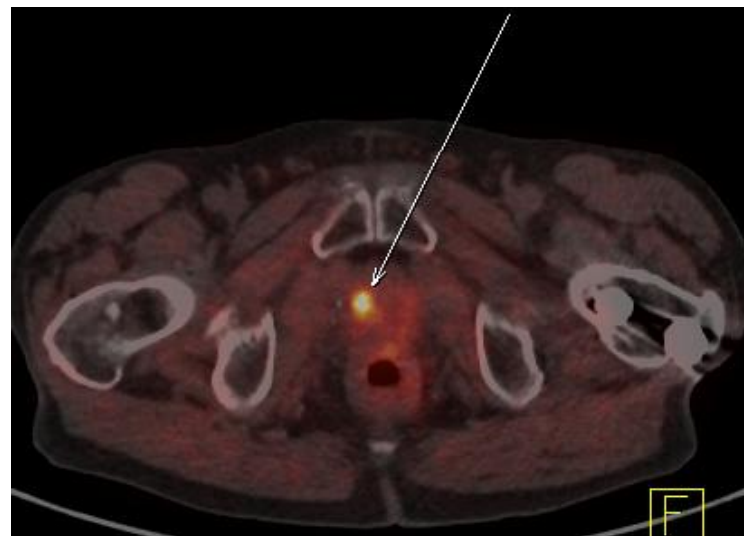




# Urological Imaging Studies

Kyu Won Lee  
The Catholic  
University of Korea

# Imaging study



# Imaging study



# Contents

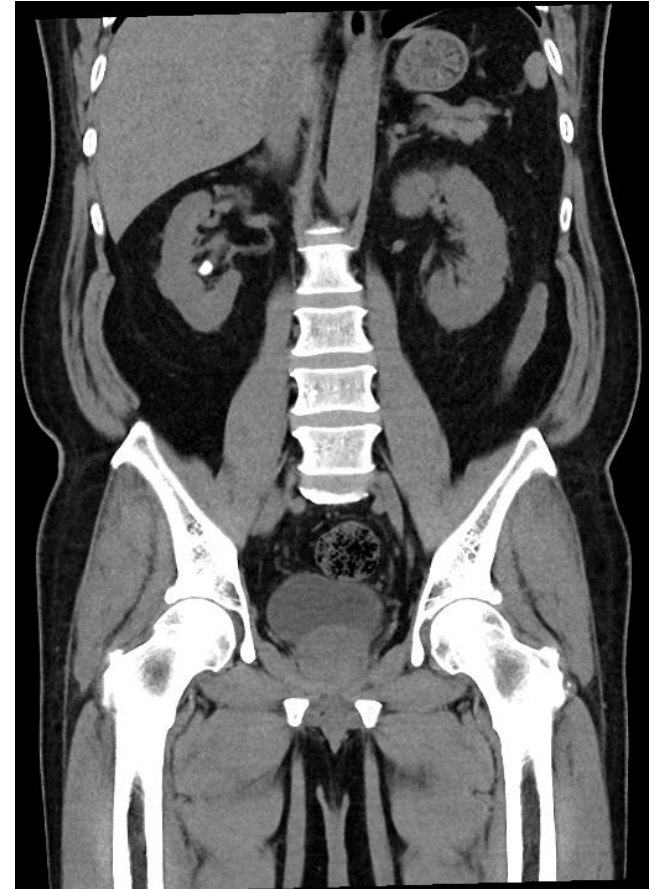
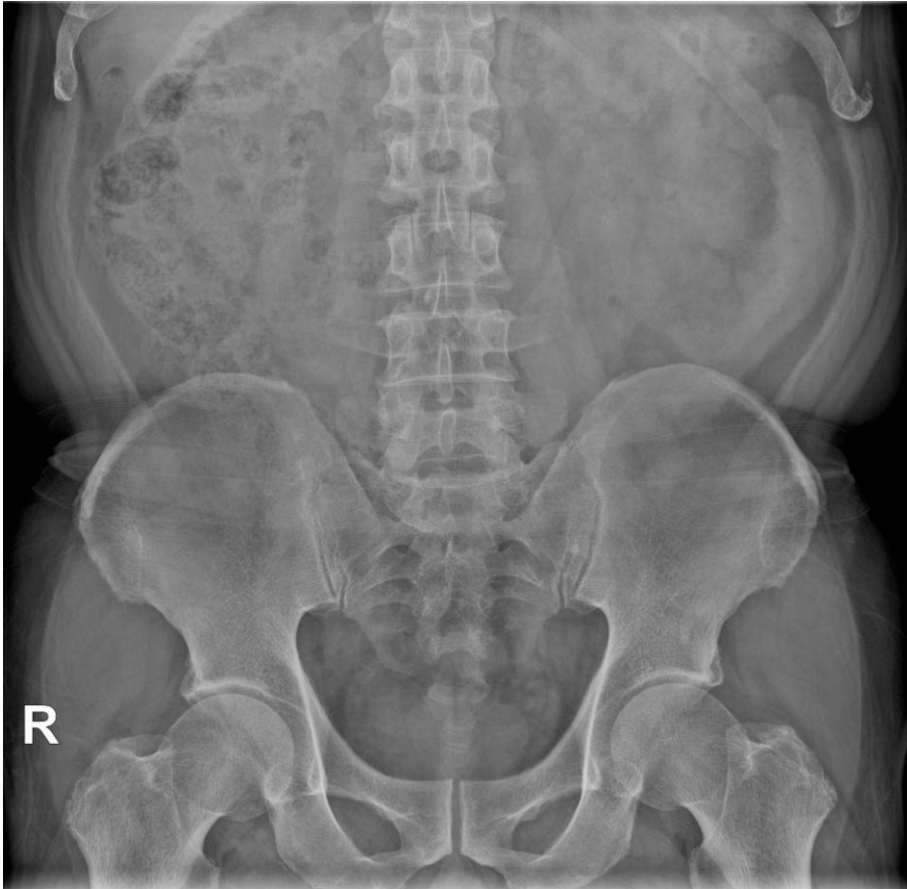


