UROGENIAL TRACT IMAGING

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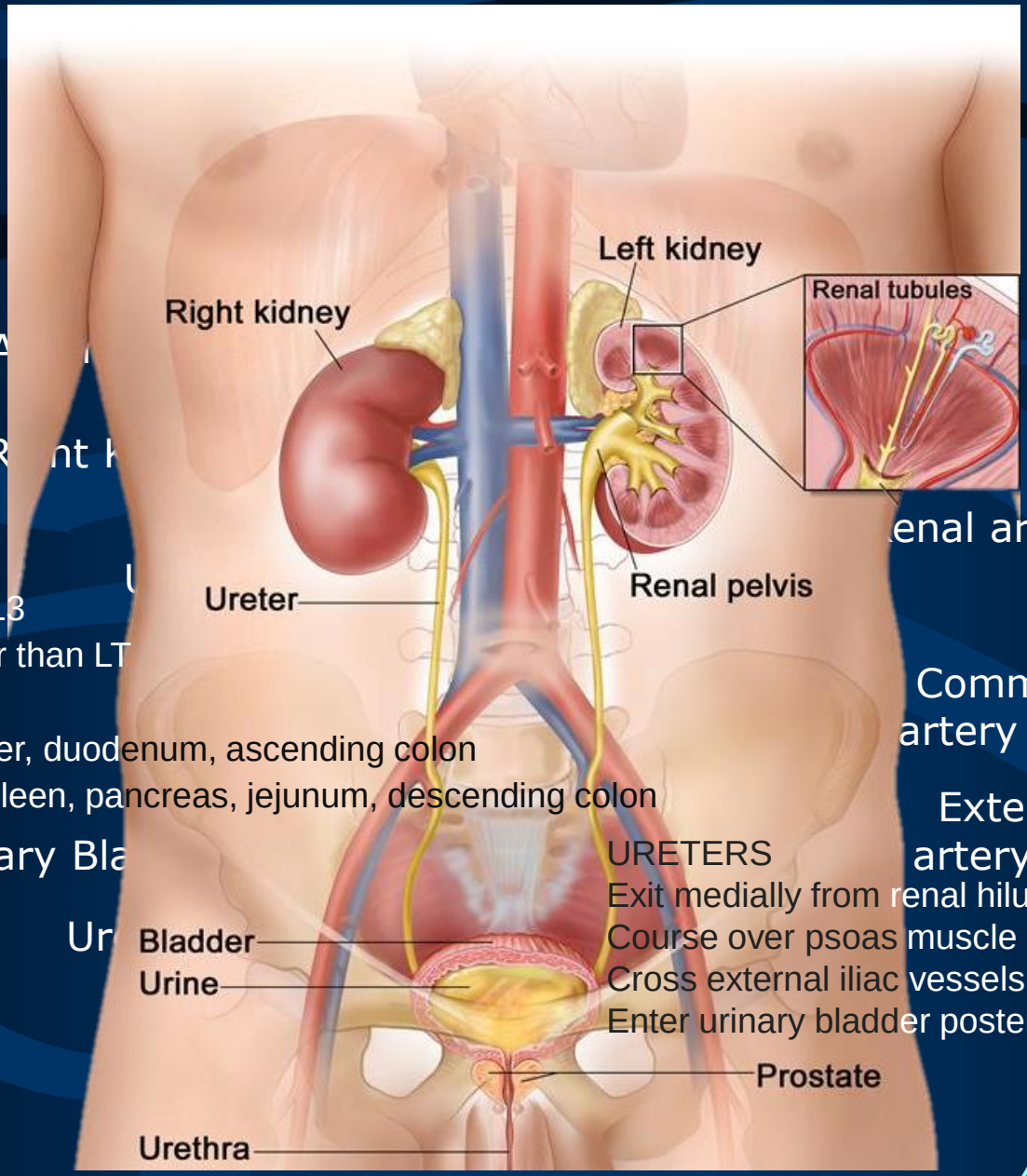
OBJECTIVES

- ✓ To recognize the different imaging modalities utilized in the urogenital disorders.
- ✓ To recognize the normal appearances of the urogenital tract structures in each modality.
- ✓ To recognize the importance of a systematic approach in the interpretation of imaging.

  "Where to look & What to look for"
- ✓ To recognize the imaging findings in certain urogenital tract disorders.

OUTLINE

- ✓ Anatomy
- ✓ Imaging Modalities
- ✓ Imaging related anatomy
- ✓ Interpretation
- ✓ Imaging Findings in Certain Urogenital Disorders



KIDNEYS

- Retroperitoneal
- At level of T12-L3
- RT slightly lower than LT

Relations

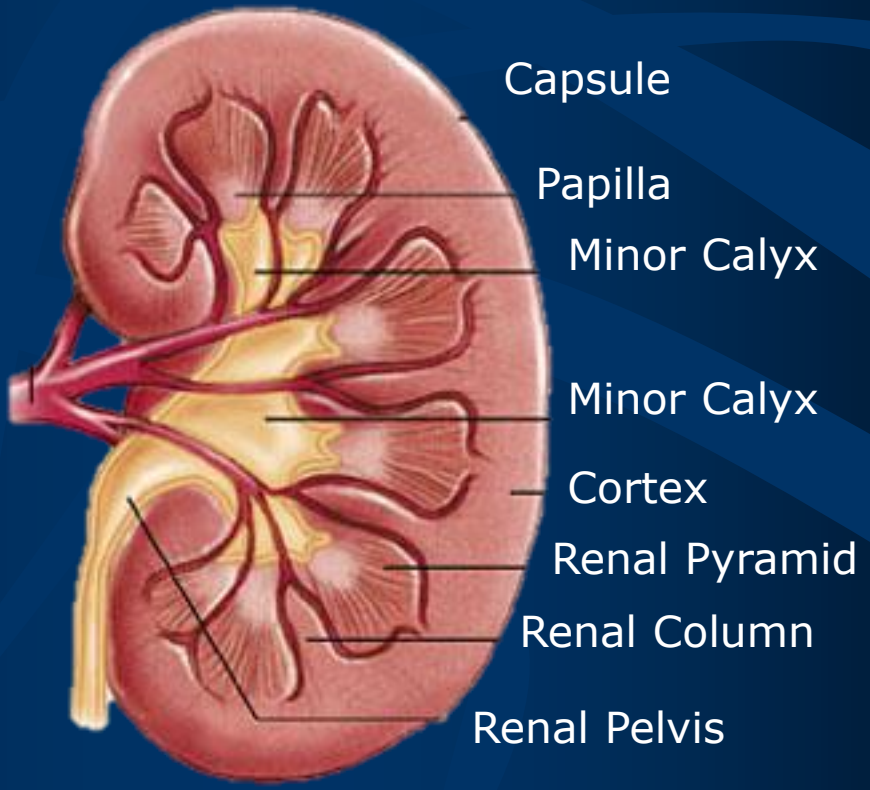
- RT related to liver, duodenum, ascending colon
- LT related to spleen, pancreas, jejunum, descending colon

