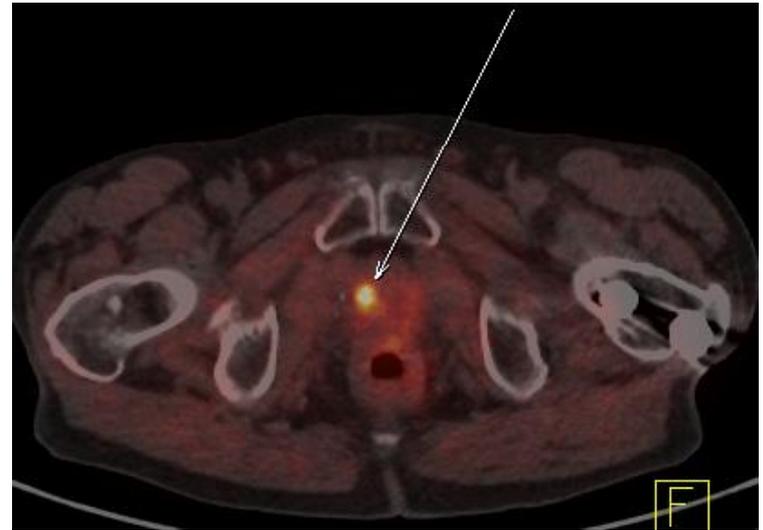
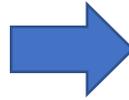
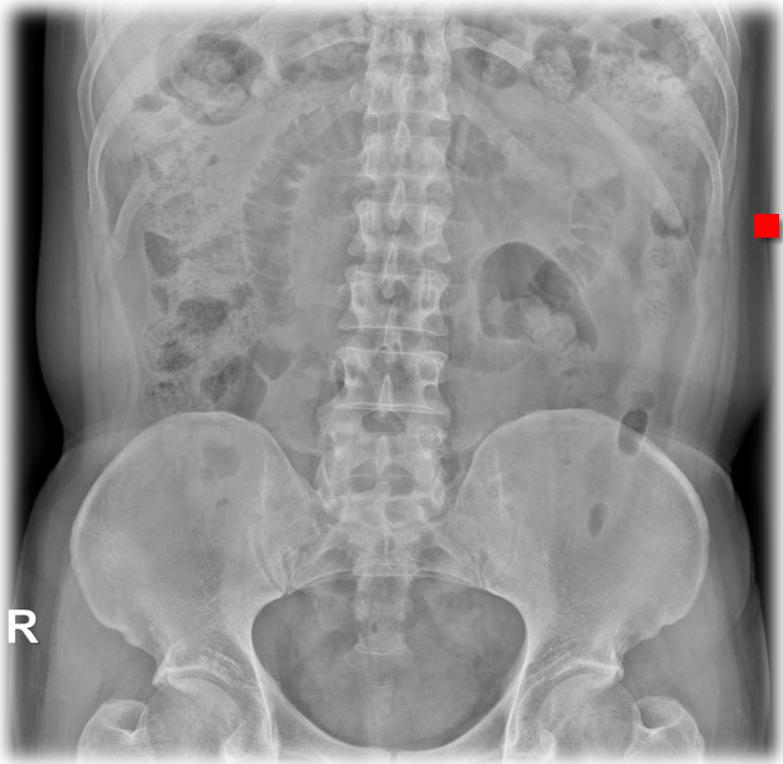




