

Radiology & investigation of hepatobiliary system

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Lecture outline:

- What is hepatobiliary system HBS?
- Radiological modalities used in imaging HBS.
- Advantages and disadvantages of each radiology modality.
- Indications of imaging HBS.

What is hepatobiliary system (HBS)?

It includes liver, gallbladder and biliary ducts.

What are the **Radiological modalities** used in imaging HBS ?

- **X Ray.**
- **Ultrasound.**
- **Computed tomography CT scan.**
- **Magnetic resonance imaging MRI.**
- **Nuclear scan.**

What is this?



What is this?

**Abdomen x-ray
OR
Abdomen radiography**



What is this ????



X ray was first observed and documented in **1895** by **Wilhelm Conrad Roentgen**

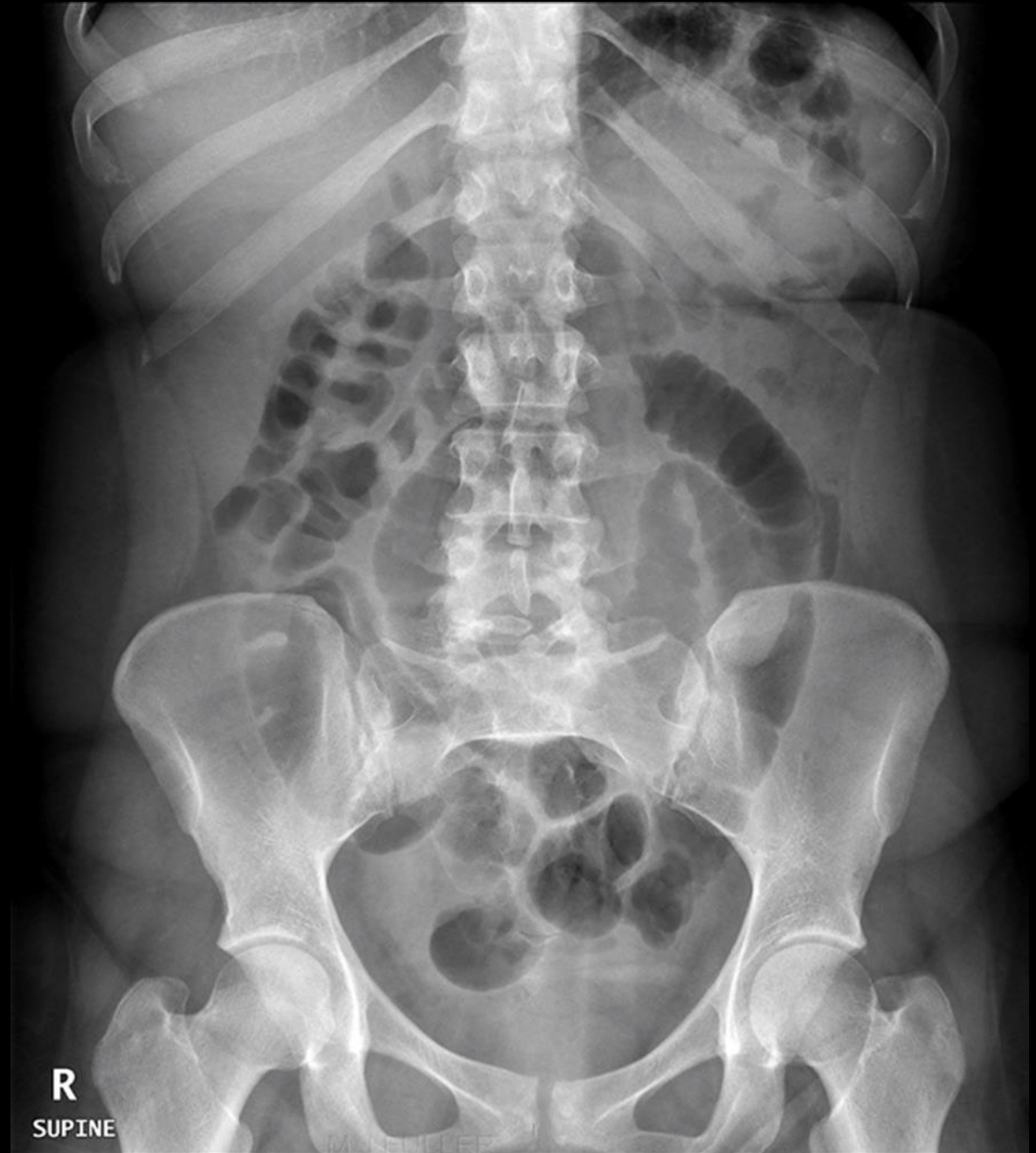


What is X ray?