URETERS

Exit medially from renal hilum
Course over psoas muscle and transverse processes
Cross external iliac vessels
Enter urinary bladder posteriorly

ANATOMY

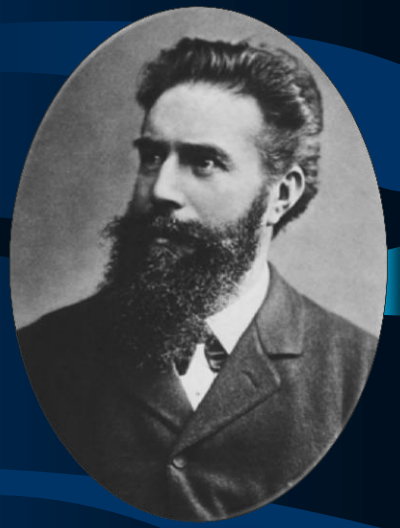
The Kidney



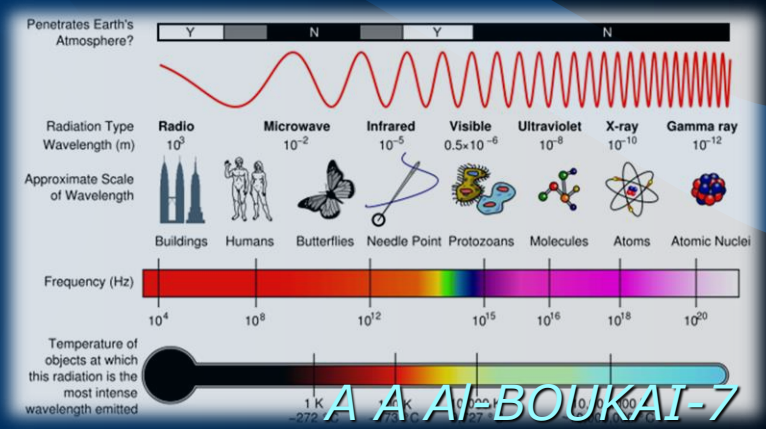
Imaging Modalities Utilized in Imaging the Urinary Tract

- ✓ Plain X-ray
- ✓ Ultrasound
- ✓ Computed Tomography
- ✓ Magnetic Resonance Imaging
- ✓ Nuclear studies
- ✓ Angiography

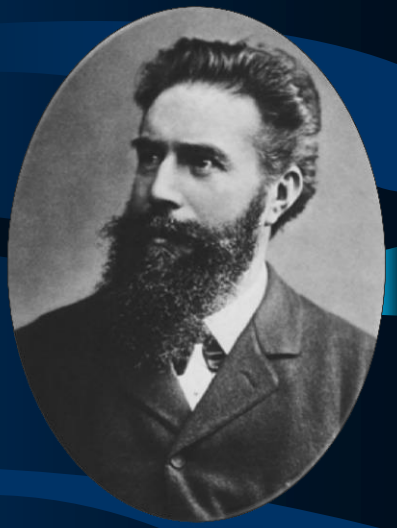
WHAT IS X-RAY?



- ✓ It is a form of electromagnetic energy that travel at the speed of light
- ✓ Discovered and named by Dr. W. C. Röentgen at University of Würzburg, 1895
- ✓ Electromagnetic energy wave spectrum
  - Gamma Rays
  - X-rays
  - Visible light
  - Infrared light
  - Microwaves
  - Radar
  - Radio waves

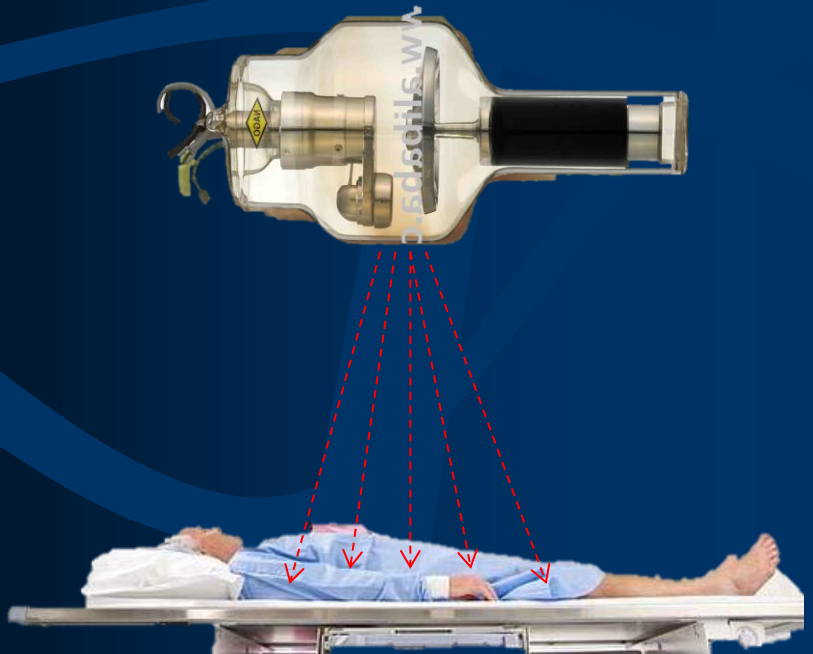


WHAT IS X-RAY?



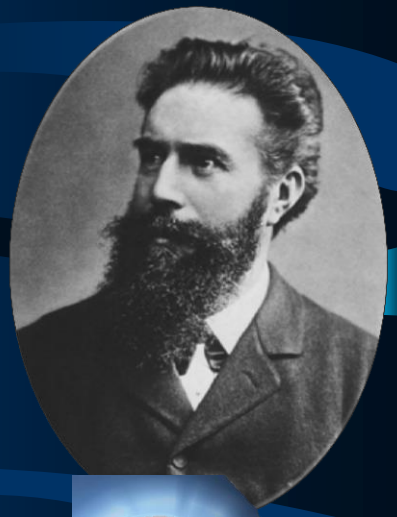
- It is a form of electromagnetic energy that travel at the speed of light

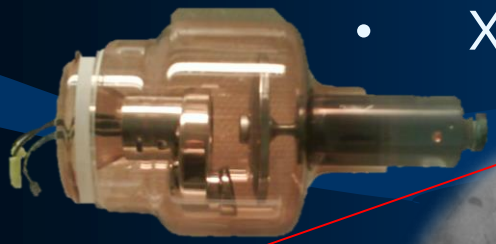
- X-rays



- Visible light

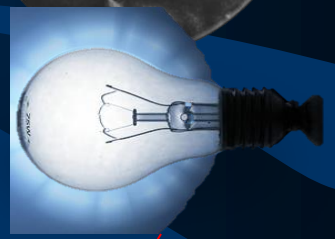
WHAT IS X-RAY?