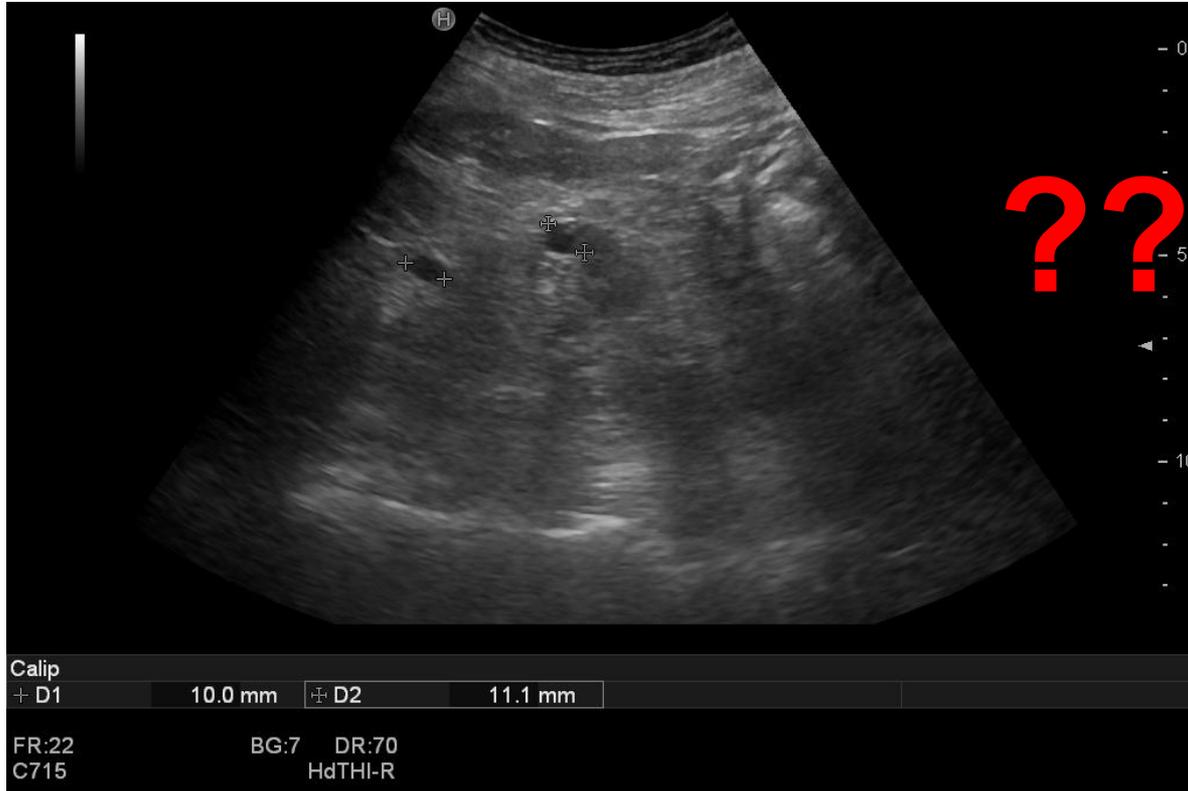
Urological Imaging Studies

Kyu Won Lee
The Catholic
University of Korea

Imaging study



Imaging study



Contents

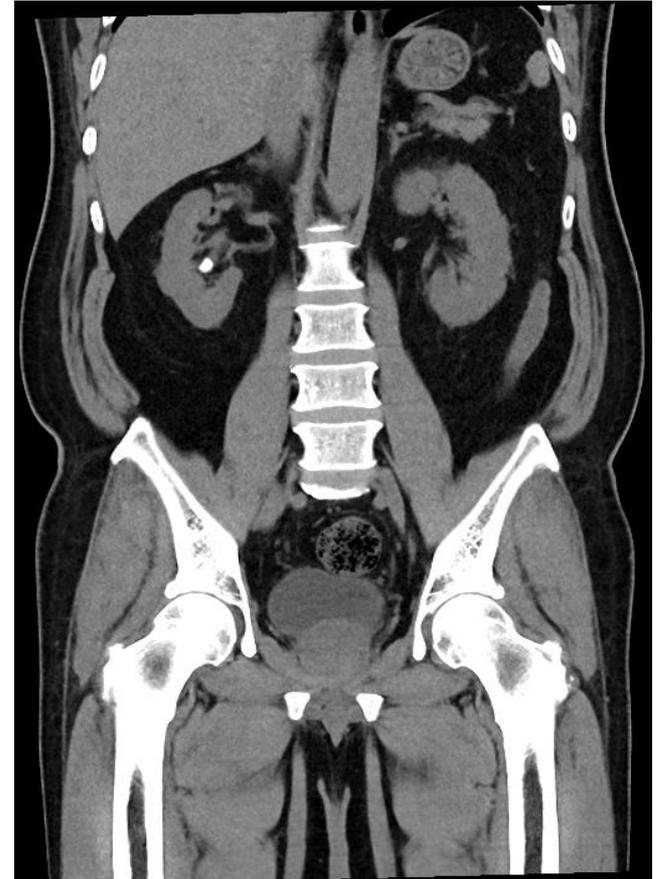
