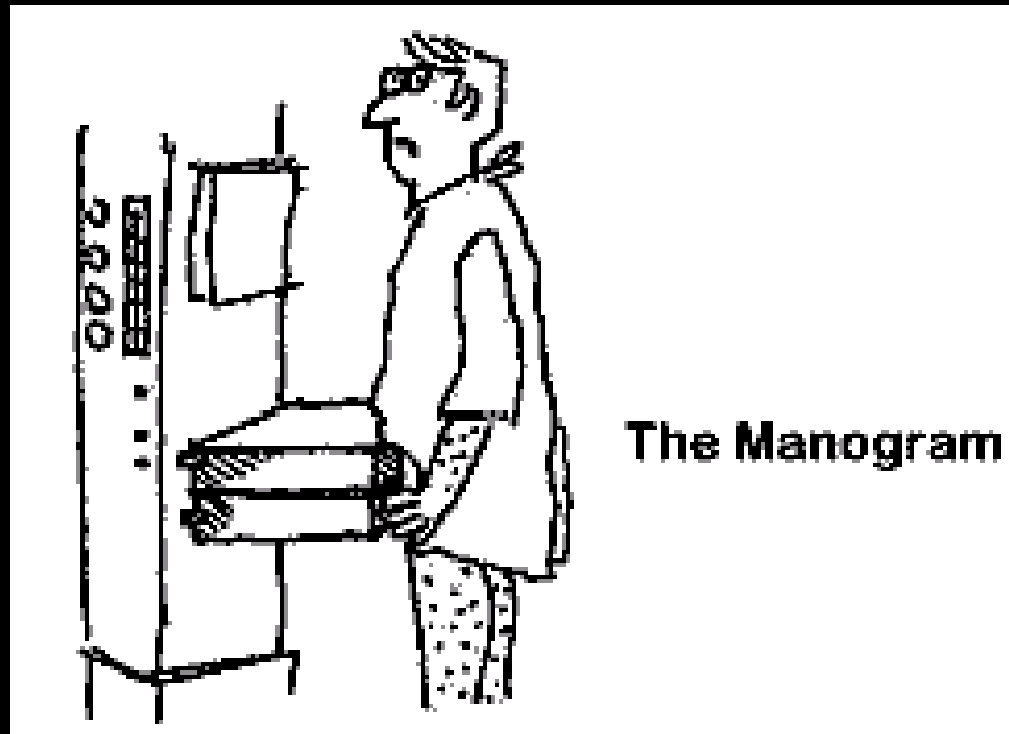


MR skanning af prostata

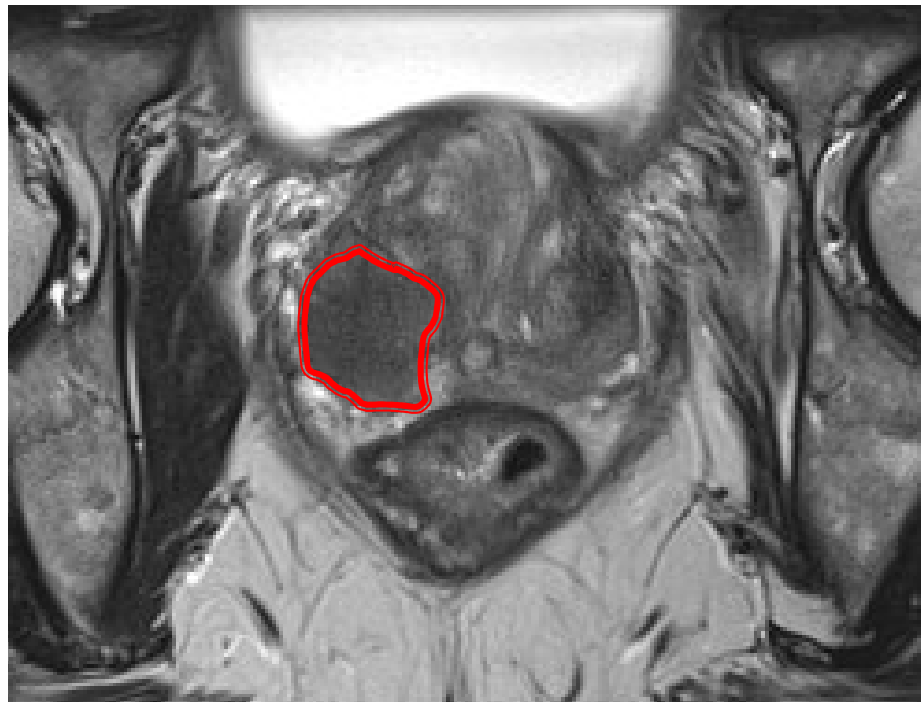


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De næste 30 minutter

- Påvisning og billedvejledt biopsi af PCa vha MRI
- - og ikke staging
- Udfordringer for det urologiske fællesskab