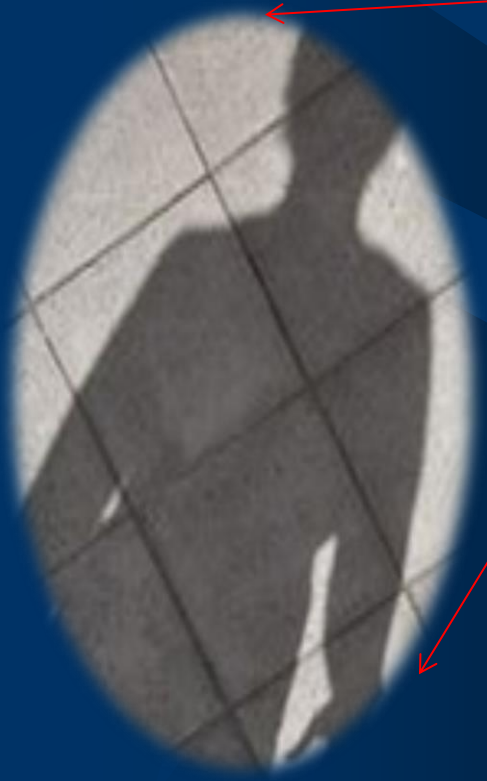




- X-rays

- Visible light





WHAT IS X-RAY?

- ✓ X-rays are emitted and detected in cassette which generate either a hard copy film or a digital image
- ✓ X-ray beam interaction with body tissue can:
  - ✧ Pass all the way through the body → render the film dark (black)
  - ✧ Be deflected or scattered
  - ✧ Be absorbed

  } → render the film light (white)

- ✓ Air = low atomic # = x-rays get through = image is dark
- ✓ Metal = high atomic # = x-rays blocked = image is light (white)

PLAIN X-RAY

Pros

- Widely available
- Inexpensive
- Doesn't require advanced technologist knowledge
- Can be performed quickly
- Portable

ration

PLAIN X-RAY

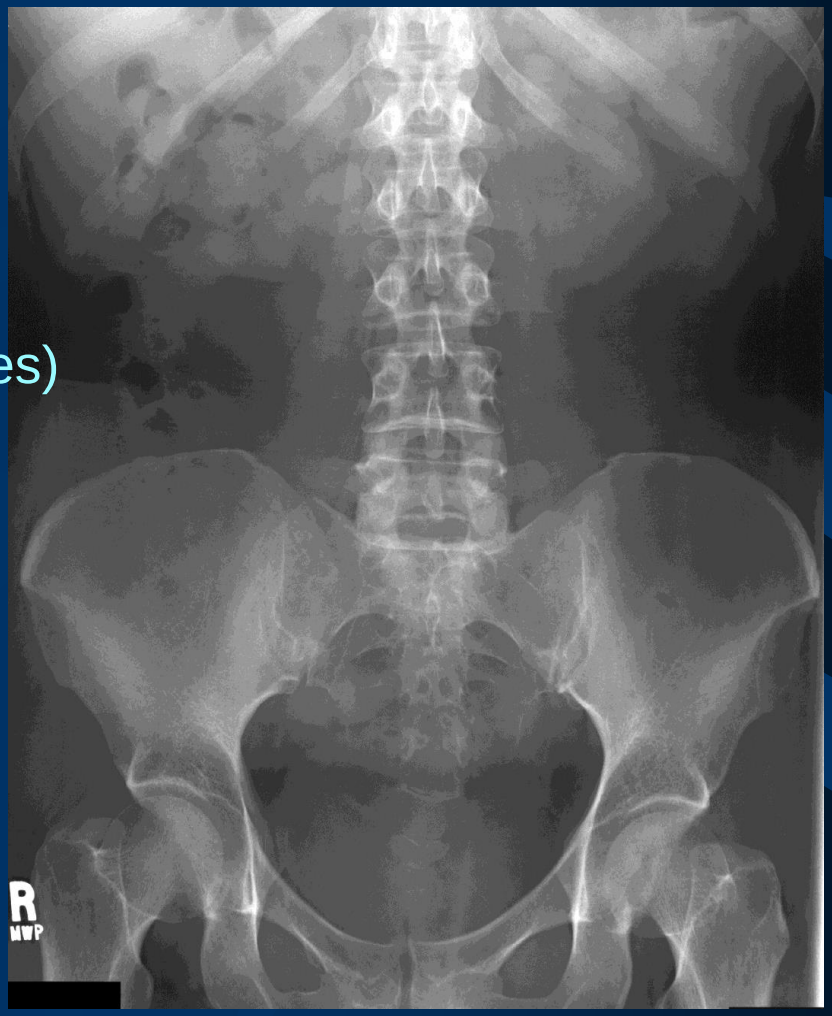
NORMAL

Image key = shades (Densities)