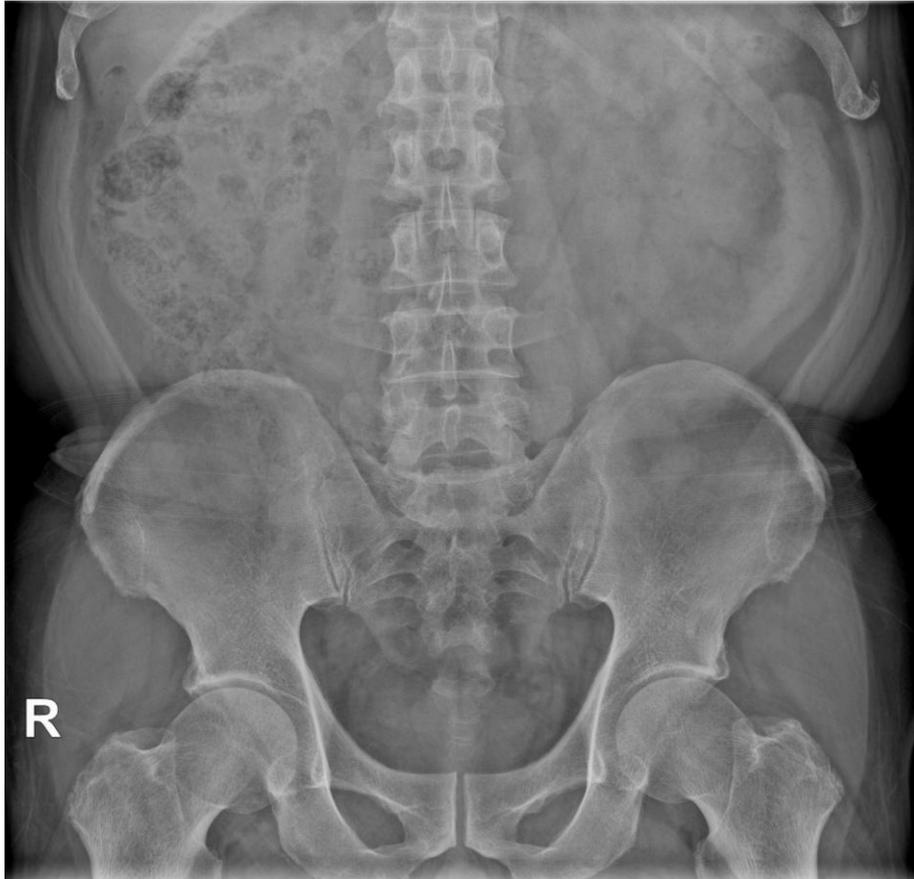


- **Urolithiasis**
- **Kidney**
- **Prostate**

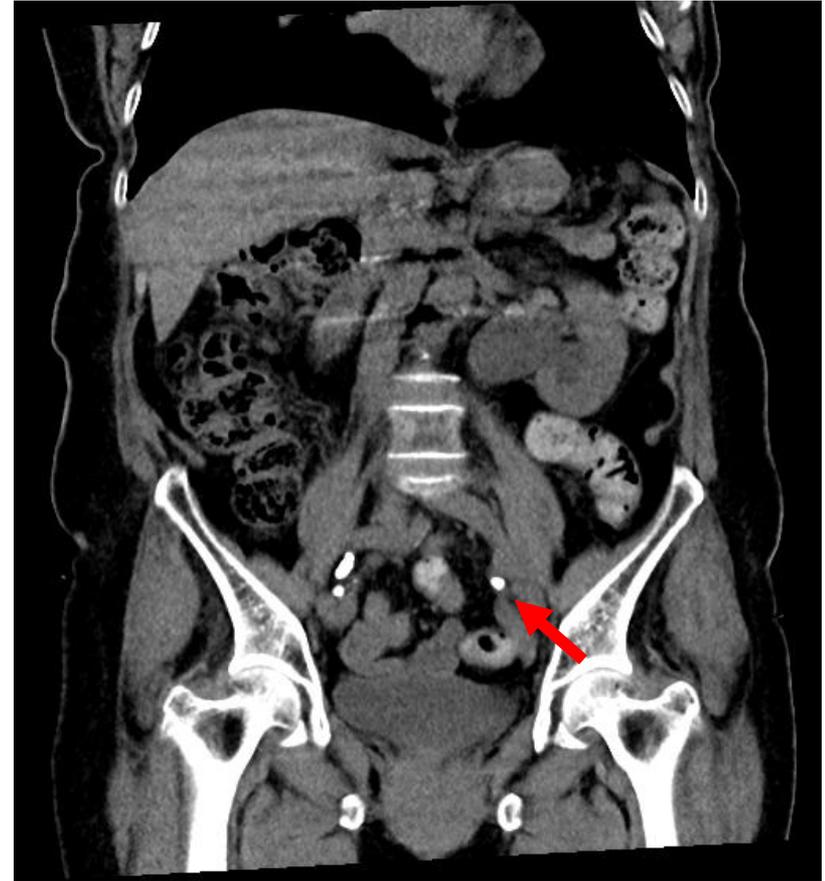
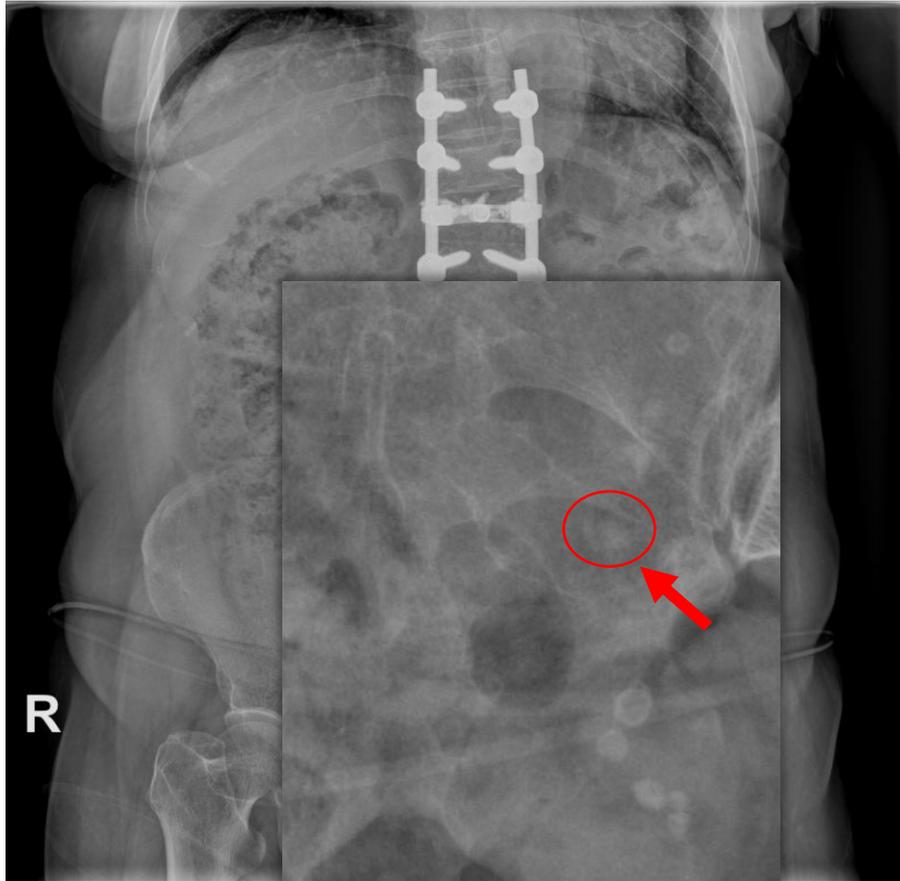