- **Urolithiasis**
- **Kidney**
- **Prostate**

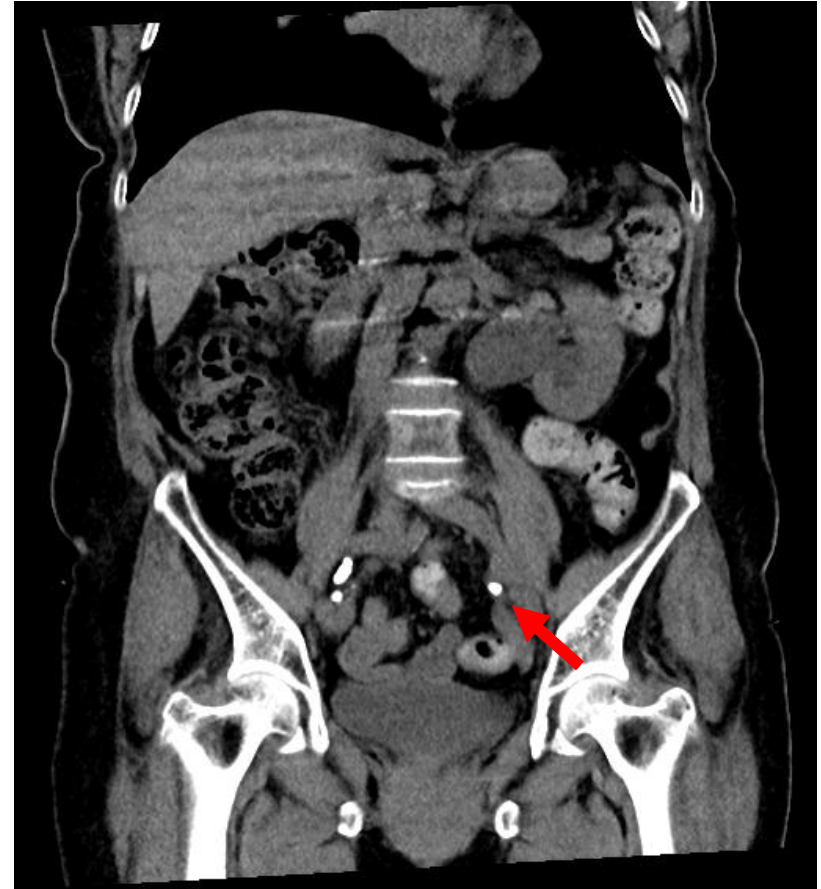
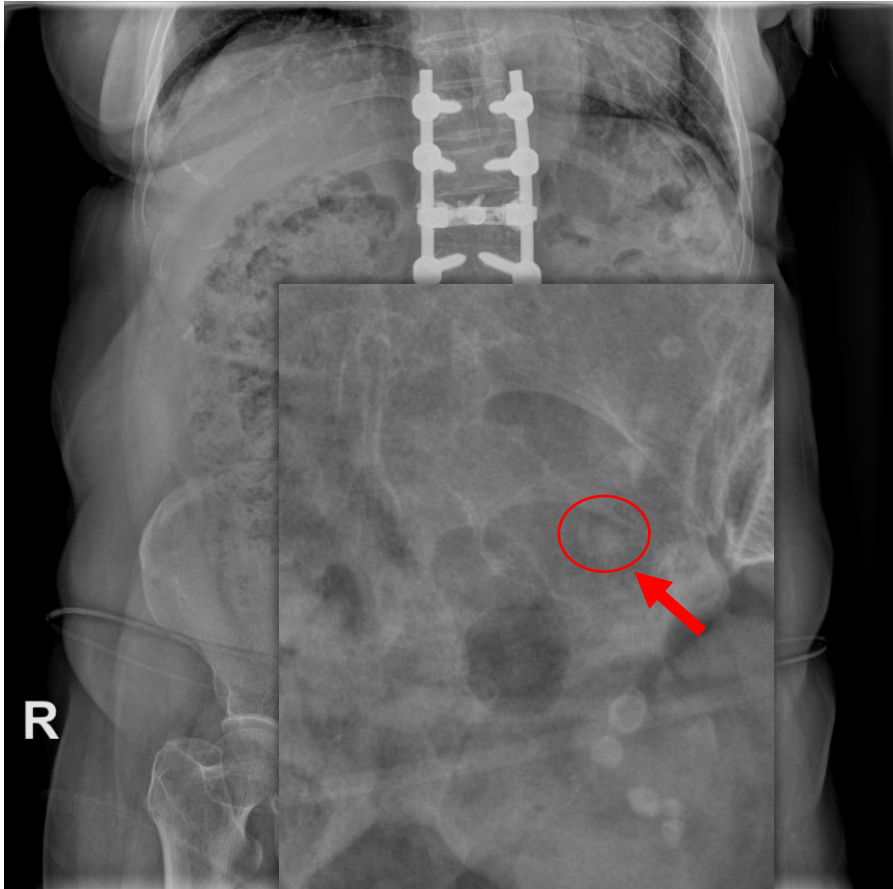
# **Urolithiasis**