White ----- bone and calcification

Black ----- air

Grey ------ soft tissue

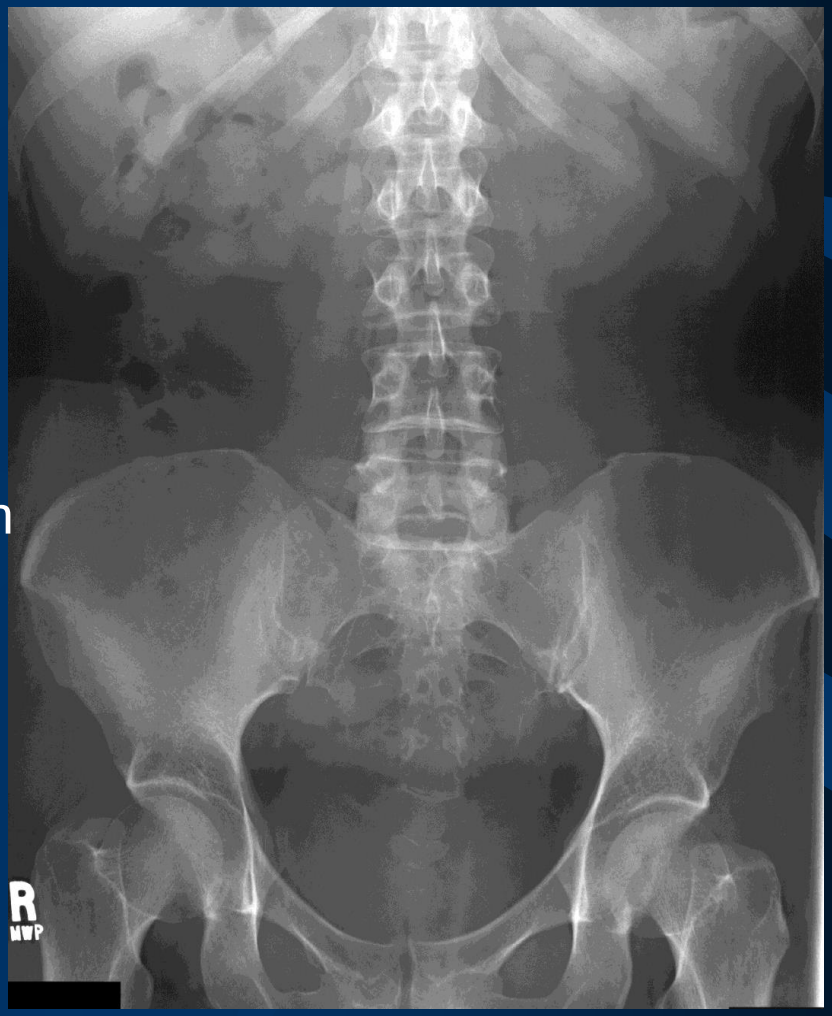


PLAIN X-RAY

NORMAL

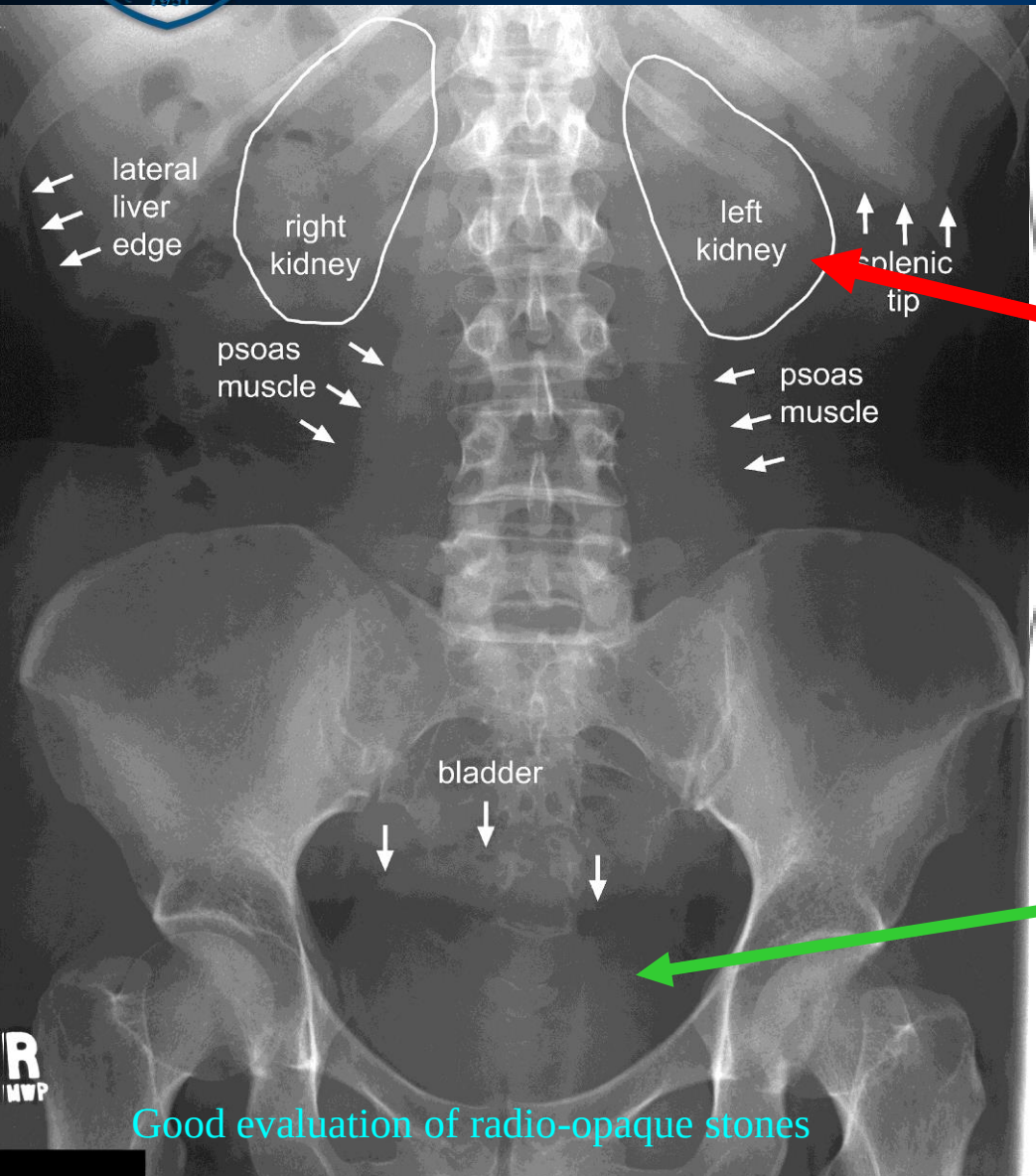
"What to look for?"

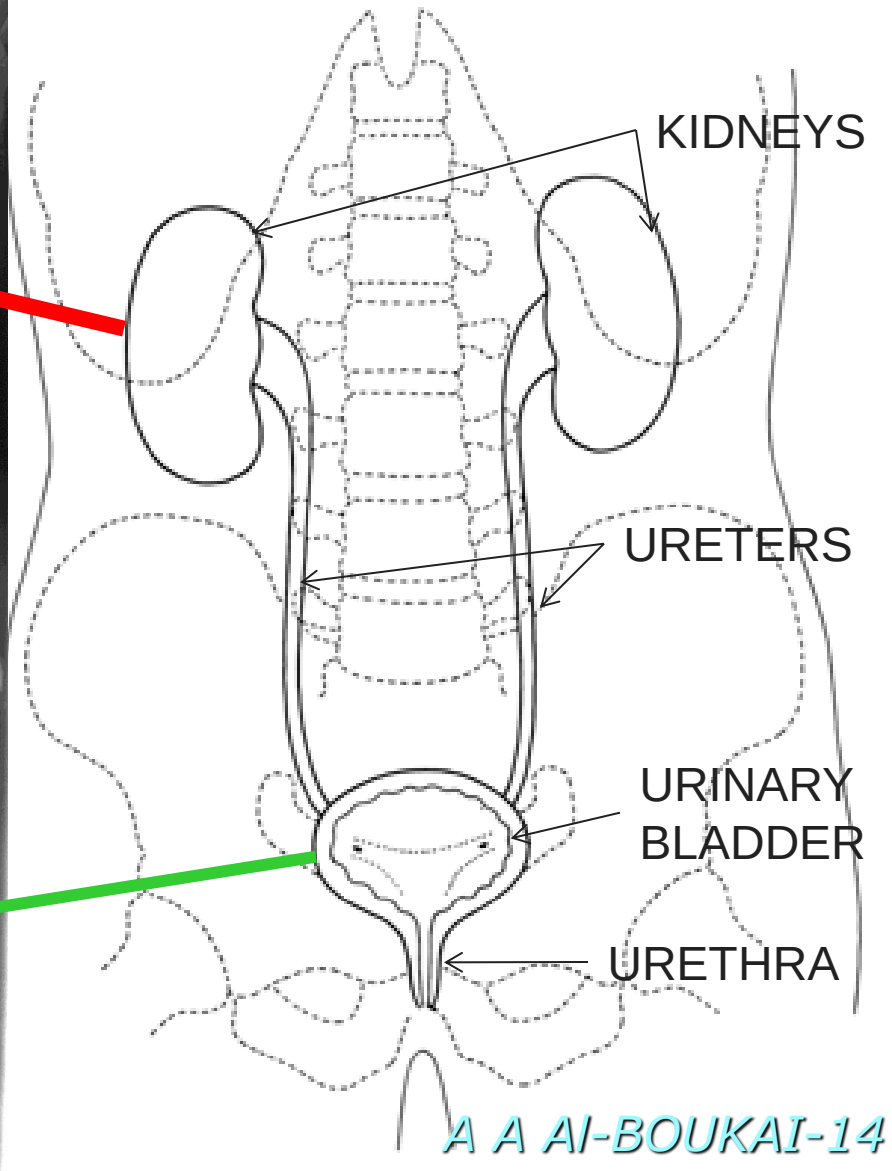
- ✓ Soft Tissues
- ✓ Stomach & Bowel gas distribution
- ✓ Bones & calcifications