Anatomi: T2 vægtning



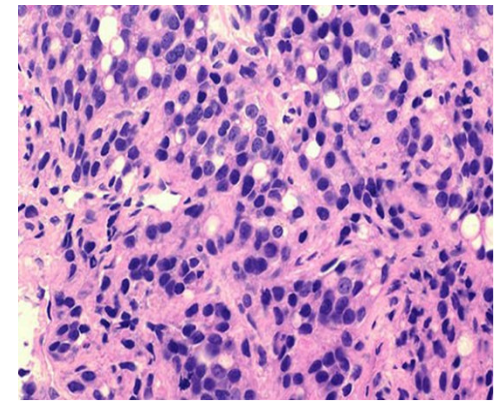
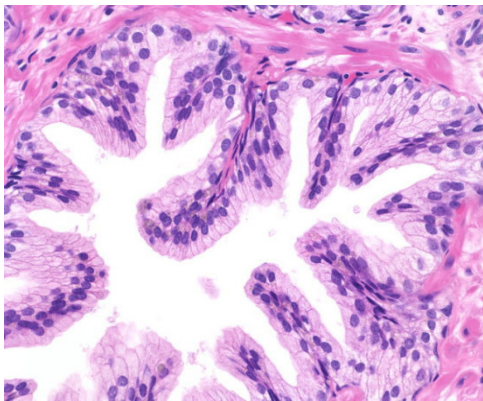
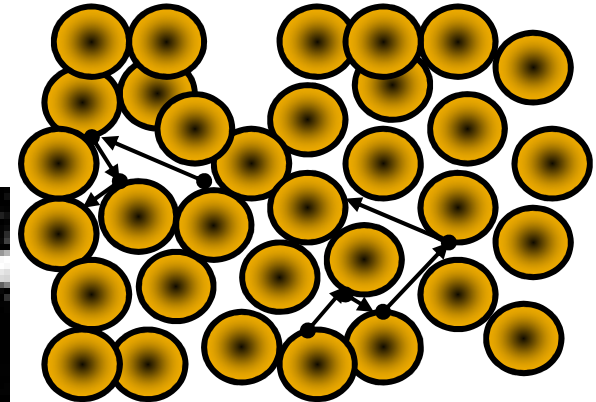
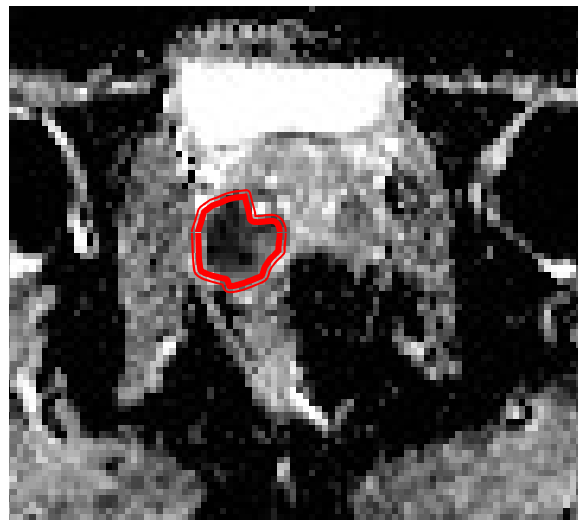
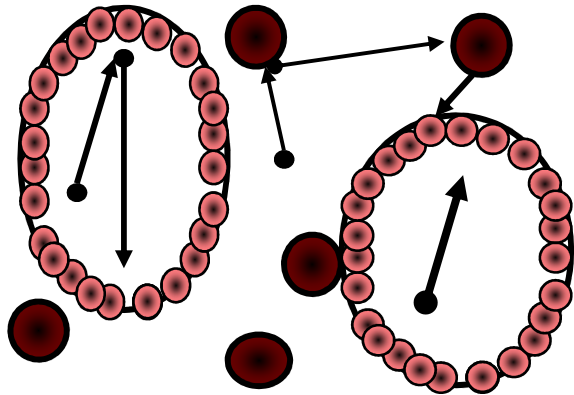
mpMRI – detection - ESUR guidelines 2012

1. High resolution T2-w: **anatomy**
2. Diffusion Weighted Imaging: **function**
3. Dynamic Contrast Enhanced: **function**
4. Hydrogen MR-Spectroscopy: **function**

MINIMUM 1 anatomic and 2 functional

During the ECR 2015 in Vienna, the 'ESUR prostate MR guidelines' (J.O. Barentsz et al., 2012) that is published in European Urology, has been awarded with the Most Cited Paper Award.

Difussion Weighted Imaging: DWI



DWI: Pca: restriktiv H₂O diffusion
Specificitet +hvor aggressiv?

Relationship between Apparent Diffusion Coefficients at 3.0-T MR Imaging and Gleason Grade in Peripheral Zone Prostate Cancer¹

Thomas Hambrock, MBChB
Gertjan M. Smit, MD
Henkjan J. Huisman, MSc, PhD
Wim M. van Oort, MD, PhD
J. Alfred Witjes, MD, PhD
Christina A. Hubbergen-van de Kaa, MD, PhD
Thomas Schreiner, PhD
Jelle O. Barentsz, MD, PhD

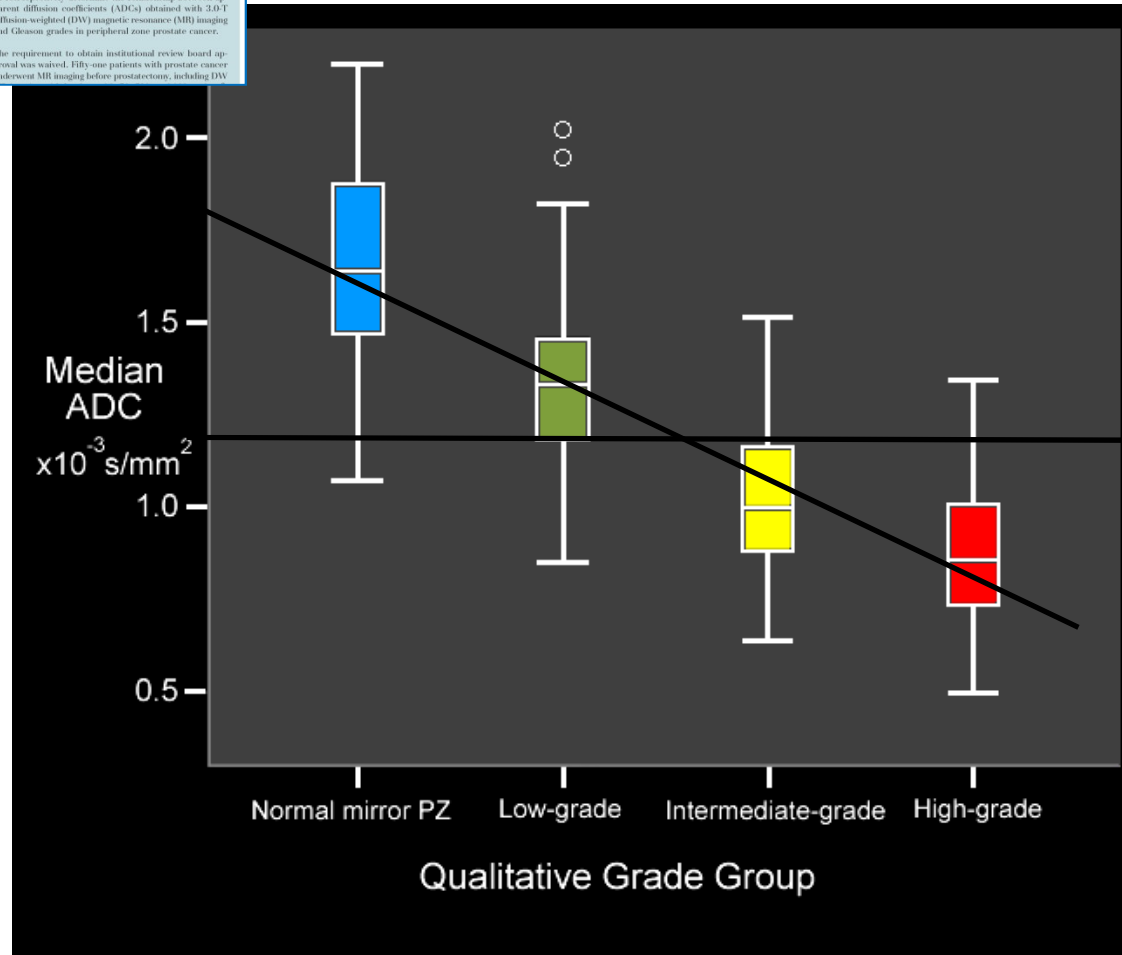
Purpose:

To retrospectively determine the relationship between apparent diffusion coefficients (ADCs) obtained with 3.0-T diffusion-weighted (DW) magnetic resonance (MR) imaging and Gleason grades in peripheral zone prostate cancer.

Materials and Methods:

The requirement to obtain institutional review board approval was waived. Fifty-one patients with prostate cancer underwent MR imaging before prostatectomy, including DW.

ADC versus Gleason score



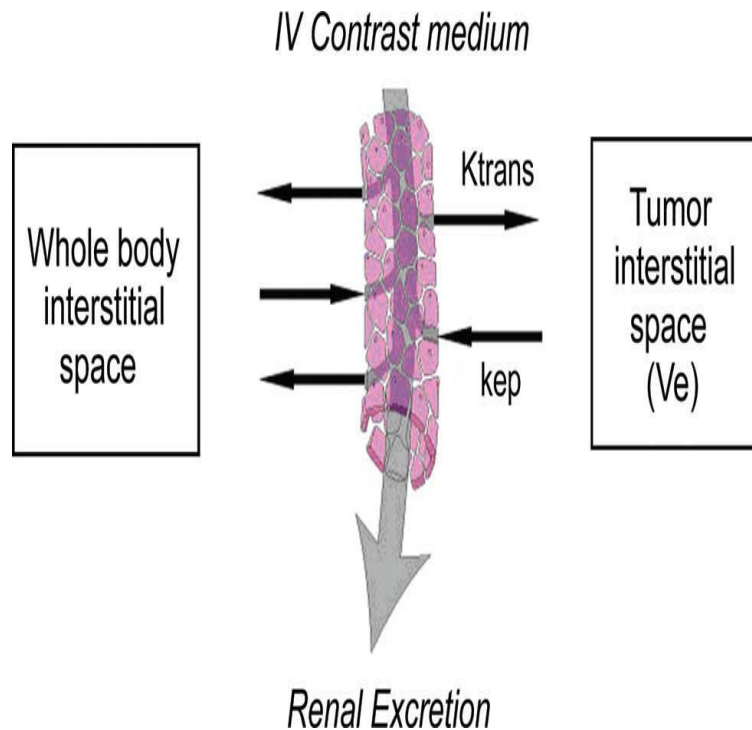
Pearson
Correlation

$r = 0.73$

$p < 0.01$

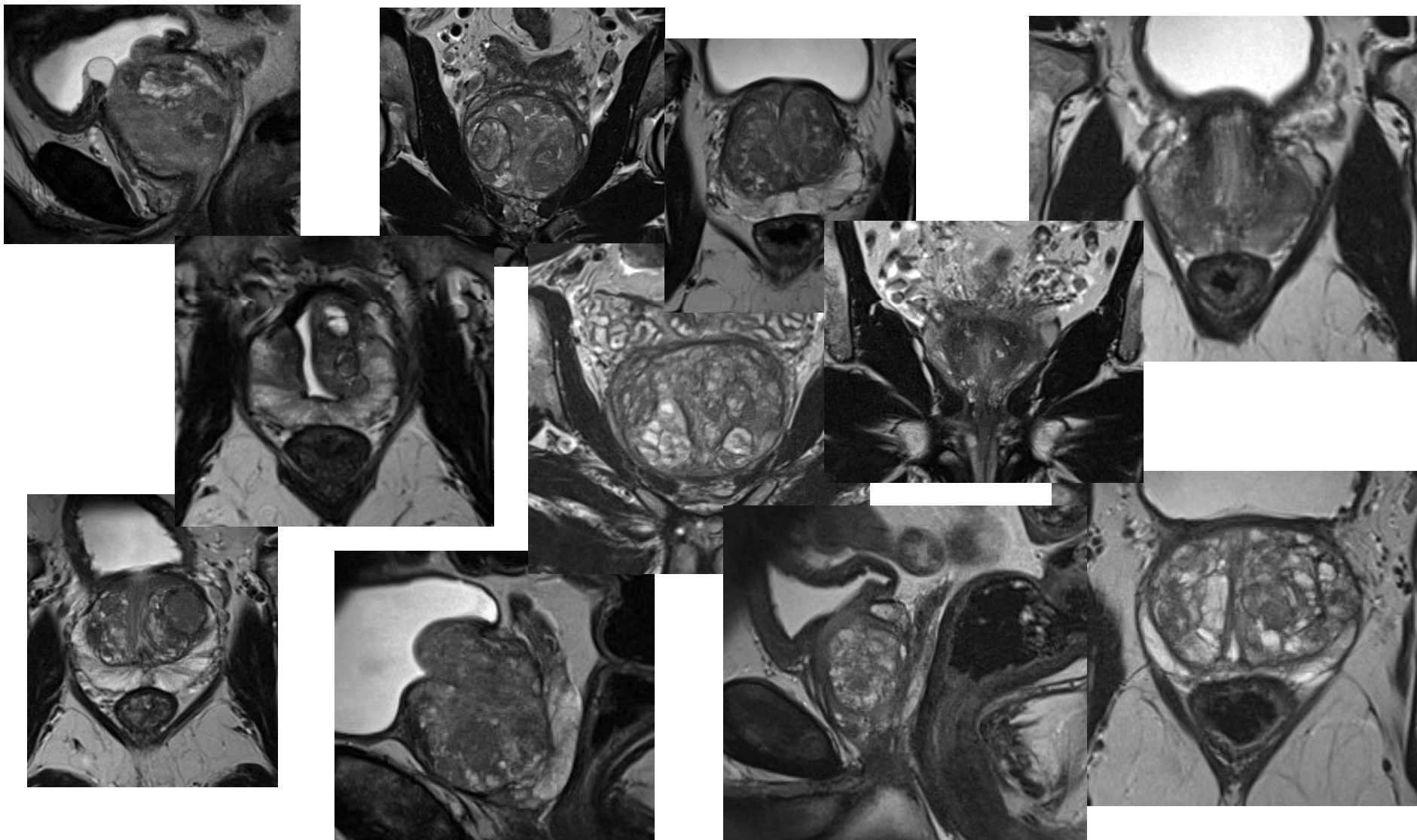
De Souza Clin Radiol 2008, Zelhof BJU 2008,, Mazahari Radiol 2008, Turkbay Radiol 2011, Alvares Radiol 2011, Somfort Invest Radiol 2013

