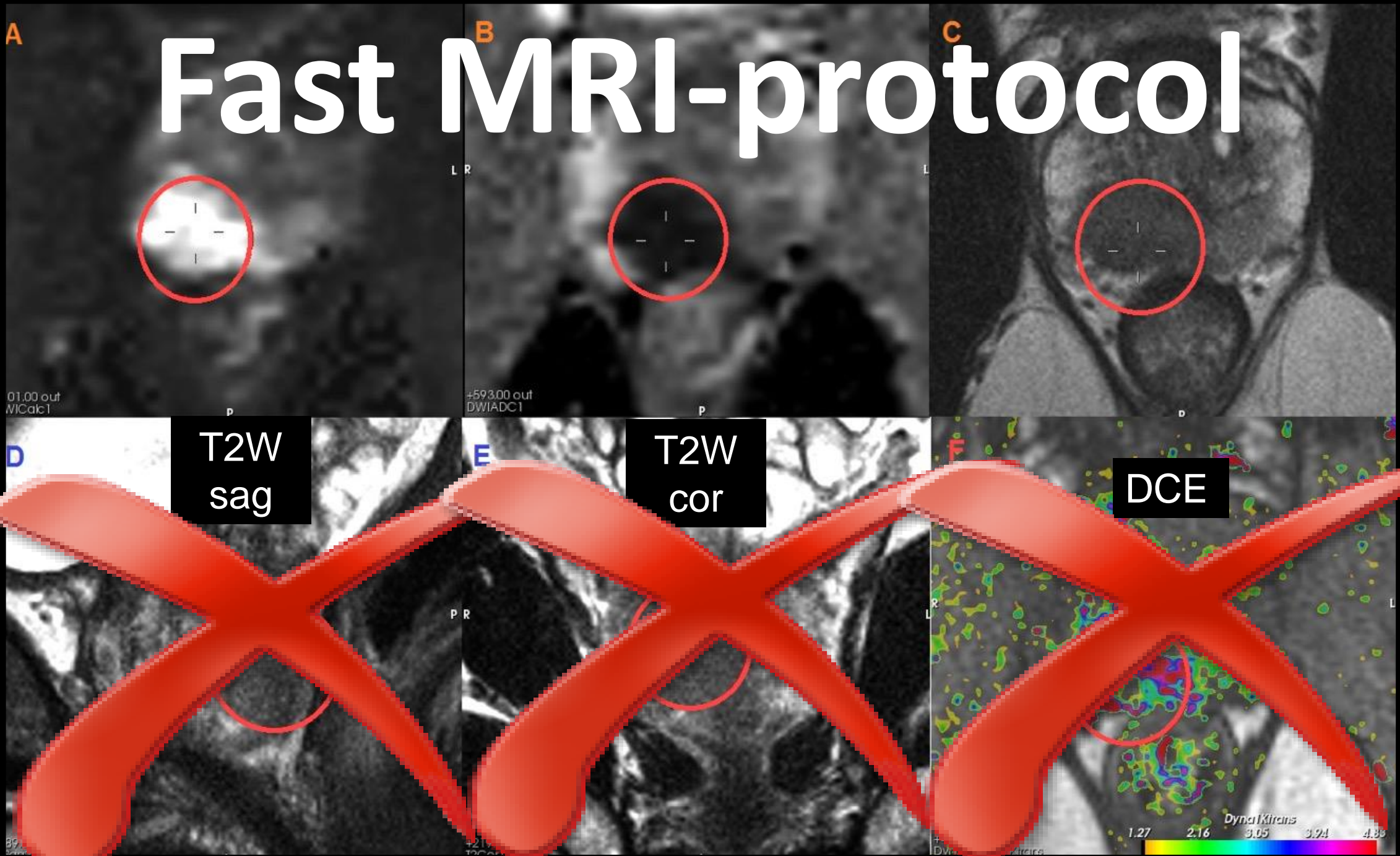




How to scan all men?