- It is energetic form of electromagnetic and ionizing radiation that can penetrate solid objects and used to take images of the human body.

X RAY language

- Radio-lucent = black
- Radio-opaque = white



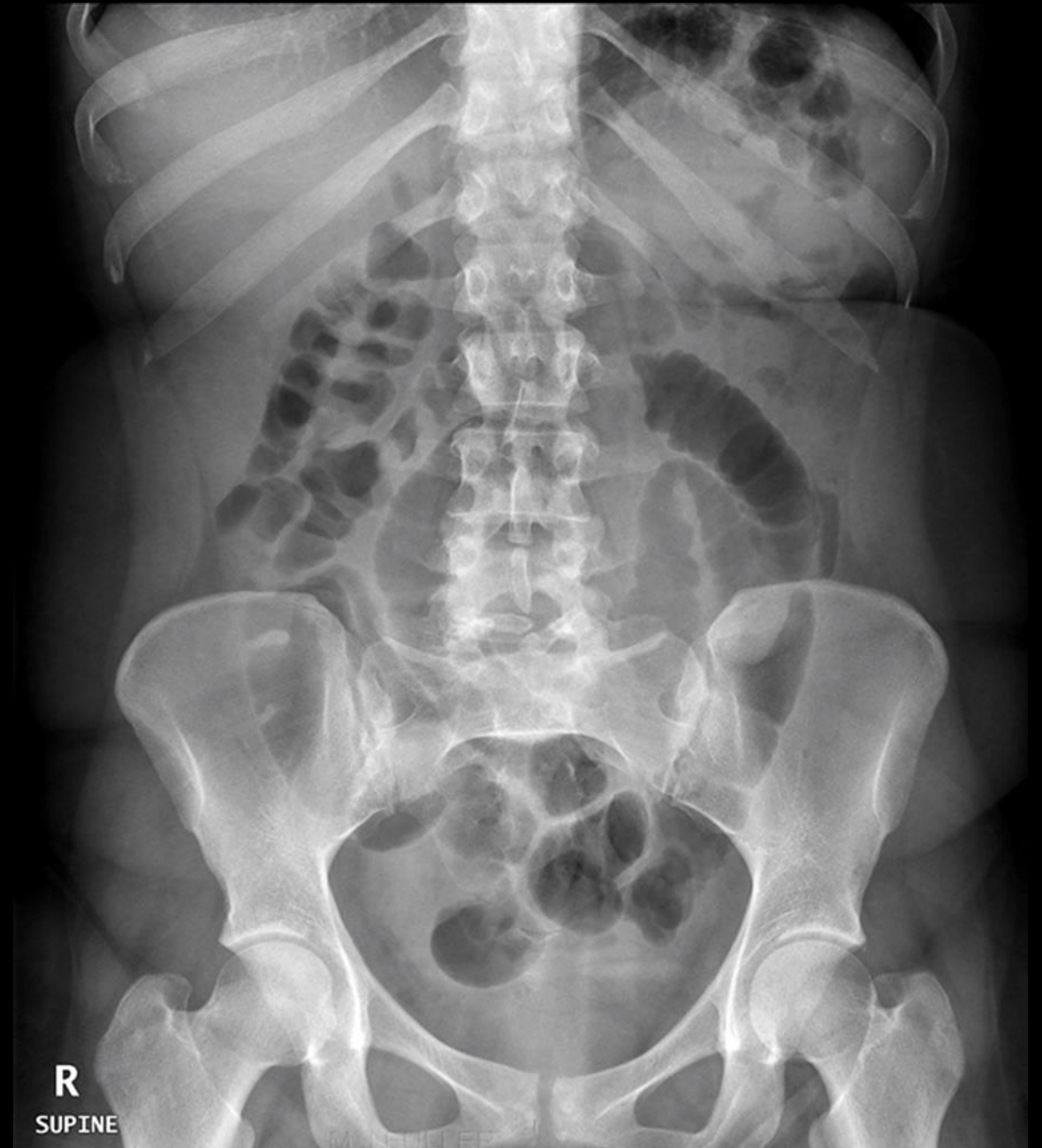
X RAY

Advantages:

- Quick and widely available
- Cheap
- Can be done bedside (portable)

Disadvantages:

- Use ionizing radiation
- Very poor in tissue details including HBS
- Very limited in detecting gallbladder stones



What is this?