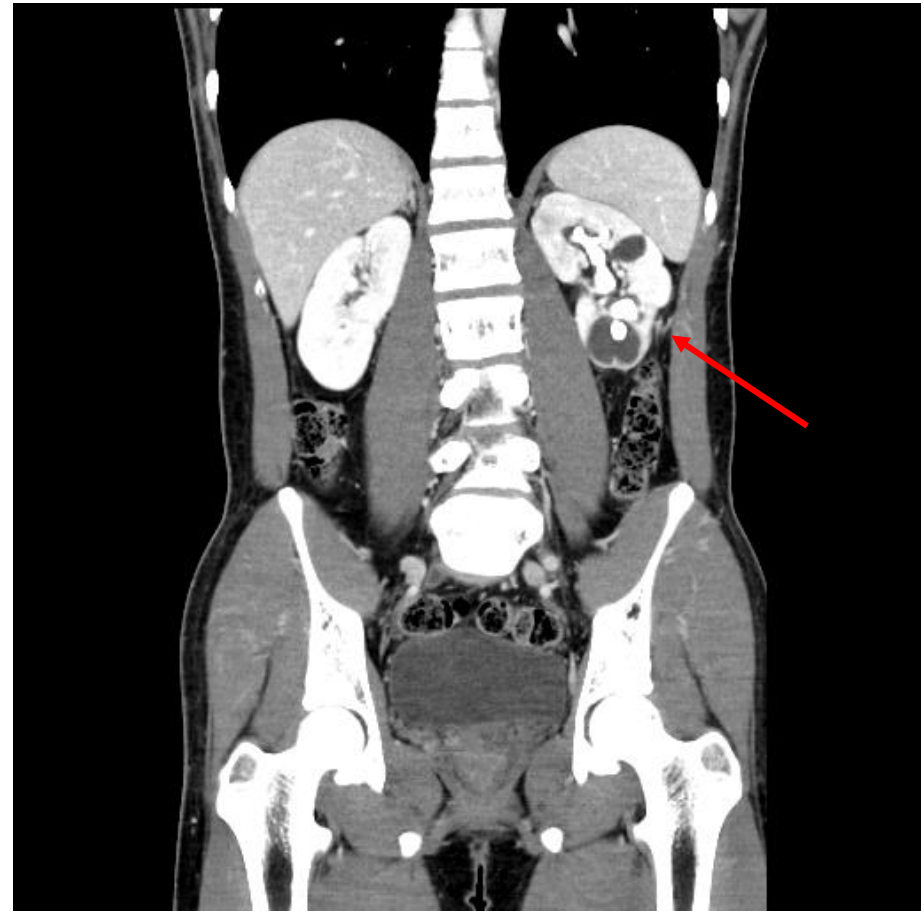
# Urolithiasis



# Urolithiasis

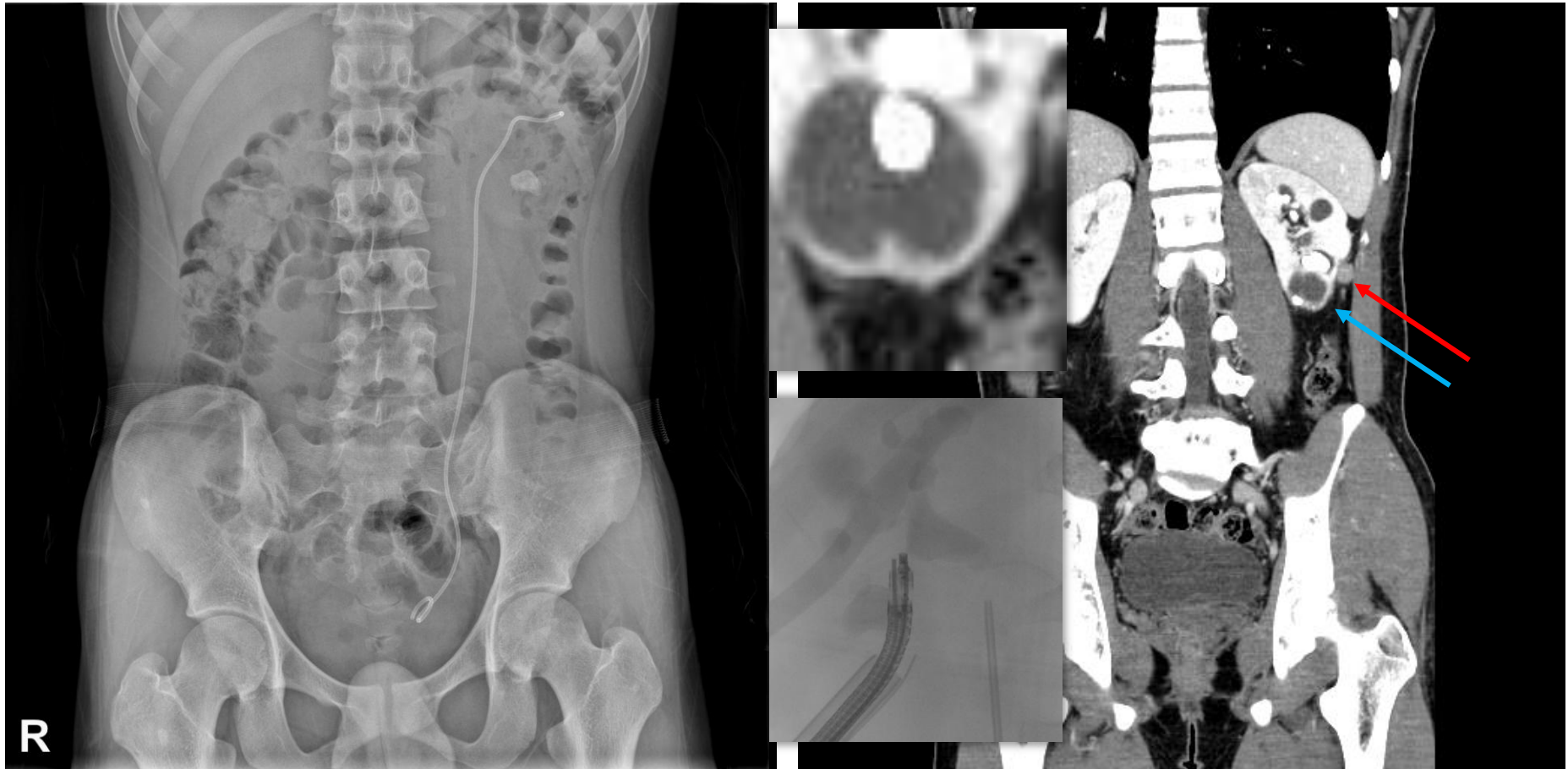


# Urolithiasis





# Urolithiasis

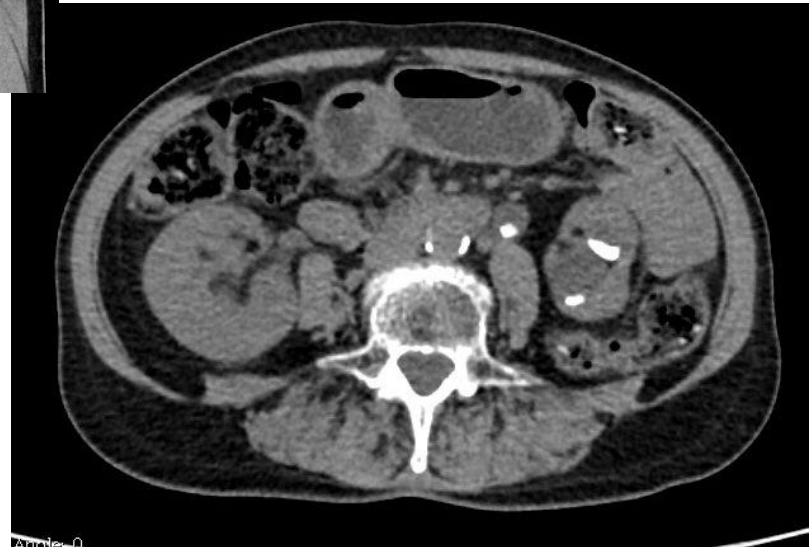


# Urolithiasis

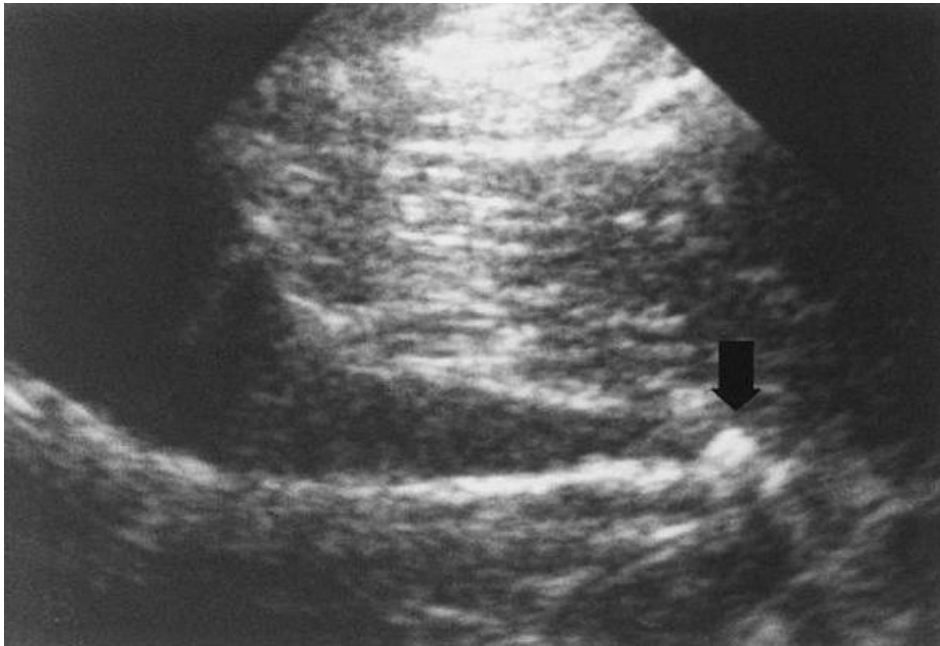
**Horseshoe  
kidney**



**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

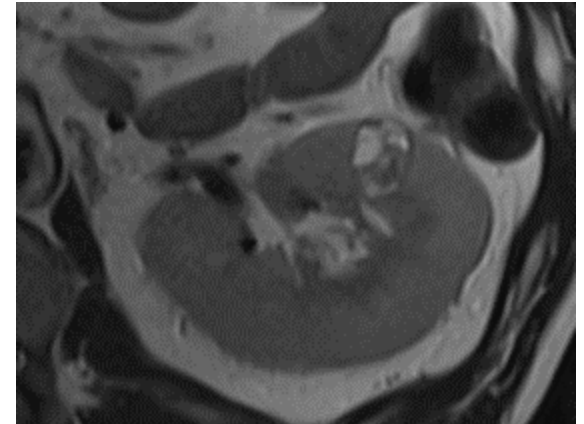
- Mandatory: Nonenhanced and parenchymal phase
- Optional: Corticomedullary, excretory phases
  - Typically, exophytic but may be intrarenal or an infiltrative mass.
  - May be hypervascular and heterogeneous (conventional) or homogeneous; poorly enhancing tumors are more likely to be papillary.
  -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