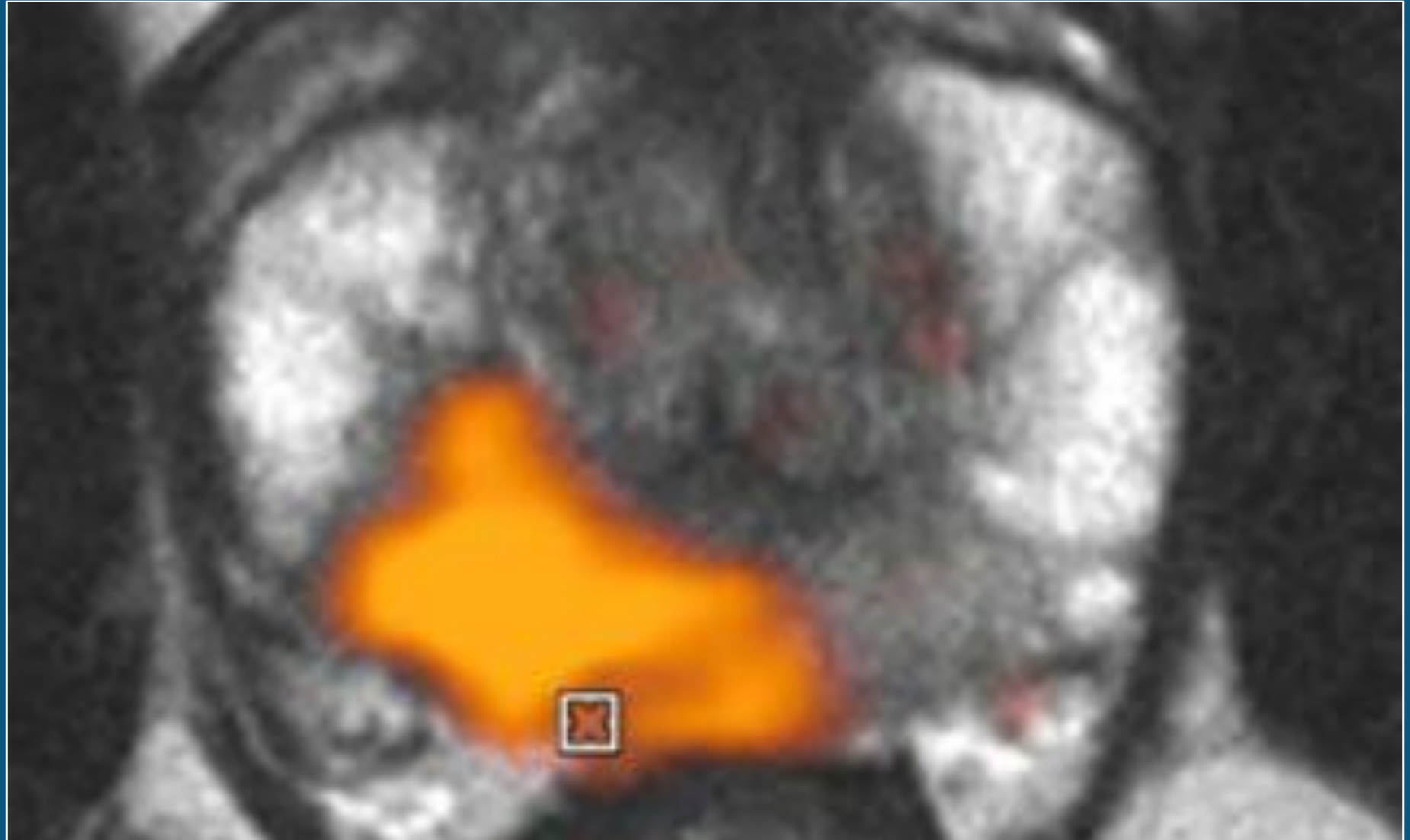


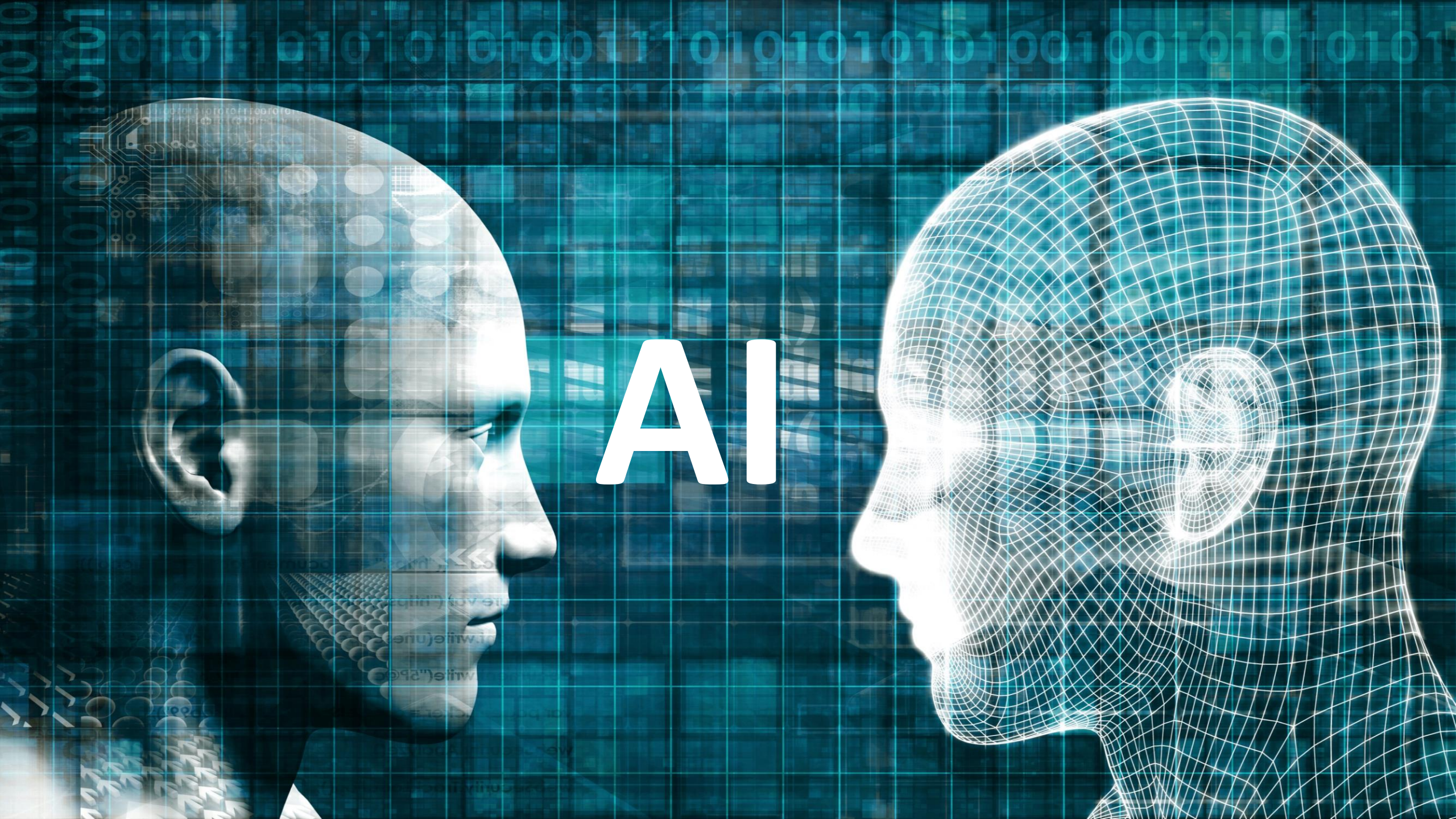
Fast MRI-protocol



PROSTAGRAM

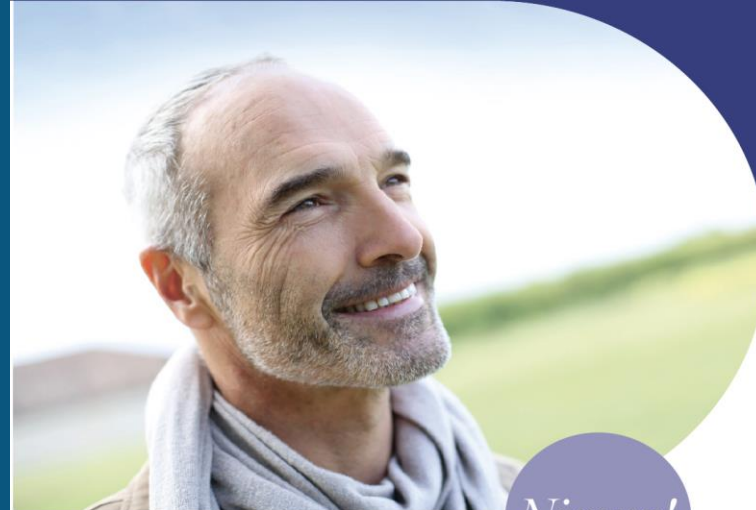
€ 95
10'





AI

If we want to prevent the harm of No or Opportunistic Screening.....



Nieuw!

MyTest Prostaat

*Zelftest voor de bepaling
van het PSA-gehalte*

- ✓ Controleer uit voorzorg of bij klachten uw prostaat
- ✓ Uitslag bekend na 5 minuten
- ✓ Eenvoudige bloedtest



We need to set up an Early Detection Program in the EU with Risk-Calculators and MRI



PRIMMED-trial

(PRostate cancer Informed Men
MRi Early Detection)

- Standardize and synchronize data within the EU



PRIMMED-trial

(PRostate cancer Informed Men
MRi Early Detection)