What is this?

ULTRASOUND



What is US?

- A diagnostic technique in which high-frequency sound waves penetrate the body and produce multiple echo patterns.
- Diagnostic Medical applications in use since late 1950's

Ultrasound

Advantages :

- No radiation
- Widely available
- Relatively cheap
- Very good in evaluating abdomen solid organs
- Can be done bedside (portable)

Disadvantages:

- Operator dependent
- Very limited in evaluating structures with air (e.g. bowel) or calcification (e.g. bone)



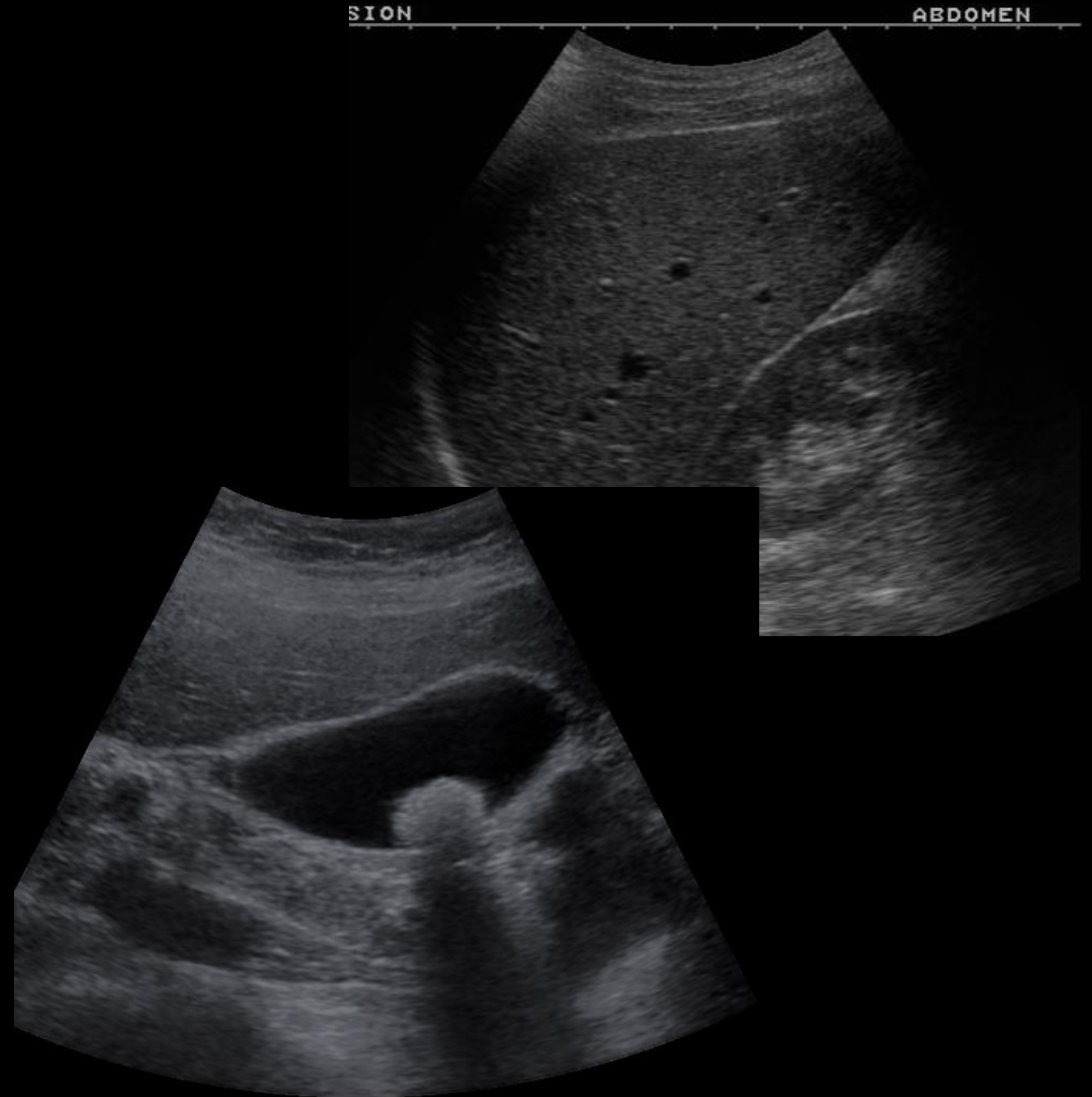
Echo patterns

Hyper-echoic = White

Hypo-echoic = Light Grey

An-echoic = Black

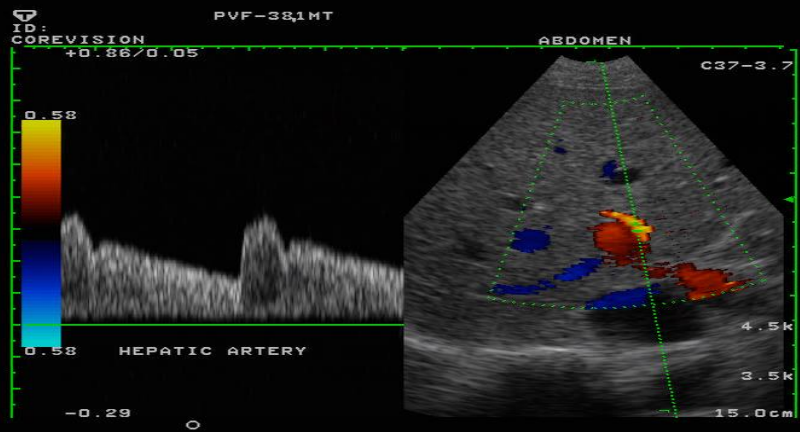
**Acoustic shadow: black band
behind dense object (e.g.
stone)**



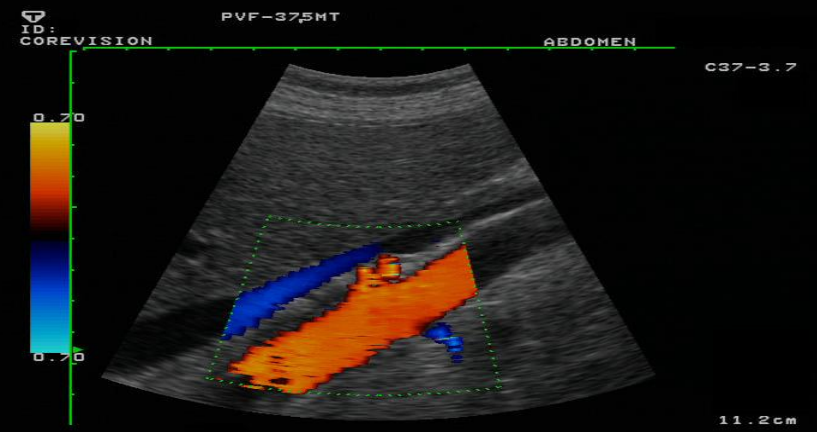
B- MODE.