Urolithiasis

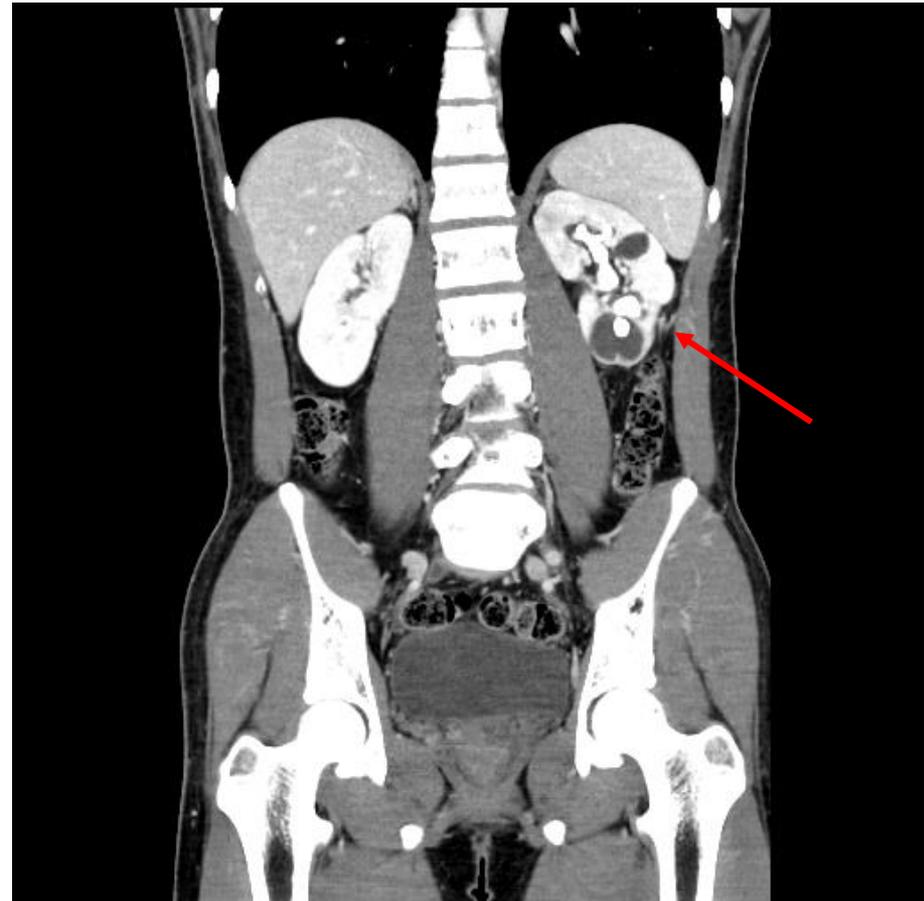
Urolithiasis



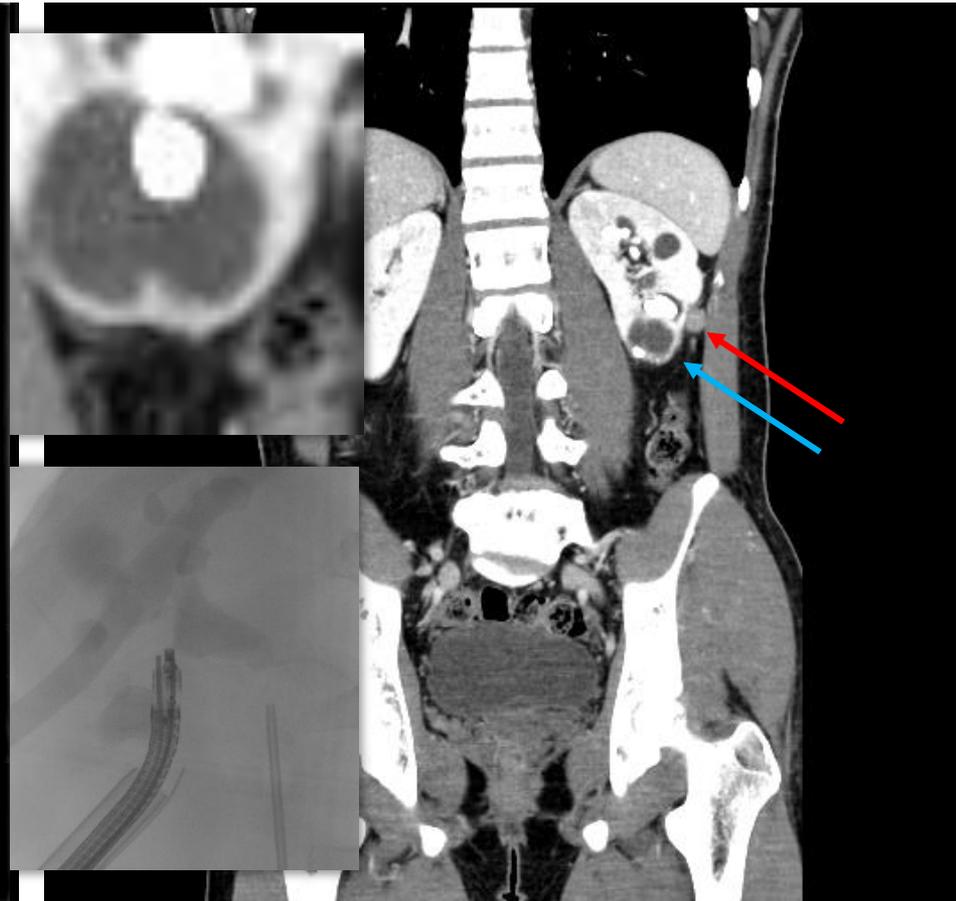
Urolithiasis



Urolithiasis



Urolithiasis

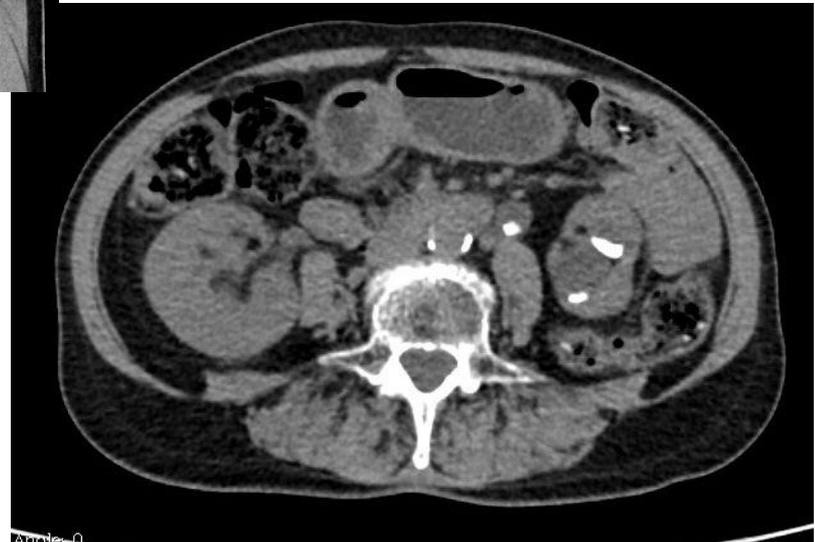


Urolithiasis

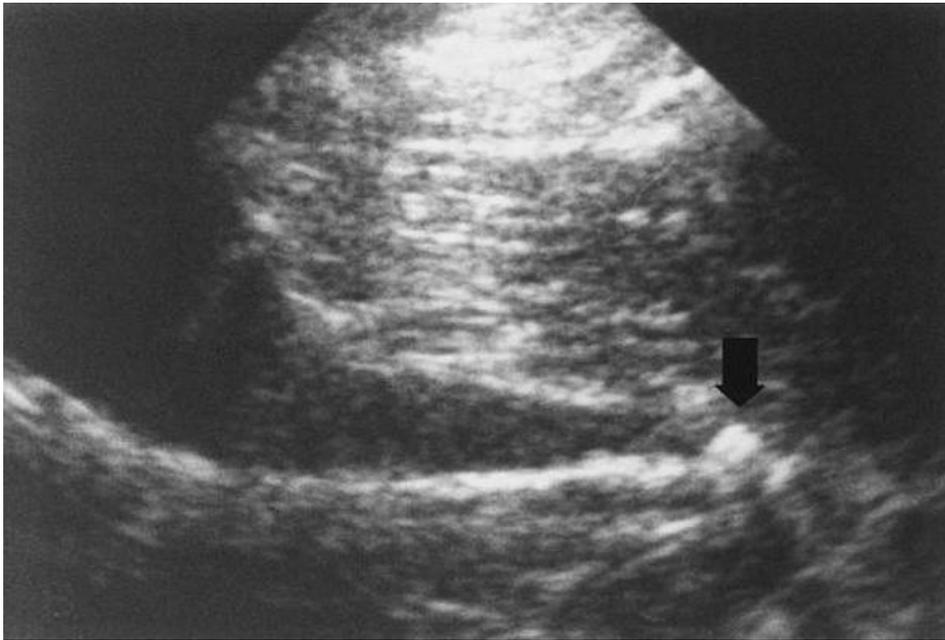
**Horseshoe
kidney**



**Retrorenal
colon**



Urolithiasis



▪ Ultrasonography

- Highly echogenic foci (observed with both radiopaque and radiolucent stones)
- posterior shadowing behind the echogenic focus

Urolithiasis





Kidney

Renal cell carcinoma

▪ CT

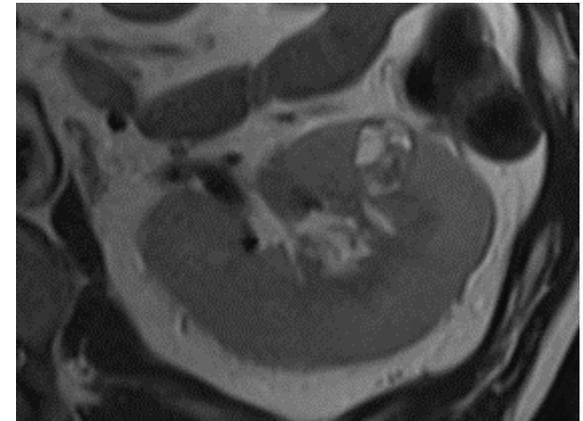
- Mandatory: Nonenhanced and parenchymal phase
- Optional: Corticomedullary, excretory phases
 - Typically, exophytic but may be intrarenal or an infiltrative mass.
 - May be hypervascular and heterogeneous (conventional) or homogeneous; poorly enhancing tumors are more likely to be papillary.
 - Typically discovered as an incidental finding.



Renal cell carcinoma

▪ MRI

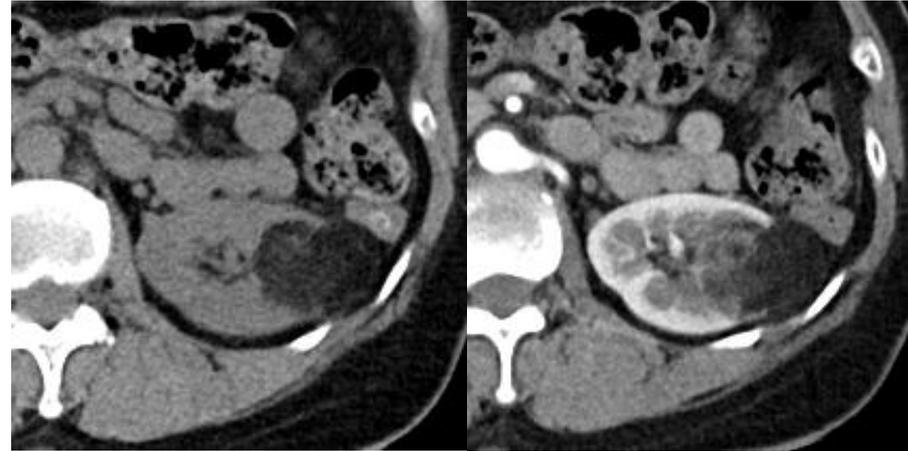
- Sensitivity similar to CT; but ability to detect enhancement superior to CT.
- Homogeneous tumors may be isointense with parenchyma on T1- and T2-weighted sequences (low T2 signal intensity should suggest papillary type).
- Opposed-phase signal loss should suggest clear cell type.
- May be hypervascular and heterogeneous (conventional) or homogeneous and poorly enhancing (papillary).