Dynamic Contrast Enhancement: DCE



DCE MRI: Pca: øget vaskulær permeabilitet
Sensitivitet

Enorm Variation



PIRADS

– *næsten* lyrikfri rapportering

Prostate Imaging and Reporting Archiving Data System

Standardiseret og ensartet rapportering:

- sammenligning af inter-observatør varians
- reduktion af variation ved at muliggøre diskussion
- ensartet kommunikation med kliniker
- kvalitetssikring og forskning
- *klar tale = klare beslutninger*

Score	PI-RADS Assessment for T2W for Peripheral Zone (PZ)
1	Uniform hyperintense signal intensity (normal)
2	Linear or wedge-shaped hypointensity or diffuse mild hypointensity, usually indistinct margin
3	Heterogeneous signal intensity or non-circumscribed, rounded, moderate hypointensity Includes others that do not qualify as 2, 4, or 5
4	Circumscribed, homogenous moderate hypointense focus/mass confined to prostate and <1.5 cm in greatest dimension
5	Same as 4 but ≥ 1.5 cm in greatest dimension or definite extraprostatic extension/invasive behavior

Score	PI-RADS Assessment for T2W for Transition Zone (TZ)
1	Homogeneous intermediate signal intensity (normal)
2	Circumscribed hypointense or heterogeneous encapsulated nodule(s) (BPH)
3	Heterogeneous signal intensity with obscured margins Includes others that do not qualify as 2, 4, or 5
4	Lenticular or non-circumscribed, homogeneous, moderately hypointense, and <1.5 cm in greatest dimension
5	Same as 4, but ≥ 1.5 cm in greatest dimension or definite extraprostatic extension/invasive behavior

Score	PI-RADS Assessment for DWI for Peripheral Zone (PZ) or Transition Zone (TZ)
1	No abnormality (i.e. normal) on ADC and high b-value DWI
2	Indistinct hypointense on ADC
3	Focal mildly/moderately hypointense on ADC and isointense/mildly hyperintense on high b-value DWI.
4	Focal markedly hypointense on ADC and markedly hyperintense on high b-value DWI; <1.5cm in greatest dimension
5	Same as 4 but ≥ 1.5 cm in greatest dimension or definite extraprostatic extension/invasive behavior

Score	PI-RADS Assessment for DCE for Peripheral Zone (PZ) or Transition Zone (TZ)
(-)	no early enhancement, or diffuse enhancement not corresponding to a focal finding on T2 and/or DWI, or focal enhancement corresponding to a lesion demonstrating features of BPH on T2WI
(+) (+)	focal, and; earlier than or contemporaneously with enhancement of adjacent normal prostatic tissues, and; corresponds to suspicious finding on T2W and/or DWI

Final PIRADS

Peripheral Zone (PZ)

DWI	T2W	DCE	PIRADS
1	Any*	Any	1
2	Any	Any	2
3	Any	-	3
		+	4
4	Any	Any	4
5	Any	Any	5

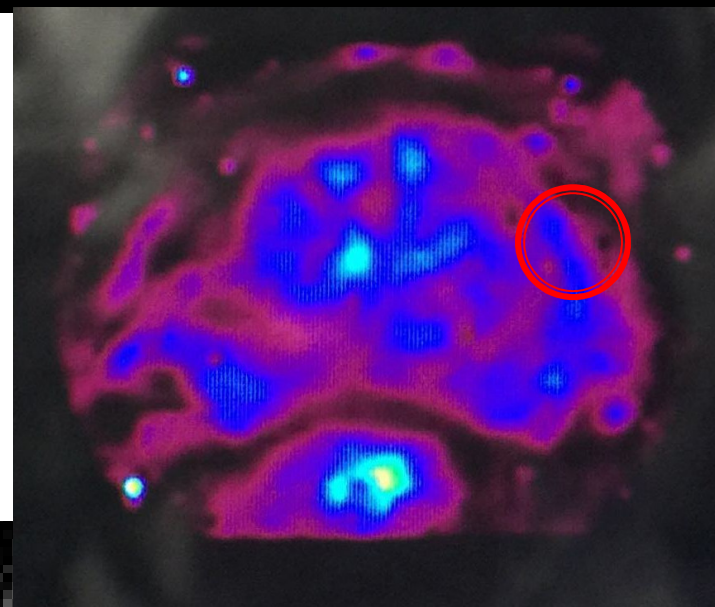
Transition Zone (TZ)

T2W	DWI	DCE	PIRADS
1	Any	Any	1
2	Any	Any	2
3	≤4	Any	3
	5	Any	4
4	Any	Any	4
5	Any	Any	5

PIRADS – handlingsorienteret beskrivelse

- PIRADS **1** = Clinically **significant** cancer is **very unlikely** to be present
- PIRADS **2** = Clinically **significant** cancer is **unlikely** to be present
- PIRADS **3** = Clinically **significant** cancer is **equivocal**
- PIRADS **4** = Clinically **significant** cancer is **likely** to be present
- PIRADS **5** = Clinically **significant** cancer is **highly likely** to be present