# Renal cell carcinoma

## ▪ MRI

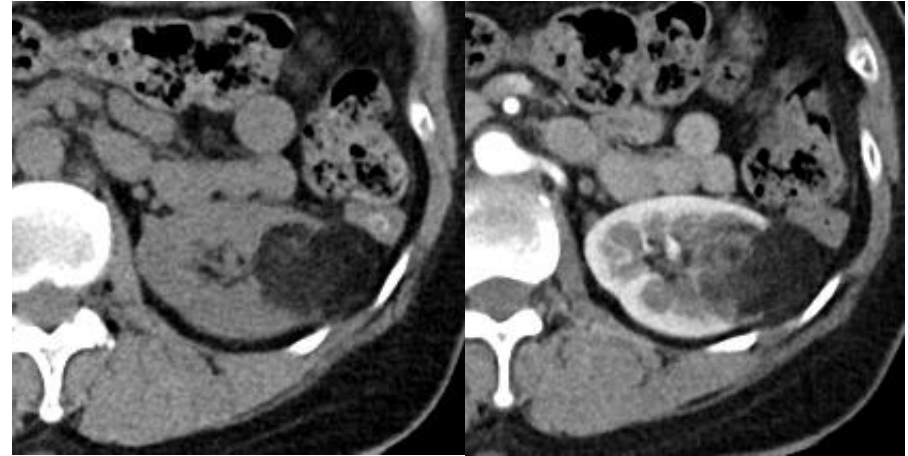
- Sensitivity similar to CT; but ability to detect enhancement superior to CT.
- Homogeneous tumors may be isointense with parenchyma on T1- and T2-weighted sequences (low T2 signal intensity should suggest papillary type).
- Opposed-phase signal loss should suggest clear cell type.
- May be hypervascular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



# Renal cell carcinoma

## Differential Diagnoses

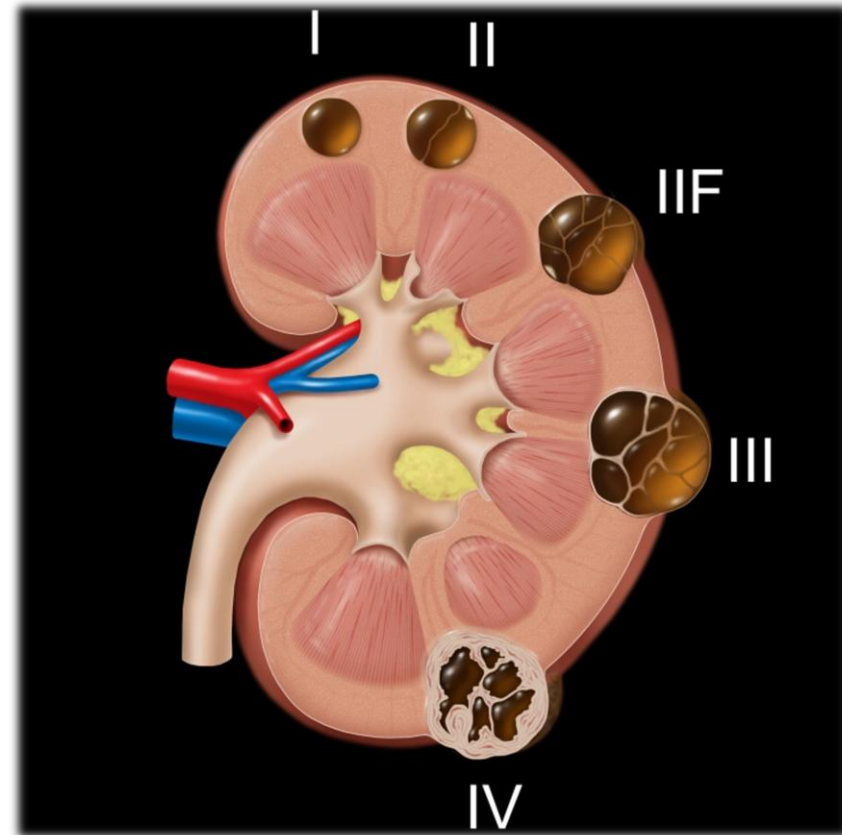
- Renal AML (angiomyolipoma)
- Renal urothelial cell carcinoma
- Renal oncocytoma
- Renal metastases and lymphoma
- Renal abscess
- Complex renal cysts (Bosniak classification types II and III)