Renal cell carcinoma

Differential Diagnoses

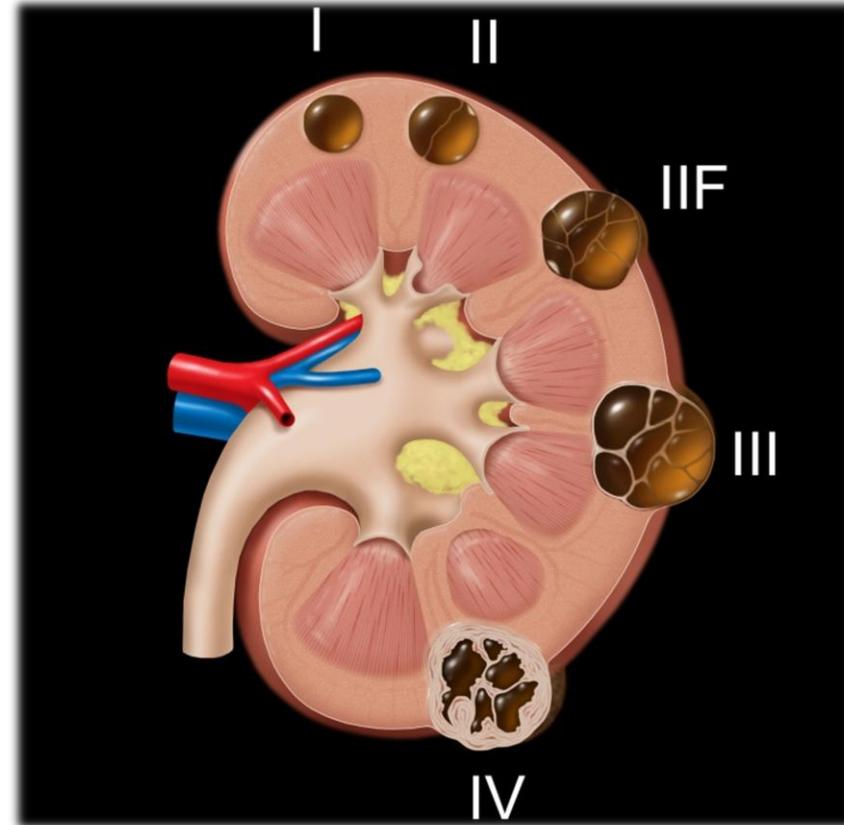
- Renal AML (angiomyolipoma)
- Renal urothelial cell carcinoma
- Renal oncocytoma
- Renal metastases and lymphoma
- Renal abscess
- Complex renal cysts (Bosniak classification types II and III)



Renal cell carcinoma

Bosniak classification

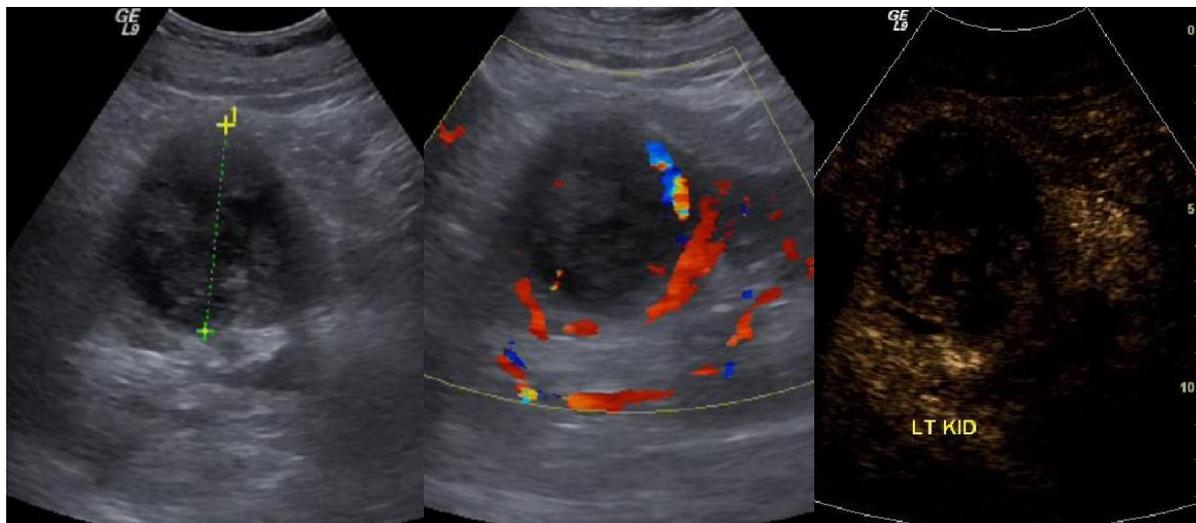
- Class I: Benign cysts
- Class II: Minimally complicated cysts; benign
- Class IIF: Requires CT/MR imaging follow-up
- Class III: More complicated cysts; usually managed surgically (biopsy controversial)
- Class IV: Malignant lesions; require surgery



Renal cell carcinoma

Ultrasonography

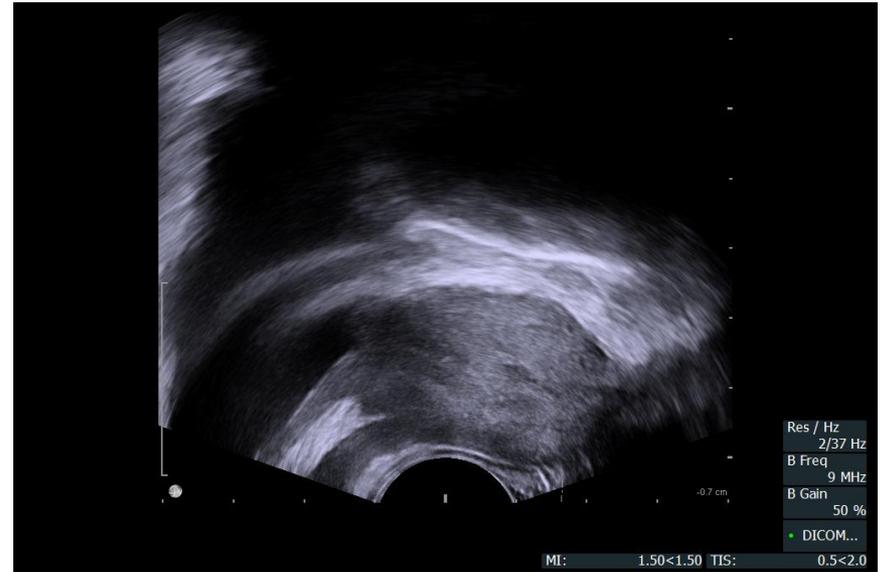
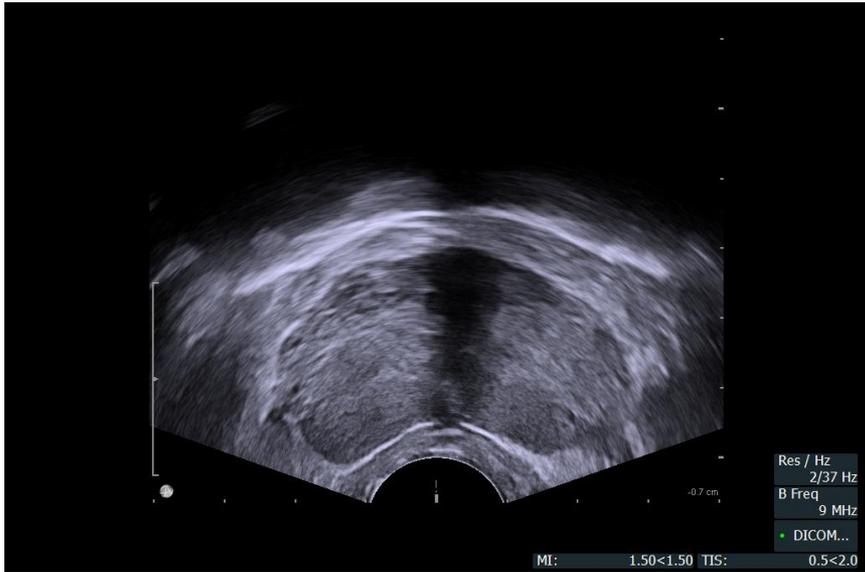
- US failed to identify 80% of masses smaller than 1 cm seen on CT
- Intraoperative ultrasound: endophytic mass
- Contrast enhanced ultrasound (CEUS)