PLAIN X_RAY (KUB)

Conventional plain film of the abdomen is called a KUB
(Kidneys, Ureters, Bladder)





Good evaluation of radio-opaque stones

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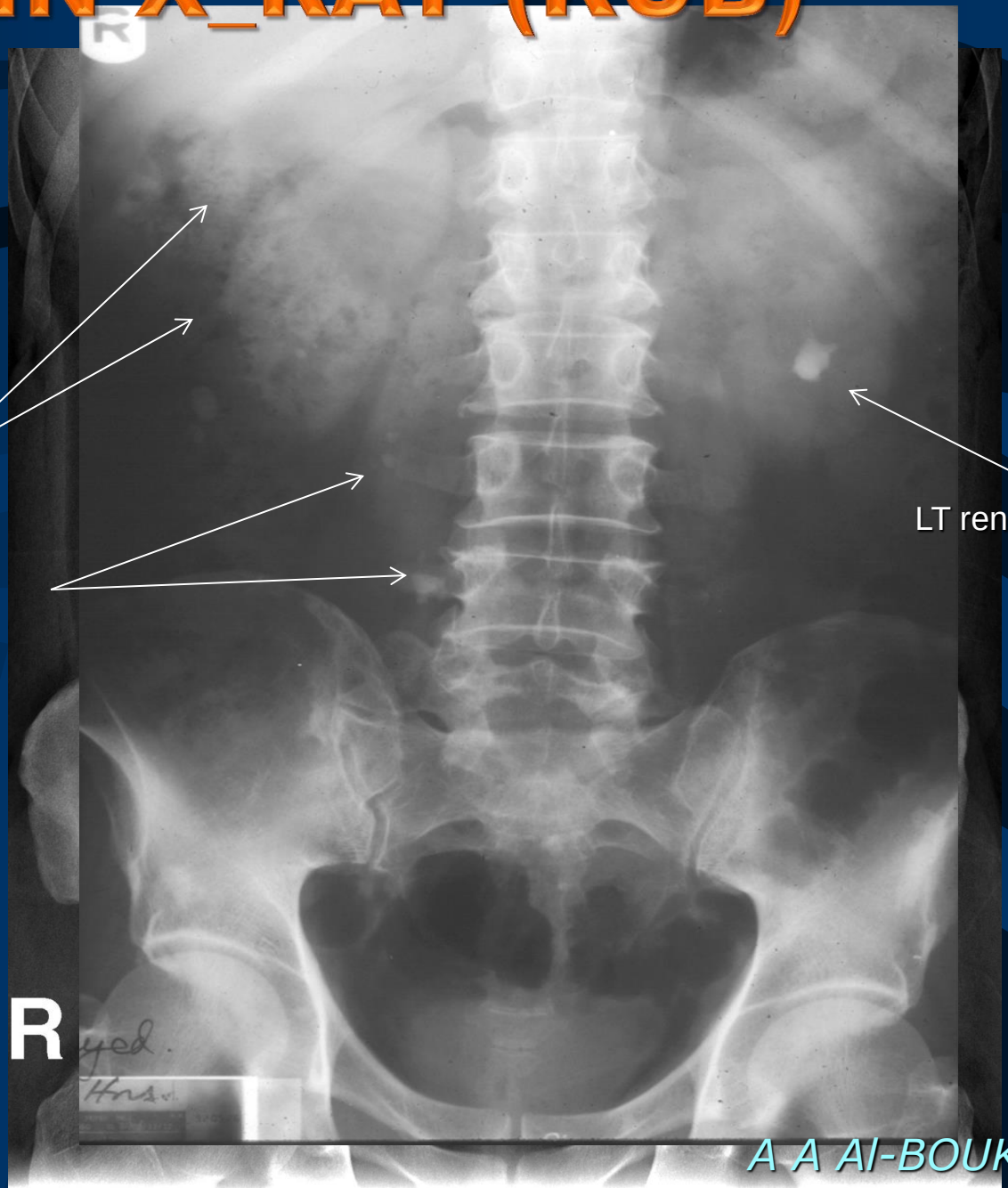
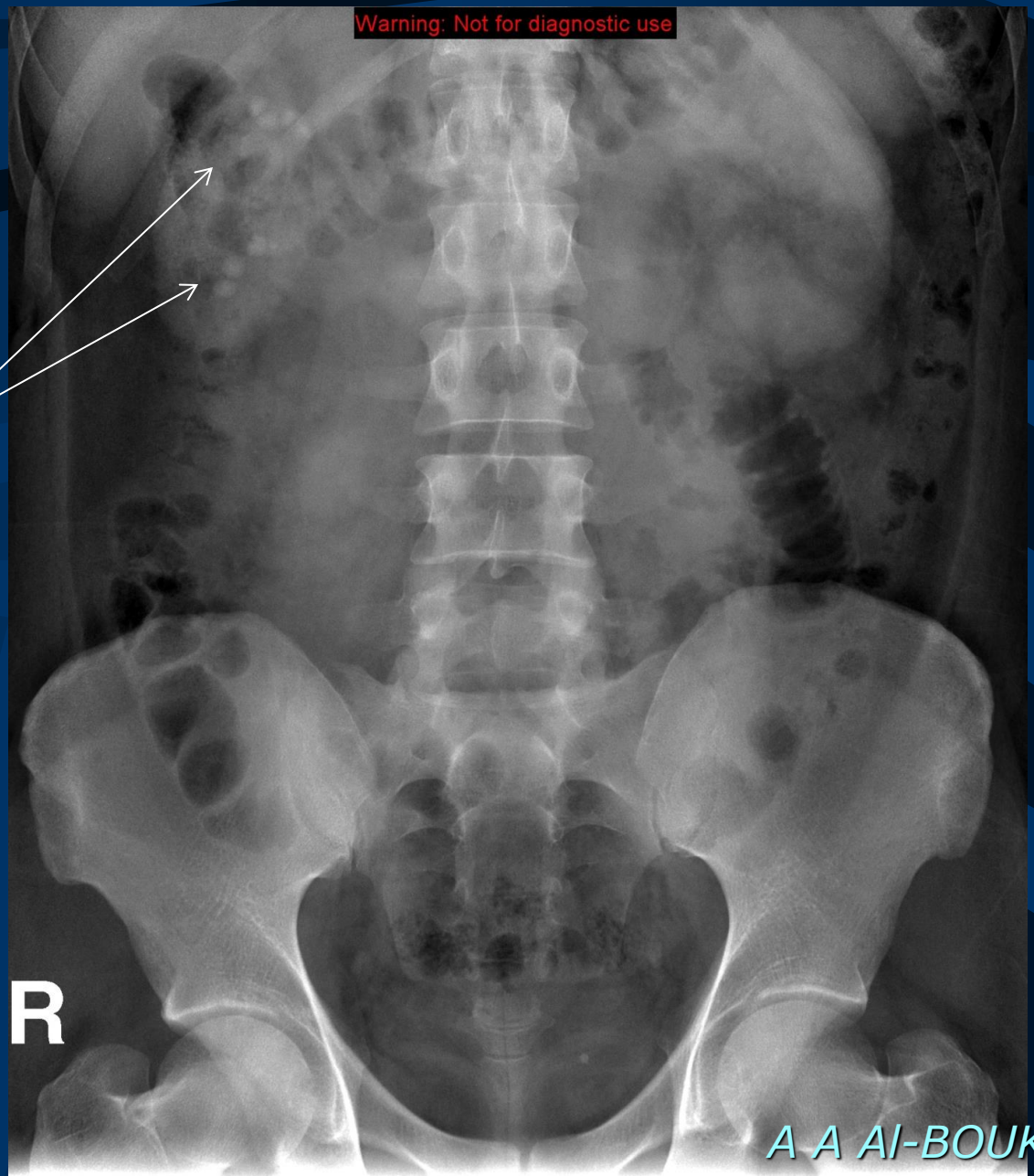
PLAIN X_RAY (KUB)