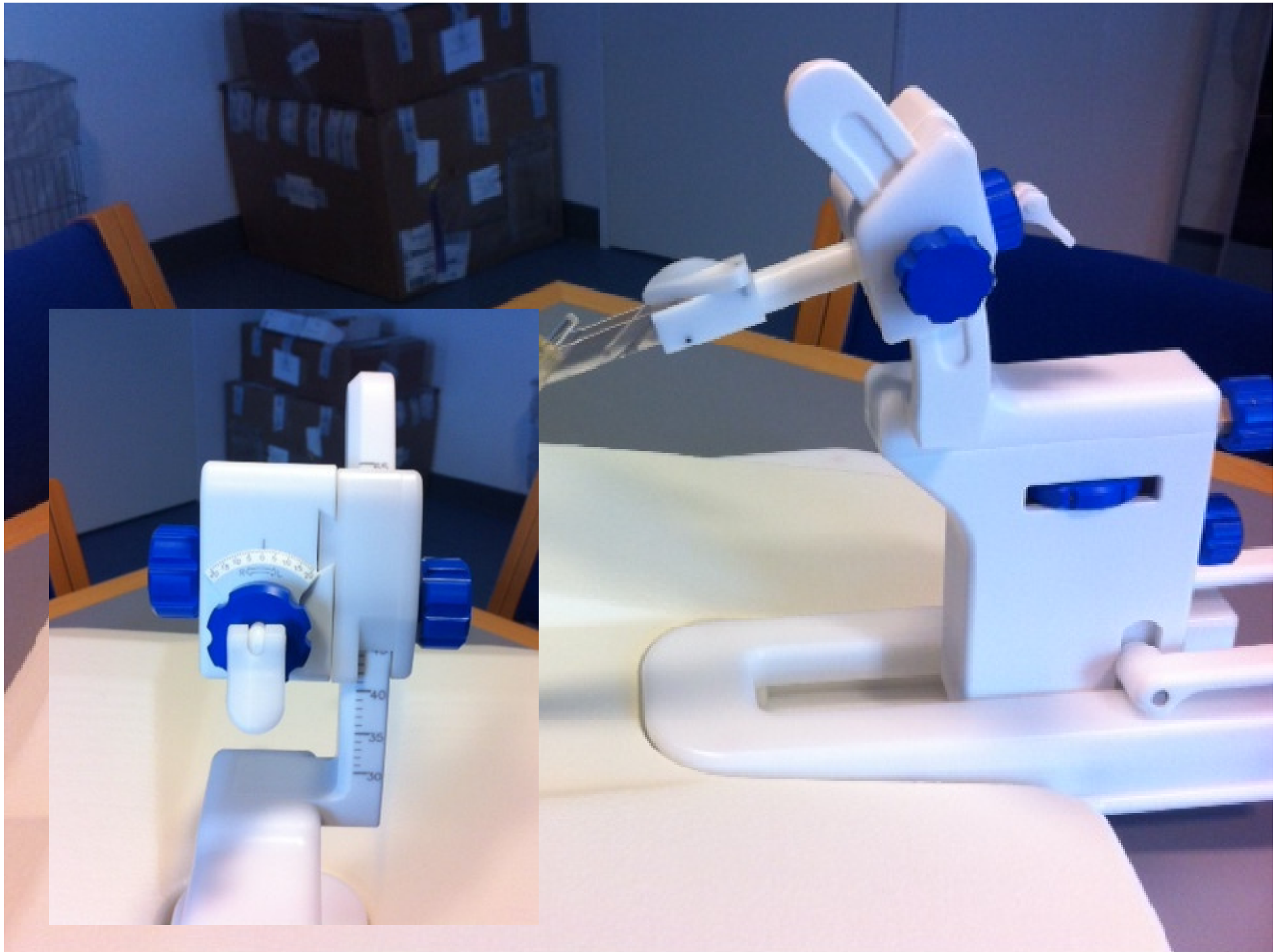
67Y, PSA 9.8, TRUSbx*2



Final PIRADS

- Prostatvolumen 58 cc, PSA densitet 0,16
- 4*4*6 mm
- Ant. horn af PZ sin.