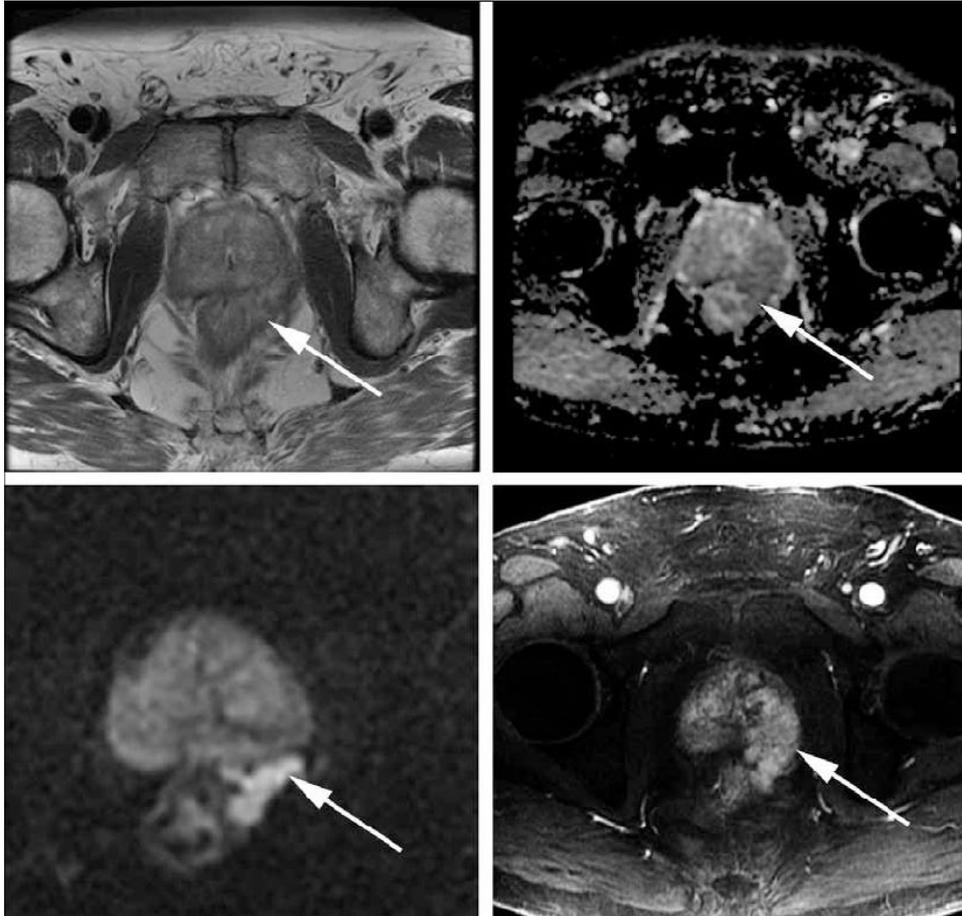


Prostate

Prostate



Prostate



Multi parametric MRI

- Contains any functional parameters of imaging used to supplement standard anatomical T1 and T2-weighted imaging
 - Dynamic contrast-enhanced (**DCE**) MRI
 - Diffusion-weighted imaging (**DWI**), including the calculation of apparent diffusion co-efficient (**ADC**) maps.

Prostate



PI-RADS

- PI-RADS 1 – Very low (clinically significant cancer is highly unlikely to be present)
- PI-RADS 2 – Low (clinically significant cancer is unlikely to be present)
- PI-RADS 3 – Intermediate (the presence of clinically significant cancer is equivocal)
- PI-RADS 4 – High (clinically significant cancer is likely to be present)
- PI-RADS 5 – Very high (clinically significant cancer is highly likely to be present)

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Platinum Priority – Prostate Cancer

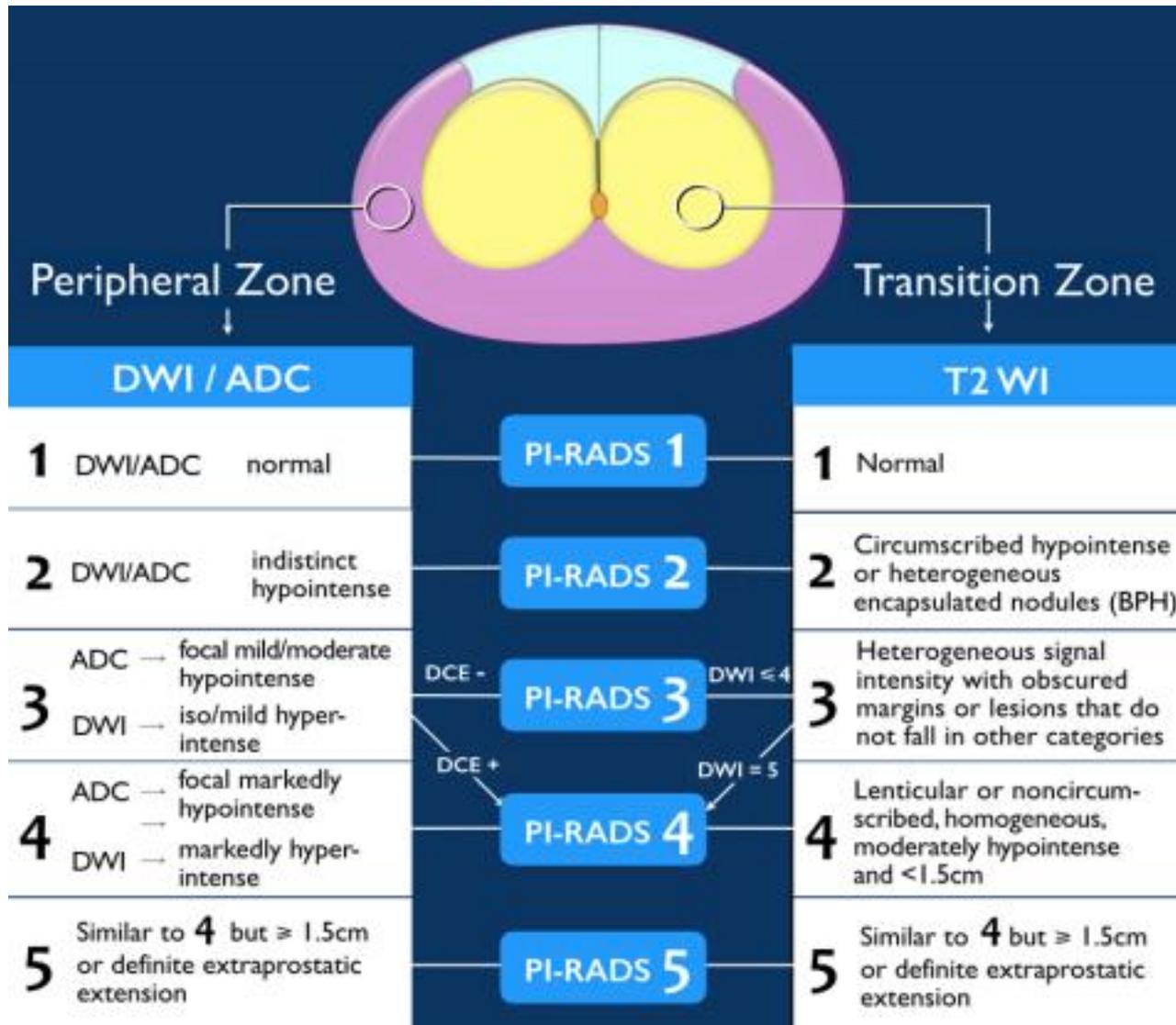
Editorial by Jelle O. Barentsz, Jeffrey C. Weinreb, Sadhna Verma et al on pp. 41–49 of this issue