# Renal cell carcinoma

## Bosniak classification

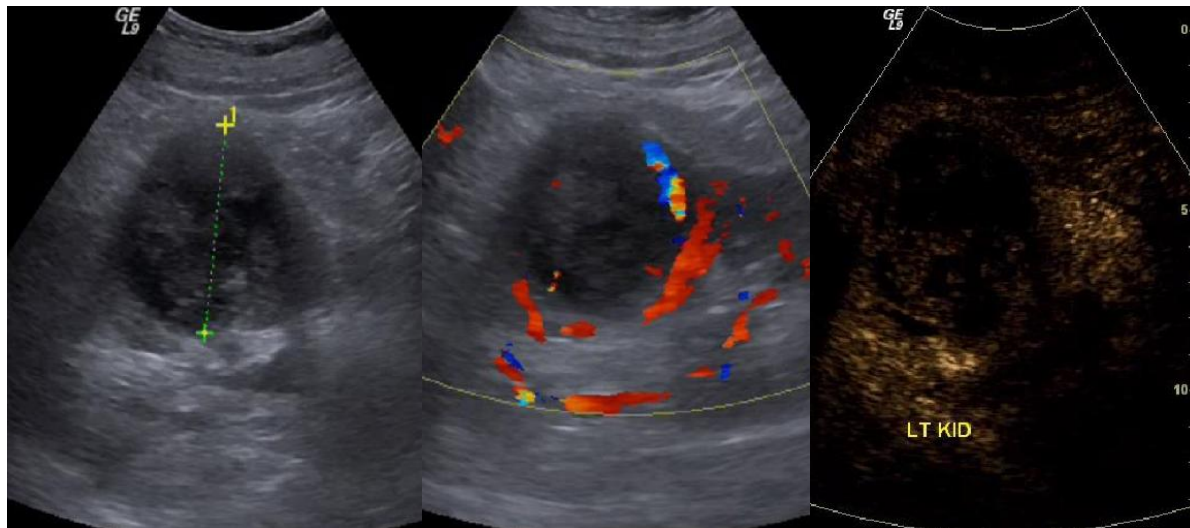
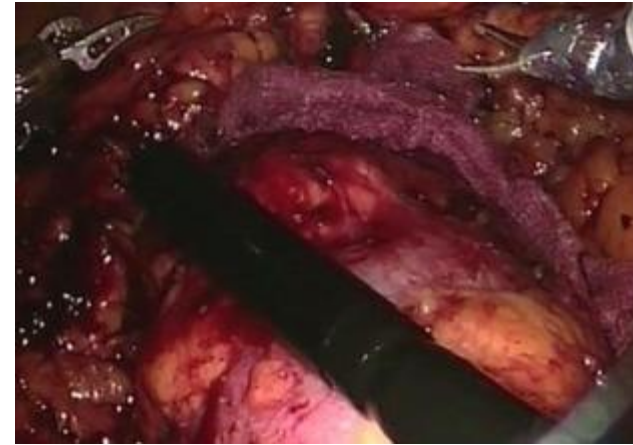
- Class I: Benign cysts
- Class II: Minimally complicated cysts; benign
- Class IIF: Requires CT/MR imaging follow-up
- Class III: More complicated cysts; usually managed surgically (biopsy controversial)
- Class IV: Malignant lesions; require surgery



# Renal cell carcinoma

## Ultrasonography

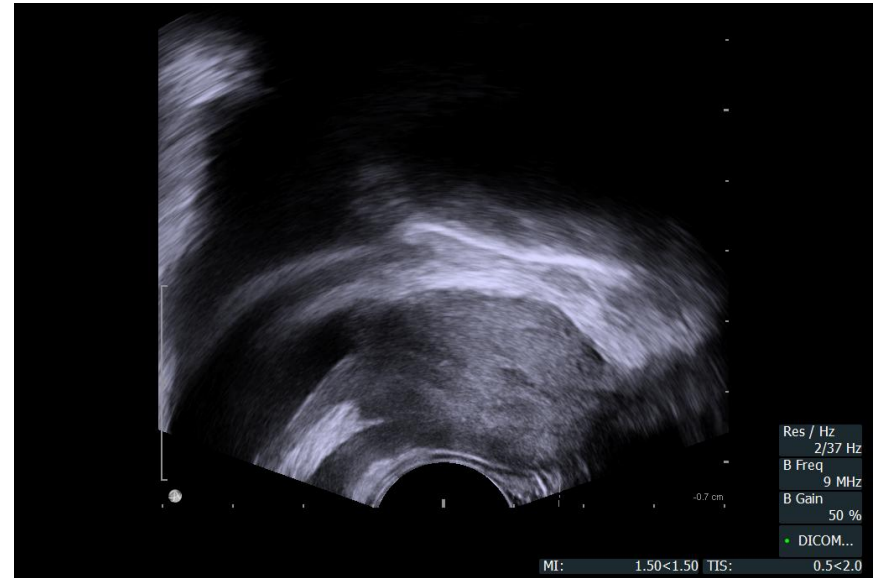
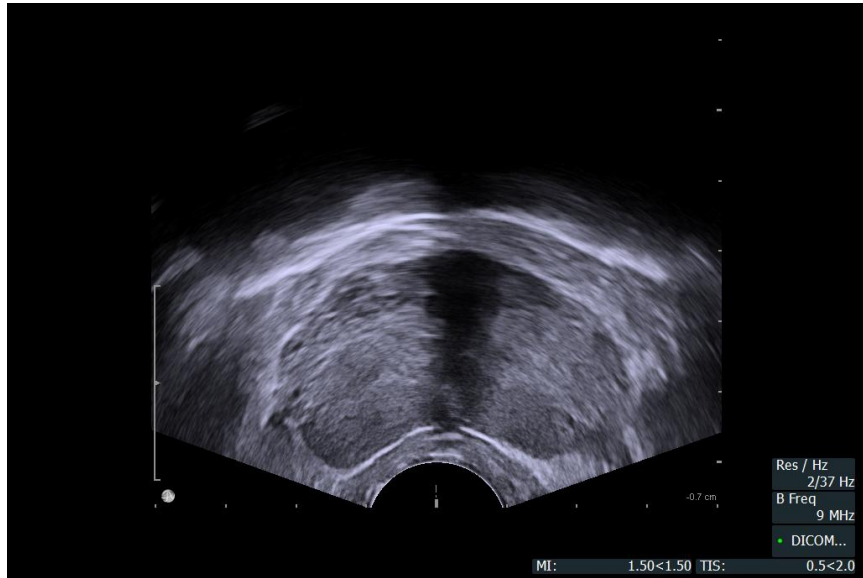
- US failed to identify 80% of masses smaller than 1 cm seen on CT
- Intraoperative ultrasound: endophytic mass
- Contrast enhanced ultrasound (CEUS)