- T2 = 4
- DCE = -
- DWI = 4
- Lowest ADC = 422
- **FINAL PIRADS 4**



MR guided in-bore biopsy

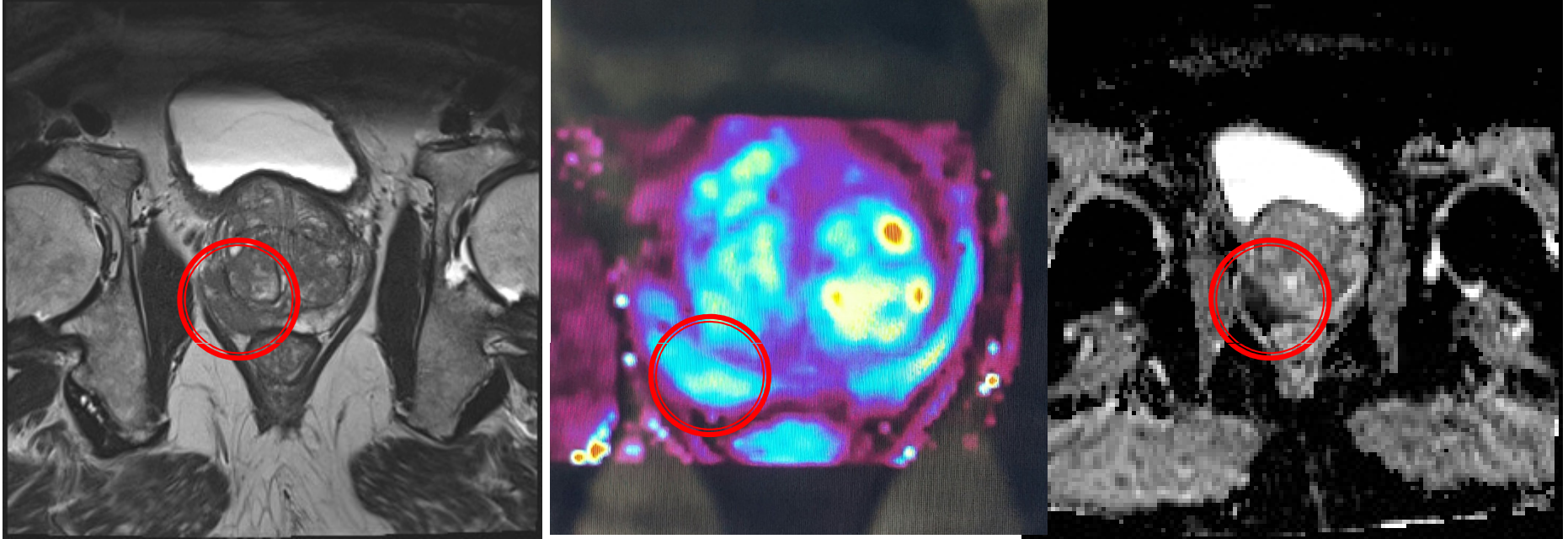


PIRADS 4, MRGB



Gl. 3+4 i 59 % af nålelængden

70 y, fluktuerende PSA, aktuelt 8,9, TRUSbx*1
antea efterfulgt af svær inf., HG-PIN, nu mpMRI:



PSA densitet = 0,09

23*24*28

T2 score = 5

DCE = +

DWI score = 5

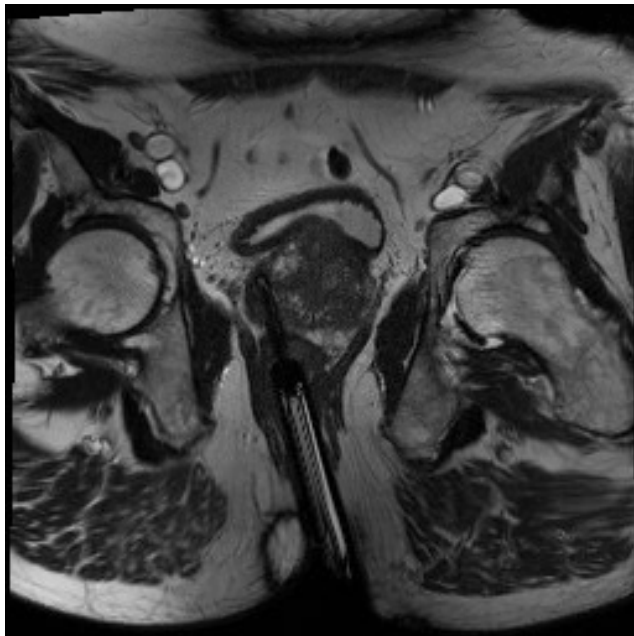
Laveste ADC værdi = 531

FINAL PIRADS = 5

'MRGB kan overvejes'

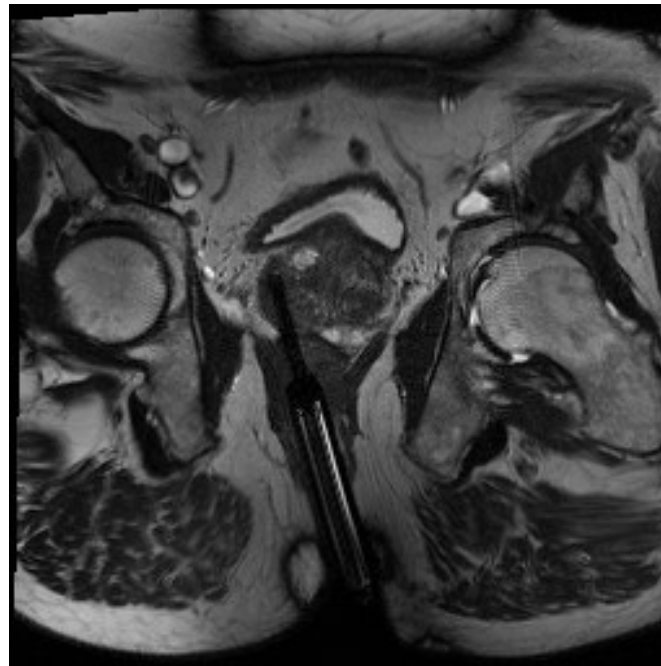
MRGB

NÅL 1



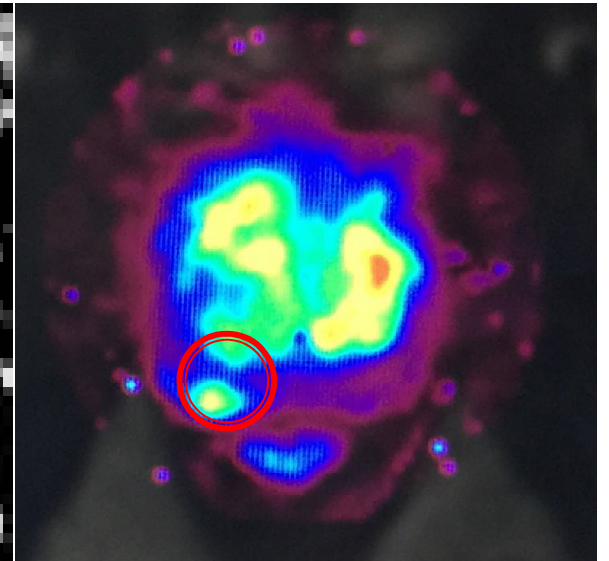
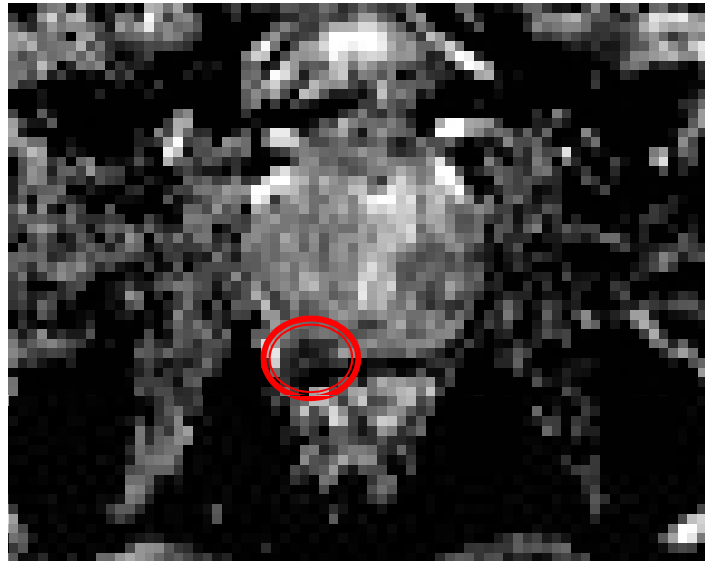
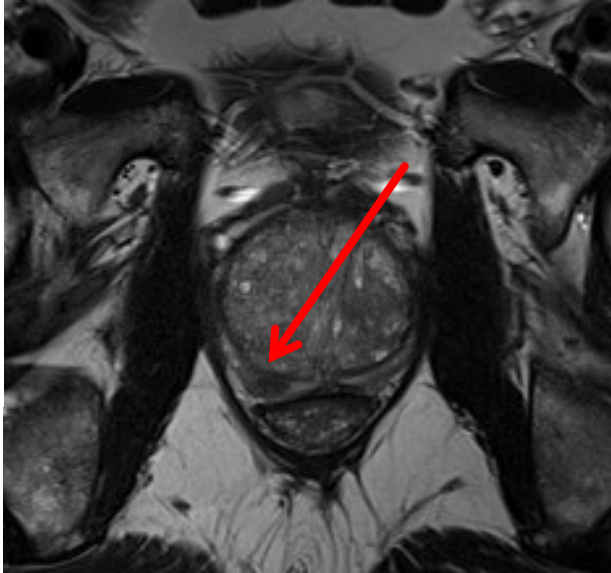
HG-PIN