PI-RADS Prostate Imaging – Reporting and Data System: 2015, Version 2

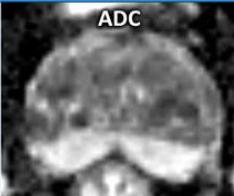
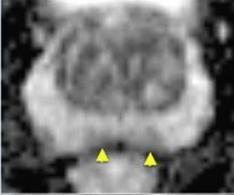
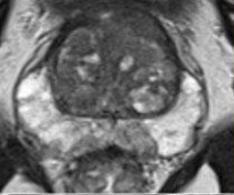
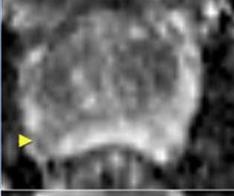
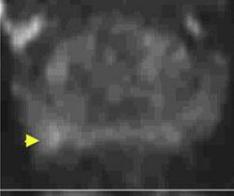
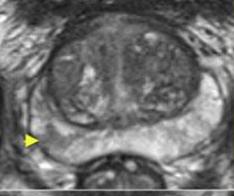
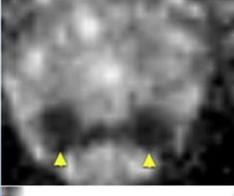
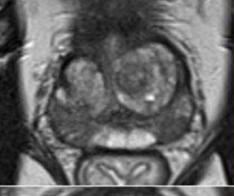
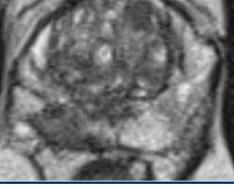
Jeffrey C. Weinreb^{a,*,*}, Jelle O. Barentsz^{b,†}, Peter L. Choyke^c, Francois Cornud^d, Masoom A. Haider^e, Katarzyna J. Macura^f, Daniel Margolis^g, Mitchell D. Schnall^h, Faina Shternⁱ, Clare M. Tempany^j, Harriet C. Thoeny^k, Sadna Verma^l

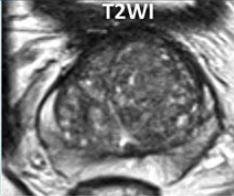
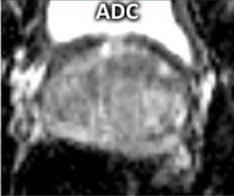
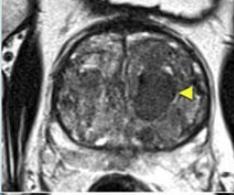
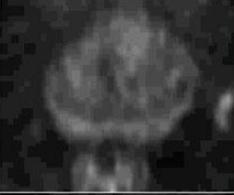
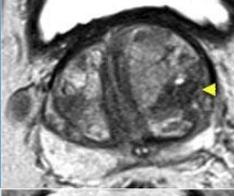
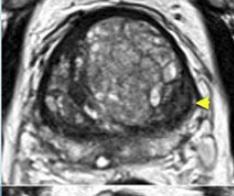
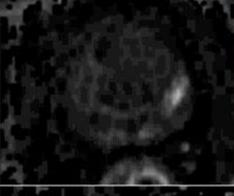
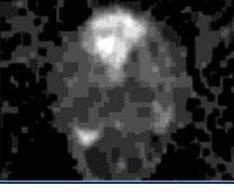
^aYale School of Medicine, New Haven, CT, USA; ^bRadboudumc, Nijmegen, The Netherlands; ^cNational Institutes of Health, Bethesda, MD, USA; ^dRené Descartes University, Paris, France; ^eUniversity of Toronto, Sunnybrook Health Sciences Centre, Toronto, Canada; ^fJohns Hopkins University, Baltimore, MD, USA; ^gUniversity of California, Los Angeles, CA, USA; ^hUniversity of Pennsylvania, Philadelphia, USA; ⁱAdMeTech Foundation, Boston, MA, USA; ^jHarvard University, Boston, MA, USA; ^kUniversity Hospital of Bern, Bern, Switzerland; ^lUniversity of Cincinnati, Cincinnati, OH, USA