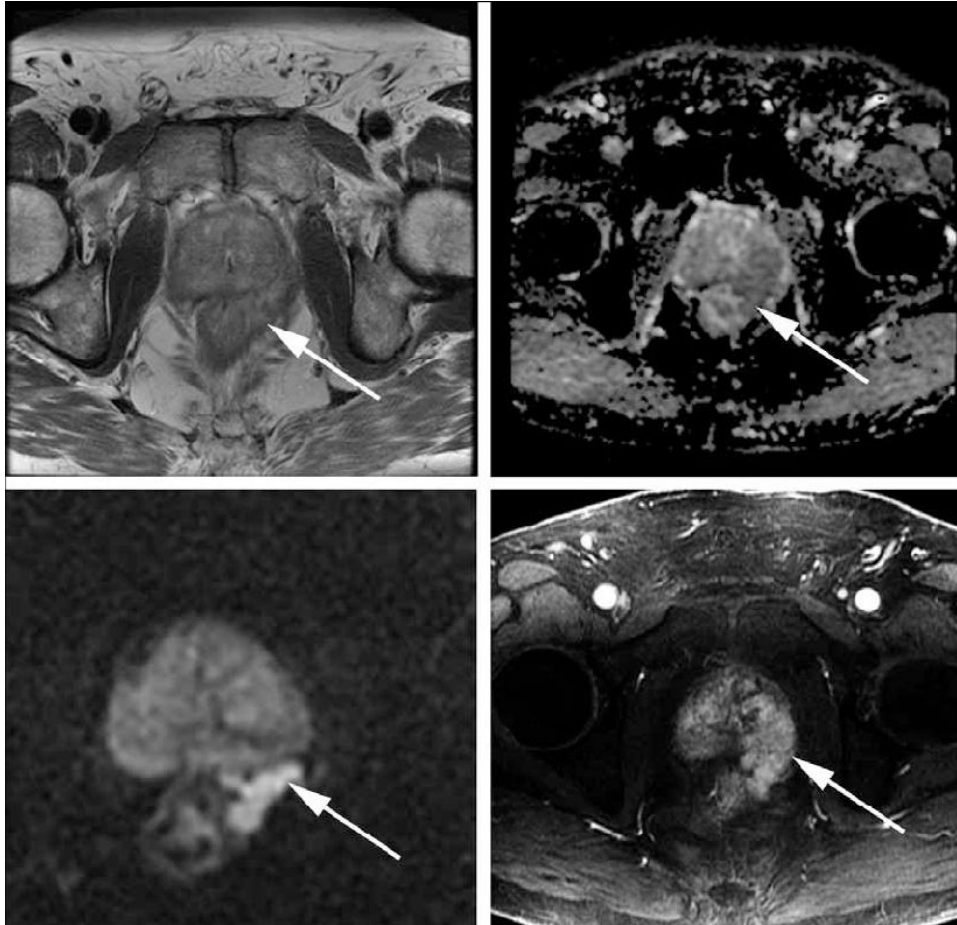


# Prostate

# 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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available at [www.sciencedirect.com](http://www.sciencedirect.com)  
journal homepage: [www.europeanurology.com](http://www.europeanurology.com)



### Platinum Priority – Prostate Cancer

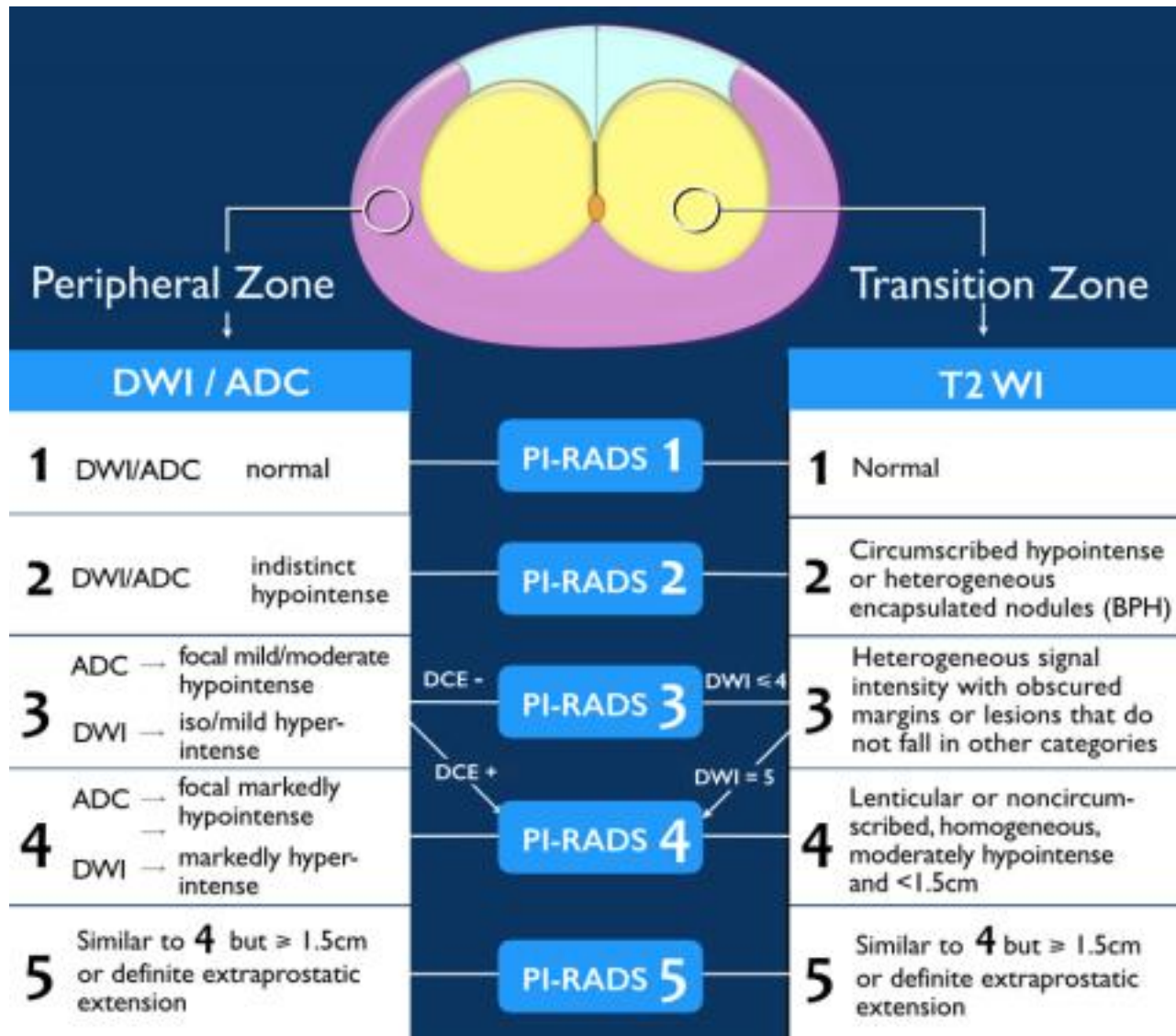
Editorial by Jelle O. Barentsz, Jeffrey C. Weinreb, Sadna Verma et al on pp. 41–49 of this issue