NÅL 2



G1 4+5 i 95 % af nålelængden

66 y, PSA 11.5, TRUSbx*2



T₂ = 4

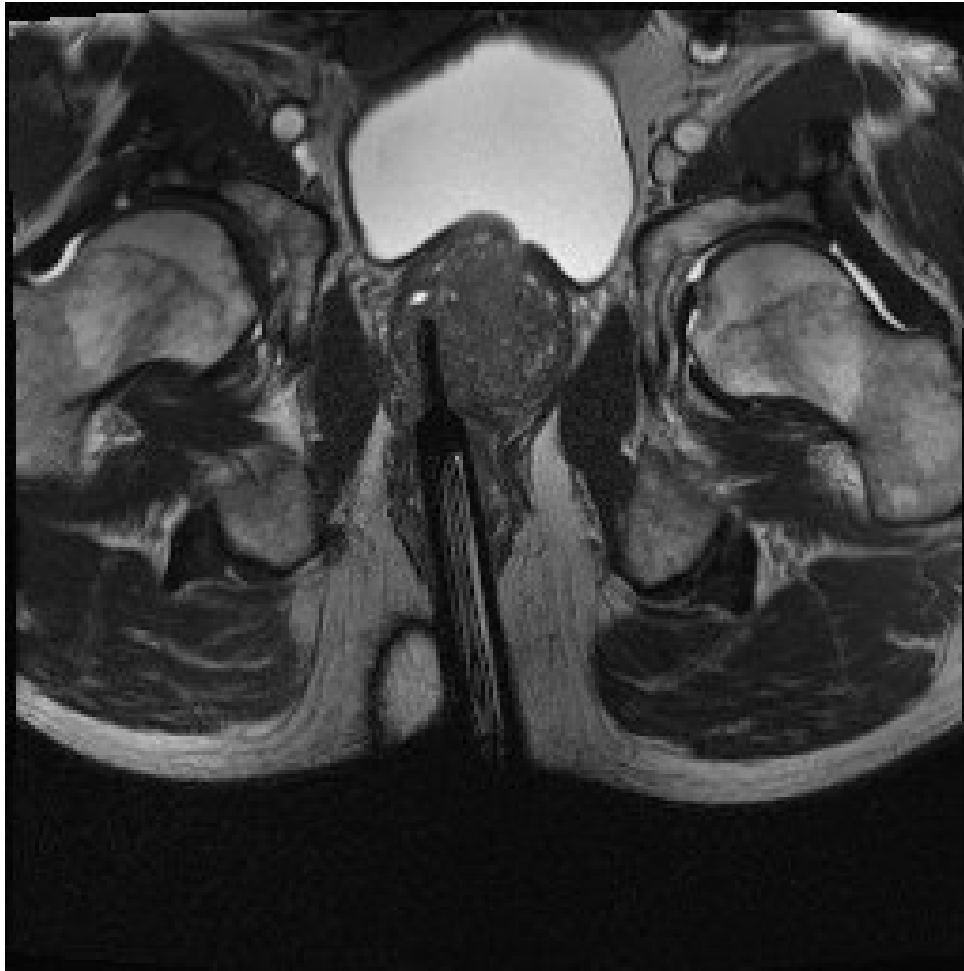
DCE = +

DWI = 4

Lowest ADC = 873

Final PIRADS 4

PIRADS 4 - MRGB



PATHOLOGI:

Svær akut og
kronisk inflammation

mpMRI - Diagnostic Performance

- NPV >> 90%: et nej er et nej!
- Sensitivitet
 - $GI \leq 6$: 29, 54, 75 % (vol. <0,5 ml, 0,5- 2 ml, > 2 ml)
 - $GI = 7$: 63, 88, 97 % (do -)
 - $GI > 7$: 80, 93, 100 % (do -)

Direct mp-MRI biopsy

Author	No. of patients	Detection rate	Min. previous negative TRUS bx
Beyersdorf	12	42	1
Engelhard	37	37	1
Anastadiasis	27	56	1
Hambrock	71	59 (93)	2
Franiel	54	39	1
Roethe	100	52 (81)	1
Hoeks	438	41 (86)	1

Aarhus MRGB

■ Patienter	96
■ Alder, mean	68
■ PSA, mean	14
■ Antal tidl. TRUSbx (range)	2 (1-6)

Aarhus MRGB

■ No. PIRADS 5/4/	49/45/8
■ TZ	59%
■ PZ	41%
■ læsion/patient	1,1
■ nåle/patient	2,3
■ Nåle/læsion	2,1

Aarhus MRGB

- Volumen/diam, mean 3 cc/15 mm
- Mean Gleason score 6,85
- Mean nålelængde 58 %
- **Hit-rate: 82% (92,71,13)**

Indikationer – og virker faldskærm?