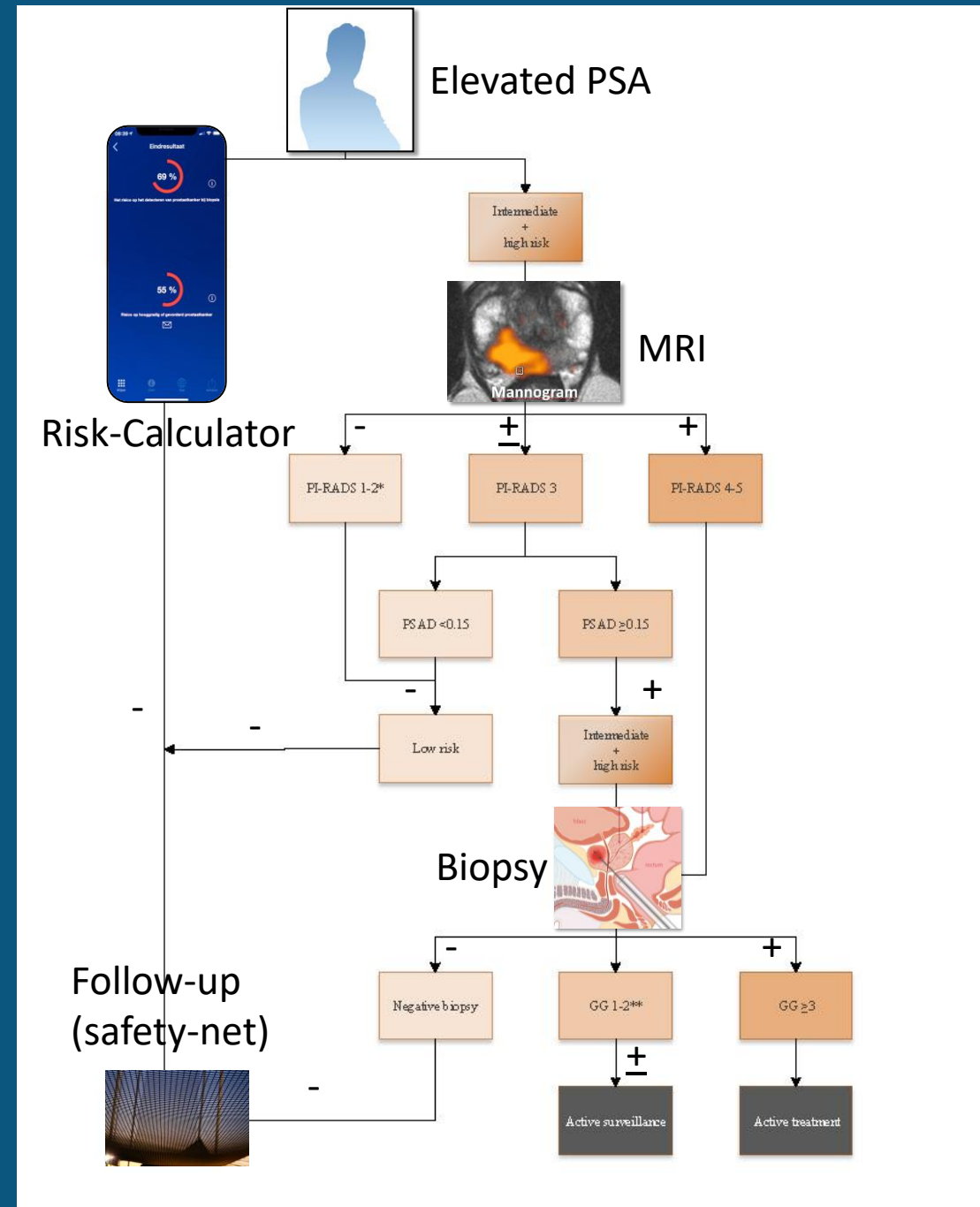
- Standardize and synchronize data
- Collect one large dataset, freely available



PRIMMED-trial

(PRostate cancer Informed Men
MRi Early Detection)

- Standardize and synchronize data
- Collect one large dataset, freely available
- Set-up a multi-country prospective trial



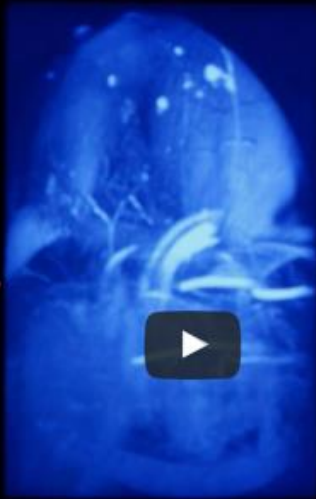
Is Early Detection of PCa now possible?



Jelle Barentsz

For Questions?

jelle.barentsz@radboudumc.nl



www.mri-prostate-barentsz.nl



Radboudumc
university medical center