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

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

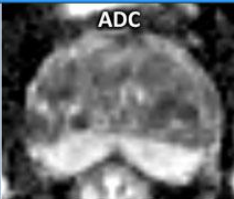

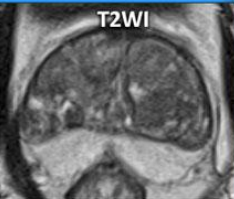
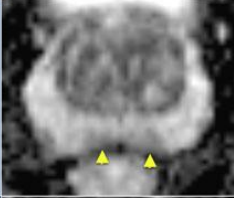

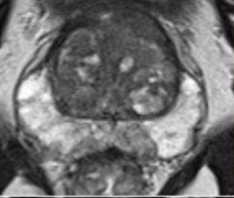
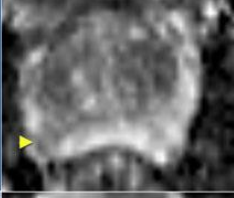

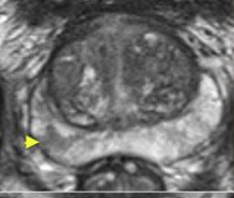
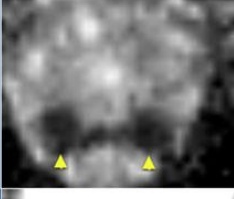

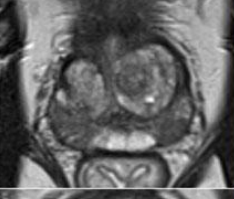


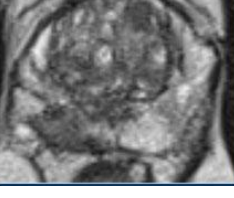
<sup>a</sup>Yale School of Medicine, New Haven, CT, USA; <sup>b</sup>Radboudumc, Nijmegen, The Netherlands; <sup>c</sup>National Institutes of Health, Bethesda, MD, USA; <sup>d</sup>René Descartes University, Paris, France; <sup>e</sup>University of Toronto, Sunnybrook Health Sciences Centre, Toronto, Canada; <sup>f</sup>Johns Hopkins University, Baltimore, MD, USA; <sup>g</sup>University of California, Los Angeles, CA, USA; <sup>h</sup>University of Pennsylvania, Philadelphia, USA; <sup>i</sup>AdMeTech Foundation, Boston, MA, USA; <sup>j</sup>Harvard University, Boston, MA, USA; <sup>k</sup>University Hospital of Bern, Bern, Switzerland; <sup>l</sup>University of Cincinnati, Cincinnati, OH, USA

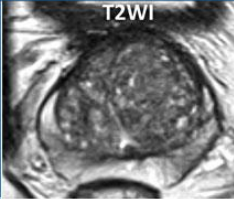
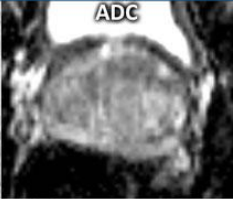
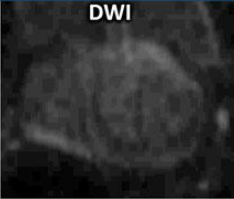
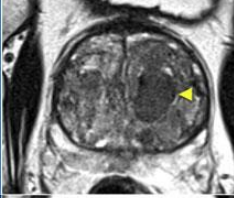