RENAL STONE



PLAIN X_RAY (KUB)

RENAL STONE



INTRA VENOUS UROGRAM

This is KUB taken post intravenous contrast injection

Also called IVP (intravenous pyelogram)

Natural contrast in the body	Added contrast in the body
Air	Barium sulfate
Fat	Iodine (Water Soluble

Demonstrates both function and structure of the renal system

- **Function ---→ Filtration**
- **Structure ---→ Contrast filled collecting system**

INTRA VENOUS UROGRAM

This is KUB taken post intravenous contrast injection

Also called IVP (intravenous pyelogram)

Indications:

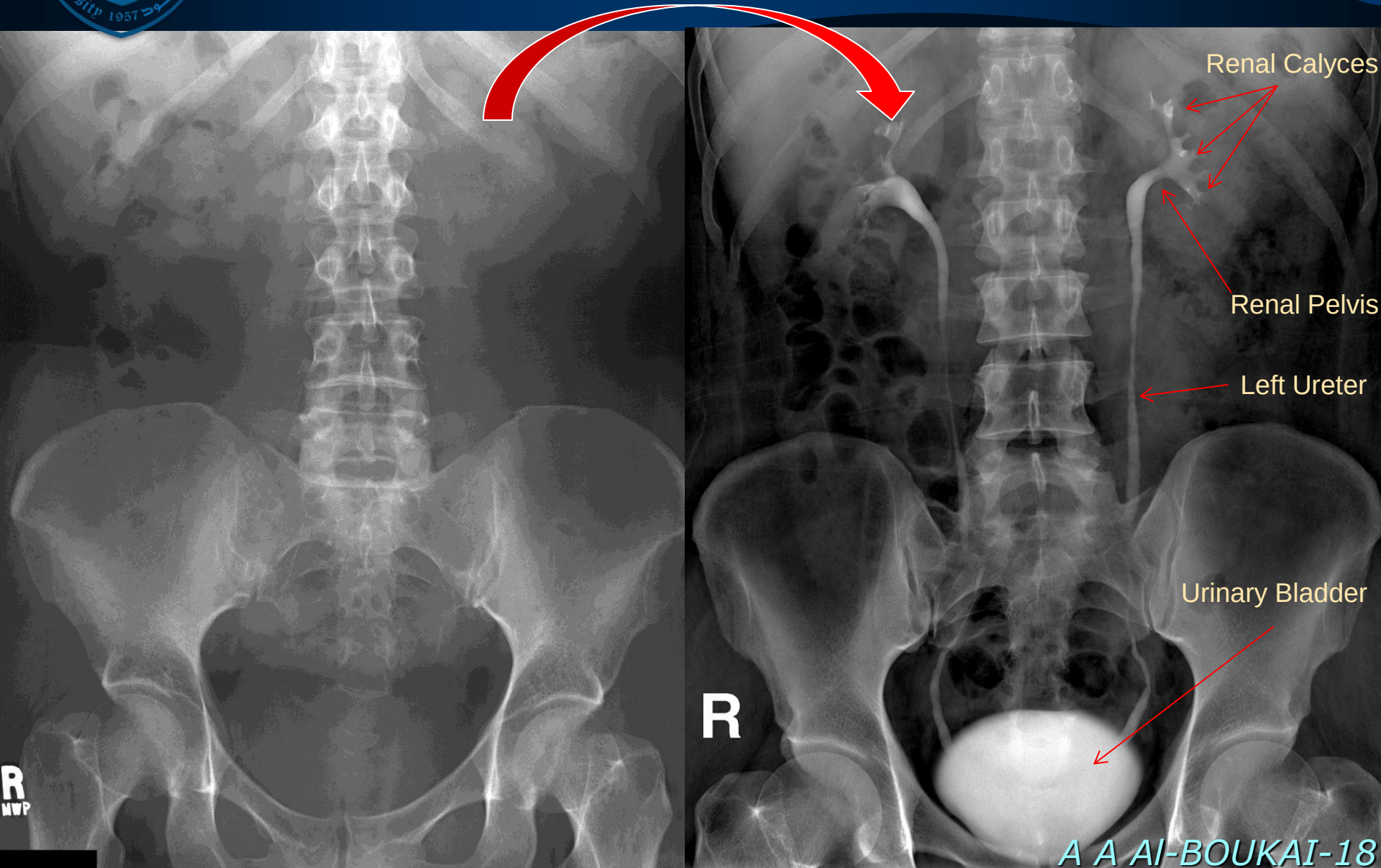
- Urolithiasis / calculus
- Pyelonephritis
- Hydronephrosis
- Trauma
- Tumour
- Renal hypertension
- Congenital abnormality

Contra-Indications: (relative)

- History of Allergy
- Asthma
- Cardiovascular disease
- Sickle cell disease
- Diabetes mellitus