“Frivillige forsøgspersoner søges til videnskabeligt lodtrækningsforsøg, der skal afklare om faldskærm har nogen effekt ved udspring fra 4000 meters højde....”

Indikationer?



Indikationer?

6.4.3 Recommendation for imaging

	LE	GR
When available, mMRI of the prostate can be used to trigger a (targeted) repeat prostate biopsy.	2b	B

mMRI = multiparametric magnetic resonance imaging

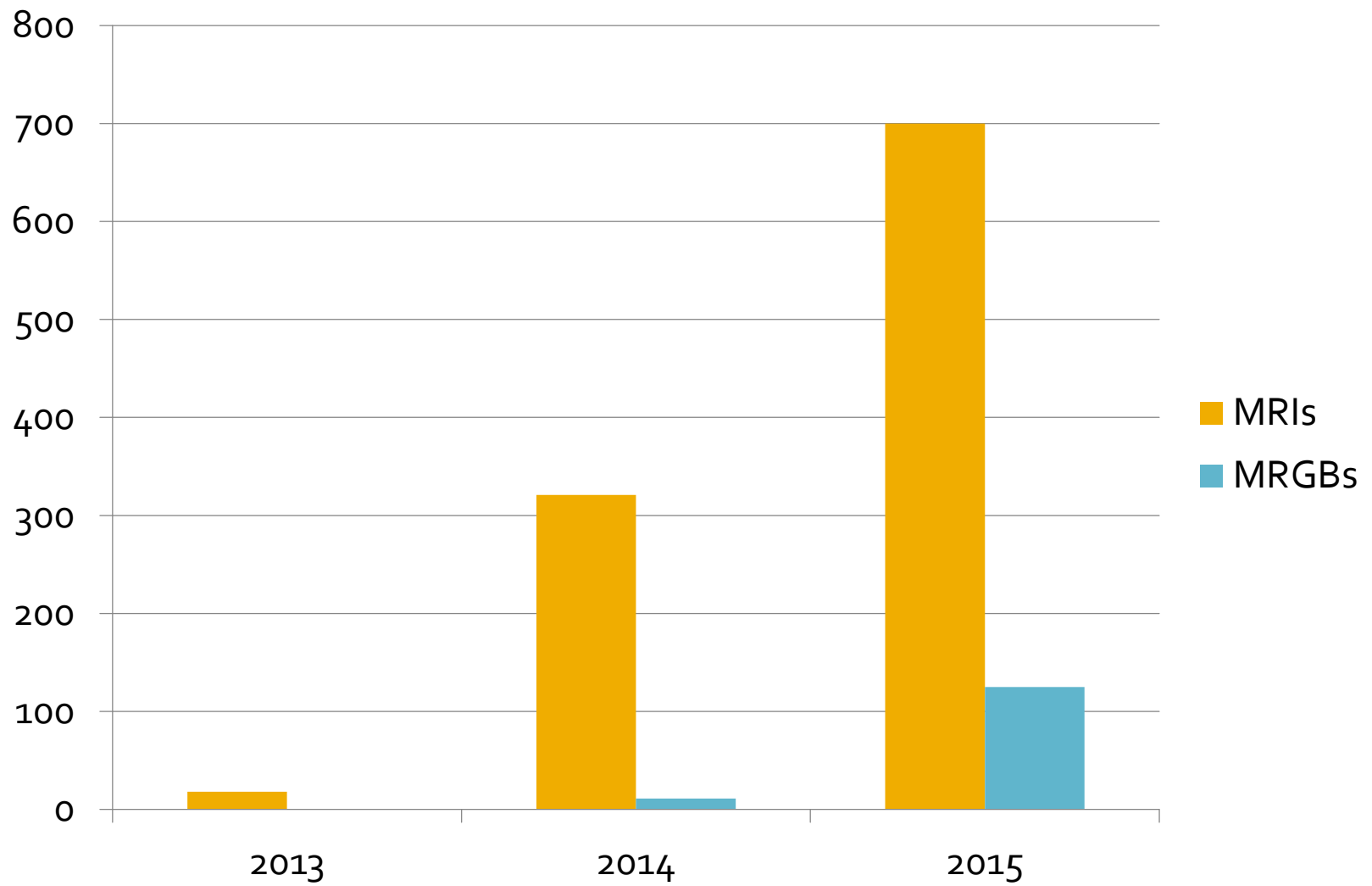
EAU Guideline 2014

5.2.4.3 Guidelines for imaging

	LE	GR
When clinical suspicion of PCa persists in spite of negative biopsies, MRI-targeted biopsies are recommended.	2b	B

EAU Guideline 2015

VAEXT - Aarhus



Erfaringer fra rectum cancer

CCG guideline 2001: obligatorisk MRI til
identificering af patienter med nyopdaget
c. rectum kræft til adjuverende CRT.

- Audit 2007 – Uddannelse af læger
 - Tilstrækkelig billedkvalitet
 - Tilstrækkelig kvalitet af beskrivelser
 - Korrekt vurdering af tumor + resektionsplan hos 50 %

• Ginnerup Pedersen Dis Colon Rectum 2011;54:328-334



Prostate MR Reference Center Centers of Excellence	The Netherlands, Nijmegen	Radboudumc
	The Netherlands, Almelo/Hengelo	Ziekenhuisgroep Twente
	The Netherlands, Den Haag	HagaZiekenhuis
	The Netherlands, Rotterdam	Maasstad Ziekenhuis
	Denmark, Aarhus	Aarhus University Hospital
	Norway, Trondheim	St. Olavs Hospital/NTNU
	Australia, Brisbane	Wesley Prostate Radiological and Urological Research Group
	Australia, Sydney	Sydney Adventist Hospital
	Australia, Cairns	Cairns Radiology
	Hong Kong	iRad Medical Diagnostic Center
Scan Centers	United States of America, Santa Monica, CA.	Medical Imaging Center of Southern California, Inc.

Hovedpiner

- Hvordan sikres ressourcerne?
 - Penge
 - ***Uddannelse***
 - Personnel
 - Skannere
- Hvor mange steder?
 - Tilknyttet alle urologiske afd. med prostata-service?
 - Få 'storcentre' med alle varer på hylderne?
- Hvordan sikres kvaliteten?
 - Systematiseret feed-back – og **fra HVEM?**
 - MDT/follow-up MDT

Tak