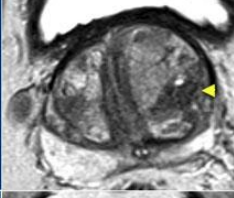


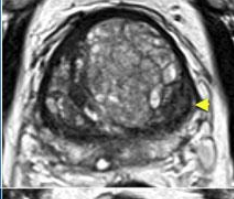

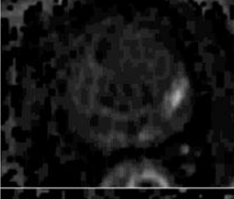


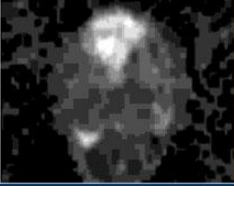
# Prostate



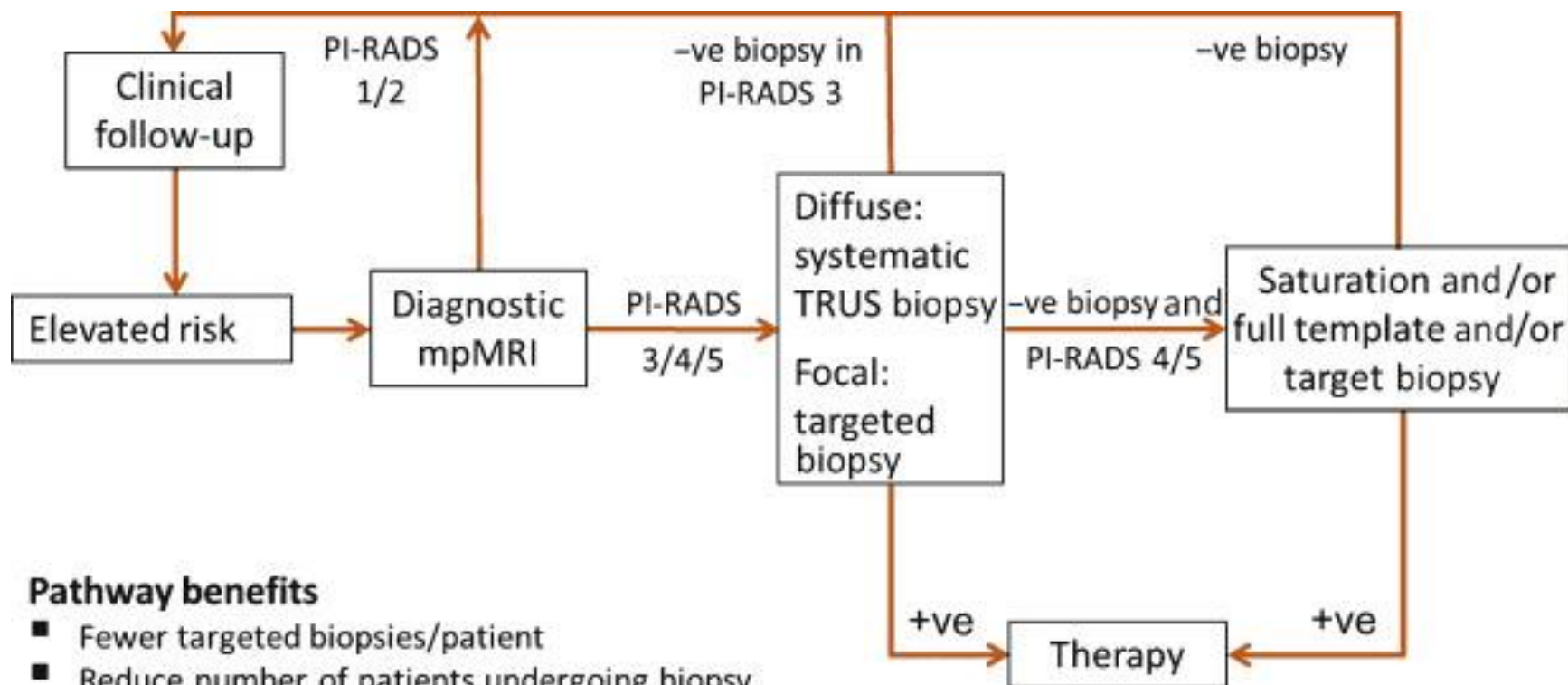


# Prostate

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

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

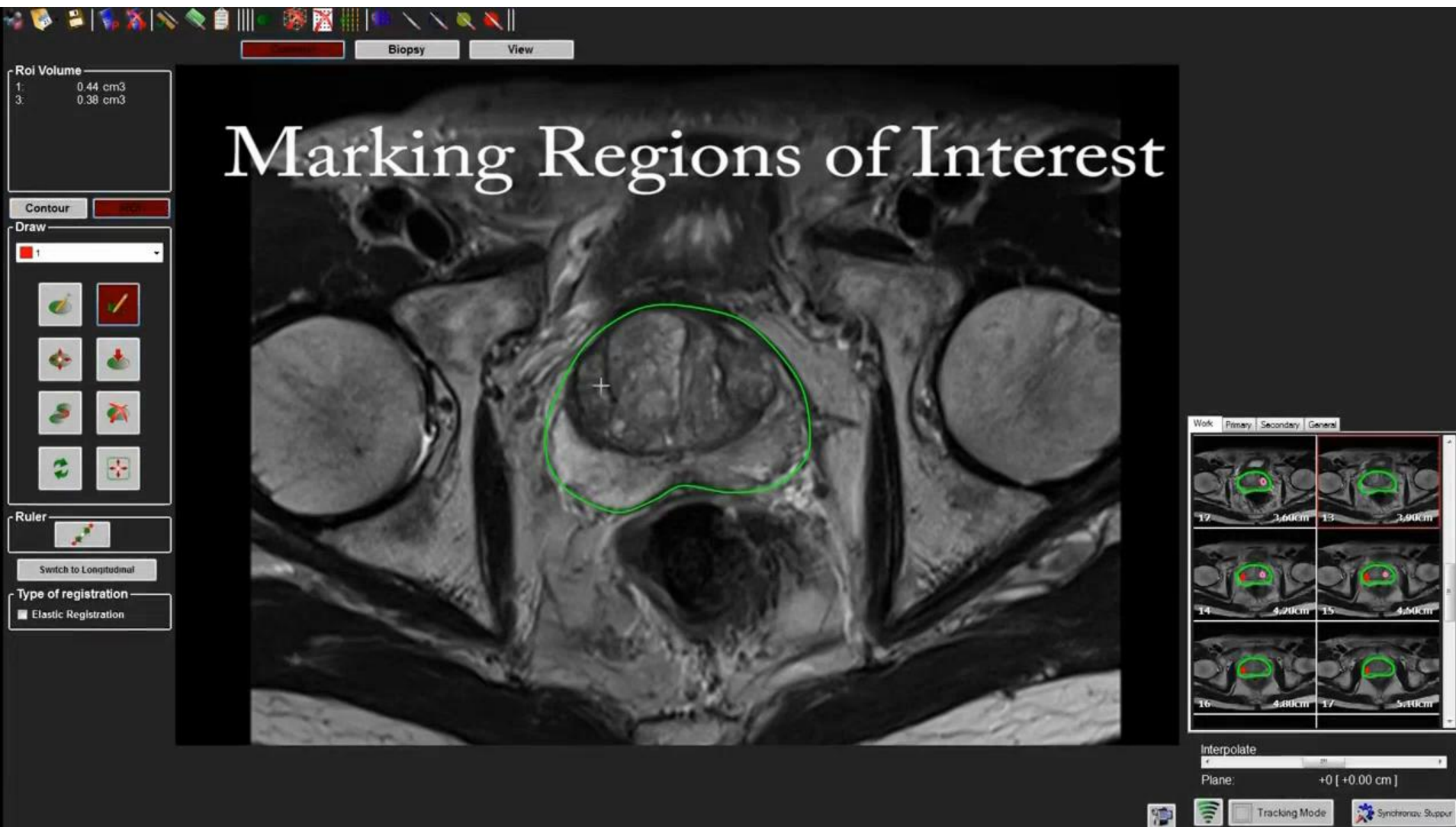
# Prostate



## 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



**Thank you for your attention**