INTRA VENOUS UROGRAM

This is KUB taken post intravenous contrast injection



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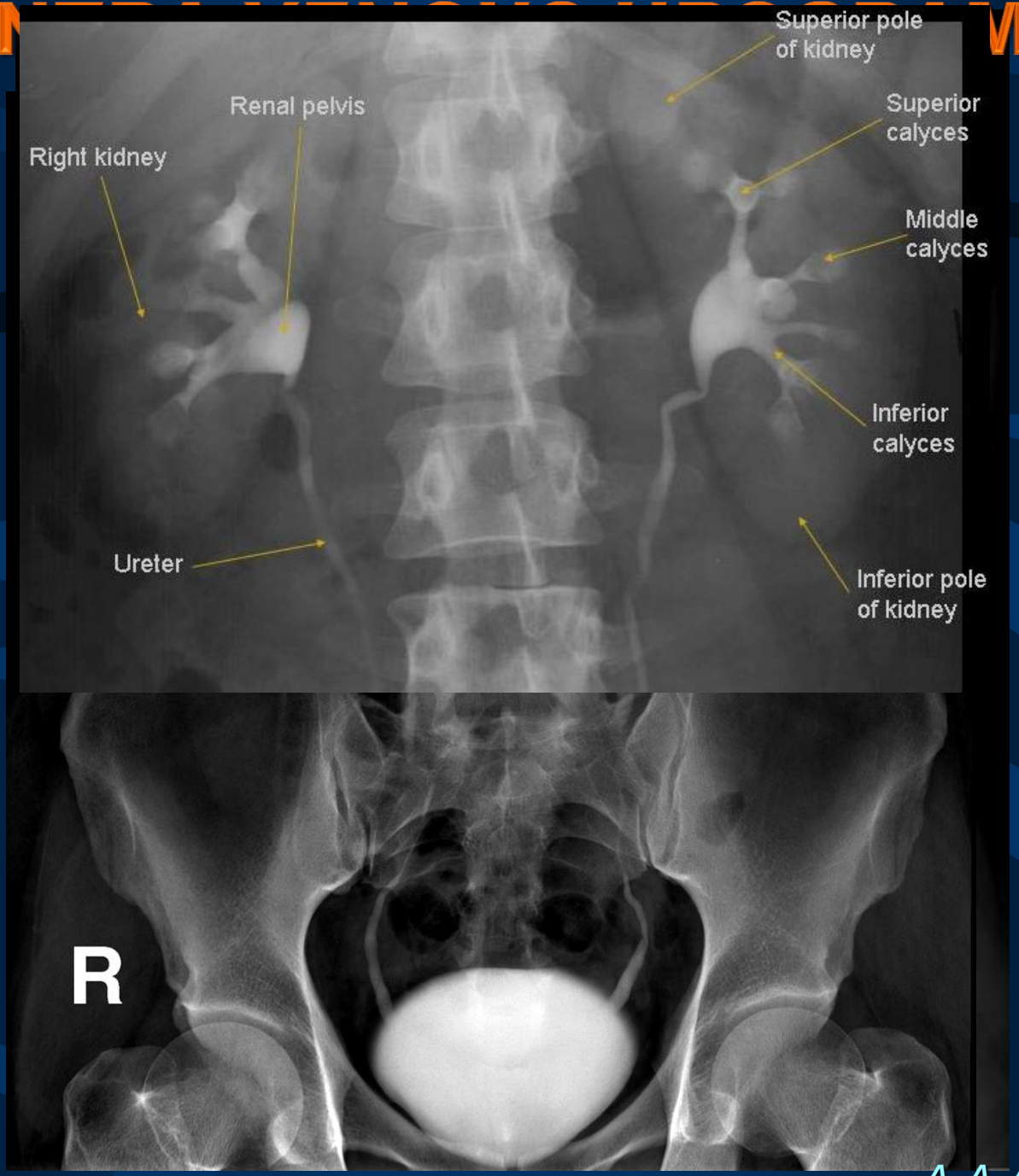
INTRAVENOUS UROGRAM



ULTRASOUND

Use of high frequency sound waves.

No radiation

Operator dependent

Used for stone, hydronephrosis, focal lesion

Contrast between tissue is determined by sound reflection (echoes)

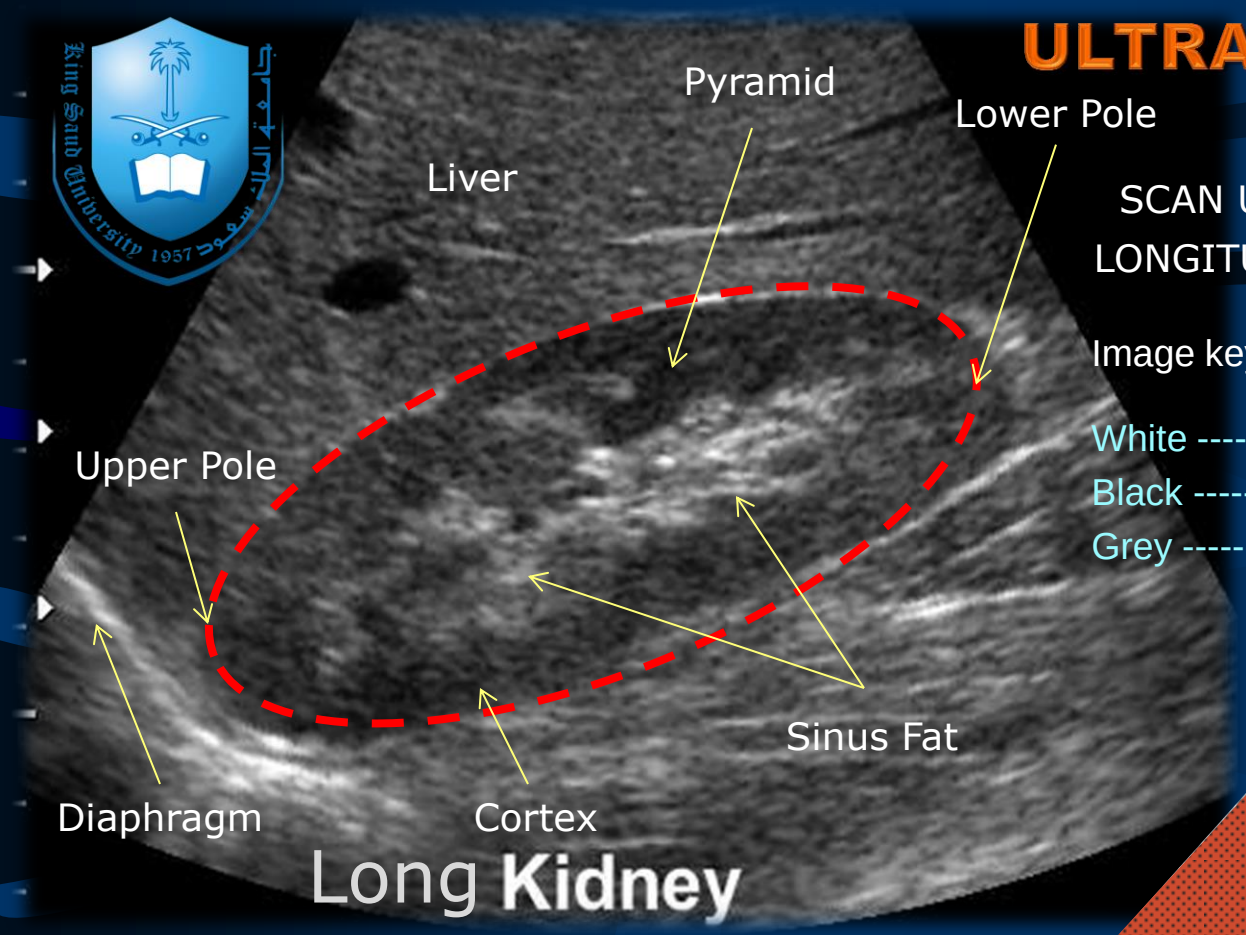
Image key = shades (echoes)