Prostate

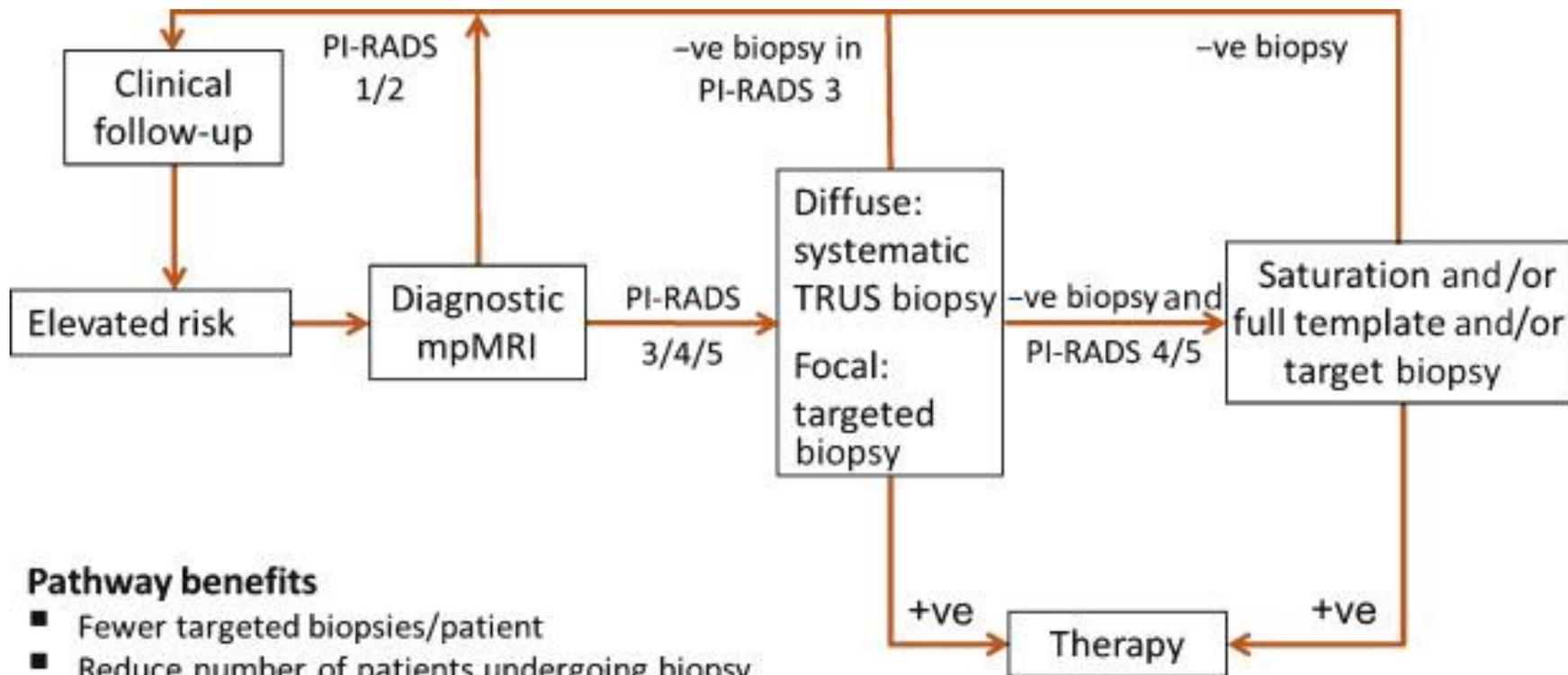


Prostate

Peripheral Zone			
ADC	ADC	DWI	T2WI
1 Normal			
2 ADC: Indistinct hypointense			
3 ADC: focal mild/moderate hypointense DWI: iso/mild hyperintense < 1.5 cm			
4 ADC: focal markedly hypointense DWI: markedly hyperintense < 1.5 cm			
5 Similar to 4 but ≥ 1.5cm or definite extraprostatic extension			

Transition Zone			
T2WI	T2WI	ADC	DWI
1 Normal			
2 Circumscribed hypointense or heterogeneous encapsulated nodules (BPH)			
3 Heterogeneous signal intensity with obscured margins or lesions that do not fall in other categories			
4 Lenticular or noncircum-scribed, homogeneous, moderately hypointense and <1.5cm			
5 Similar to 4 but ≥ 1.5cm or definite extraprostatic extension			

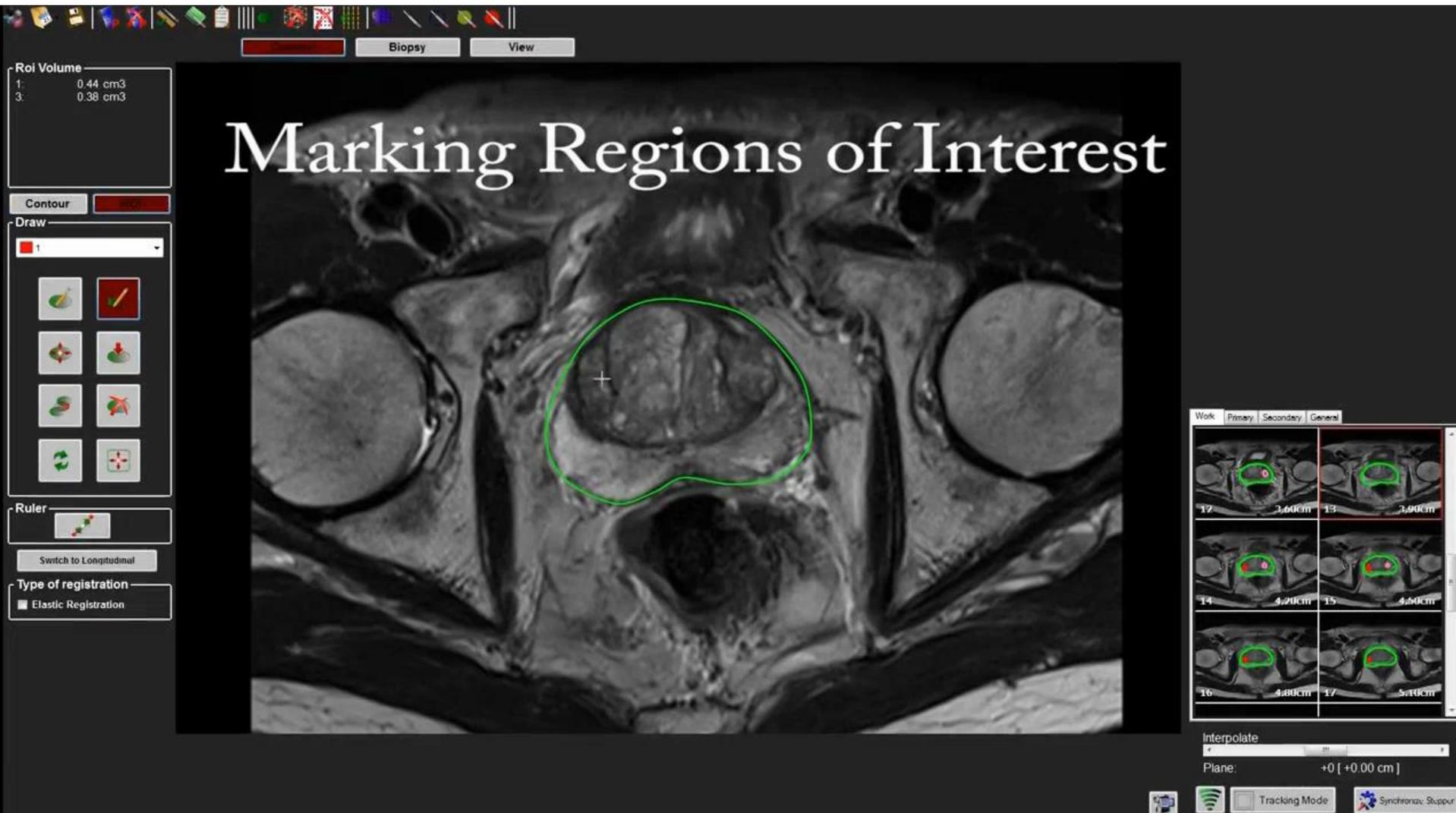
Prostate



Pathway benefits

- Fewer targeted biopsies/patient
- Reduce number of patients undergoing biopsy
- Potential increased rates of detection of significant disease
- Greater precision of determining tumor grade and volume (risk stratification)
- Potential reductions in diagnosis of indolent disease (reduces overdiagnosis and overtreatment)

Prostate



Marking Regions of Interest

RoI Volume

1:	0.44 cm ³
3:	0.38 cm ³

Contour 1

Draw

1

Ruler

Switch to Longitudinal

Type of registration

Elastic Registration

Work | Primary | Secondary | General

12	3.60cm	13	3.90cm
14	4.20cm	15	4.60cm
16	4.80cm	17	5.10cm

Interpolate

Plane: +0 [+0.00 cm]

Tracking Mode | Synchroniz. Support

The main image shows an axial MRI slice of the prostate with a green contour. A white crosshair is visible within the contour. The interface includes various toolbars and panels for image manipulation and analysis.

Thank you for your attention