White ----- High reflection

Black ----- No reflection

Grey ------ Soft reflection

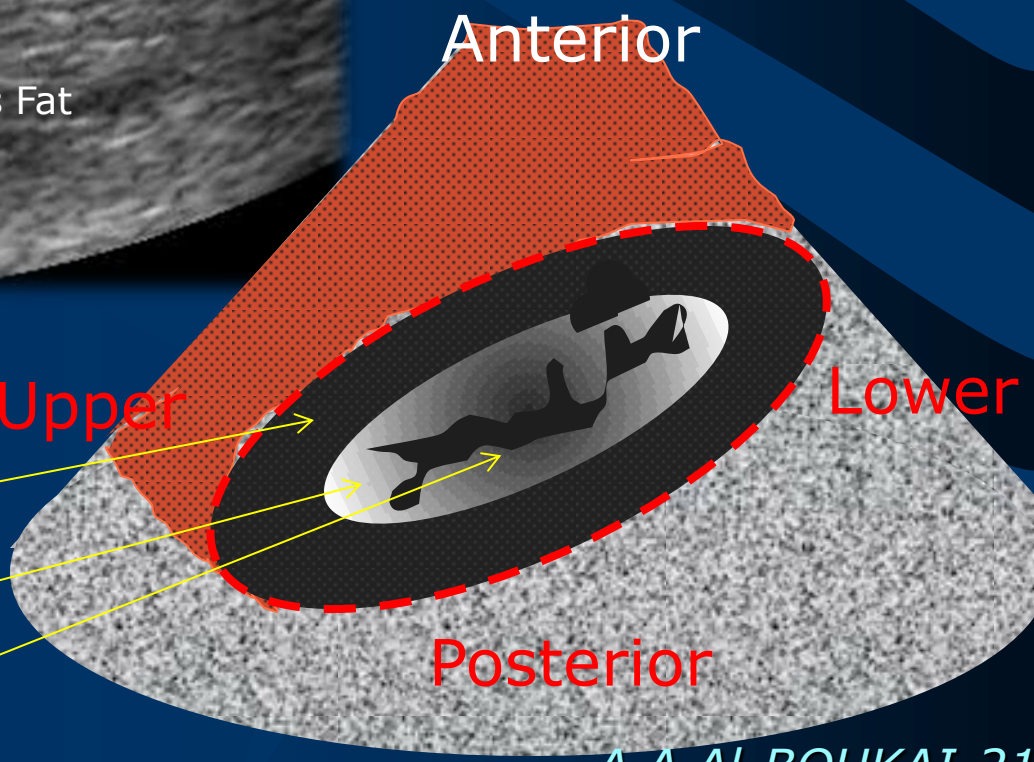
ULTRASOUND ANATOMY



SCAN USUALLY PERFORMED IN BOTH LONGITUDINAL & TRANSVERSE PLANES

Image key = shades (echoes)

White ----- High reflection (stone, calcification, air)
Black ----- No reflection (fluid)
Grey ------ Soft reflection (soft tissue)



Cortex→ Hypoechoic

Medulla→ Hyperechoic

(Fat)Collecting system→ anechoic

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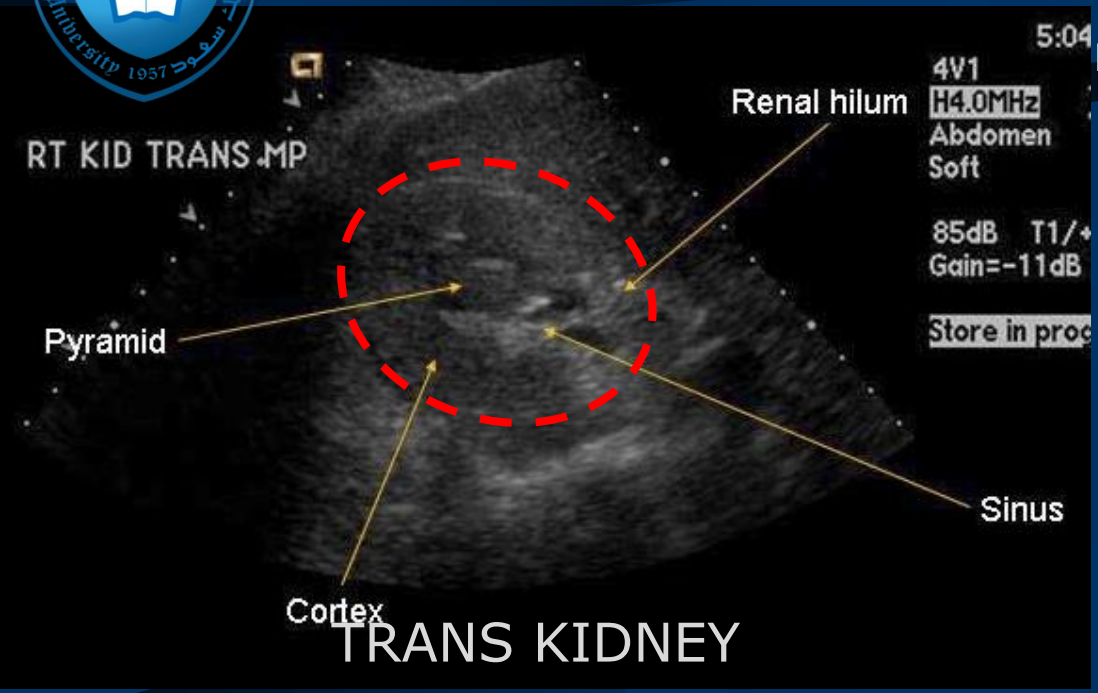
ULTRASOUND ANATOMY

SCAN USUALLY PERFORMED IN BOTH LONGITUDINAL & TRANSVERSE PLANES



TRANS KIDNEY