DUPLEX

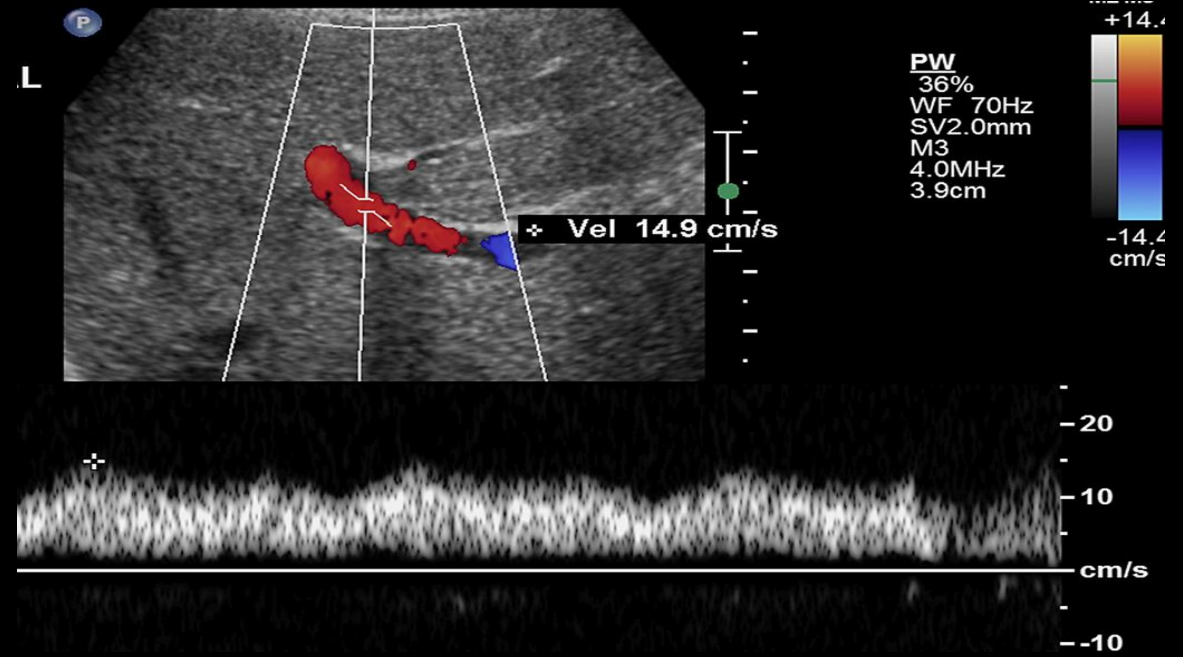


COLOR DOPPLER





B- MODE



DUPLEX

FR 28Hz
RS

AGC

M2

2D
42%
C 57
P Low
HRes

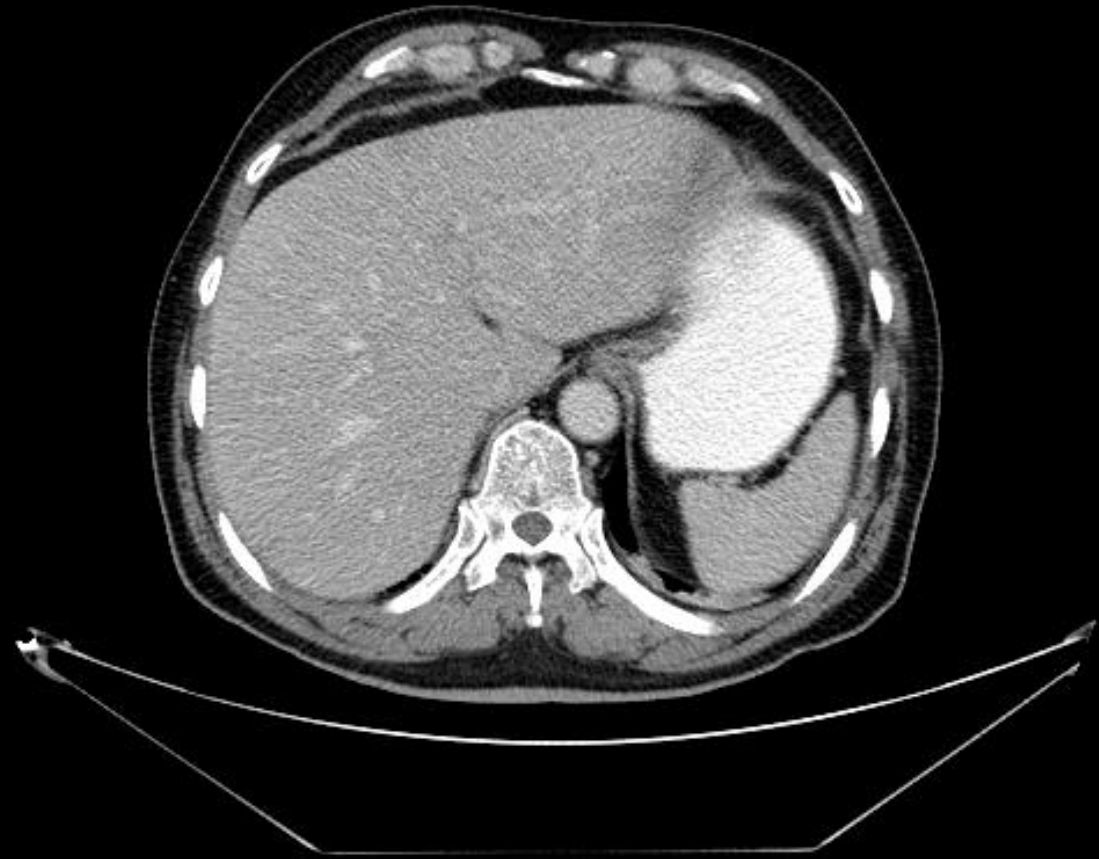
P



-0
-1
-2
-3
-4
-5
-6
-7
-8
-9

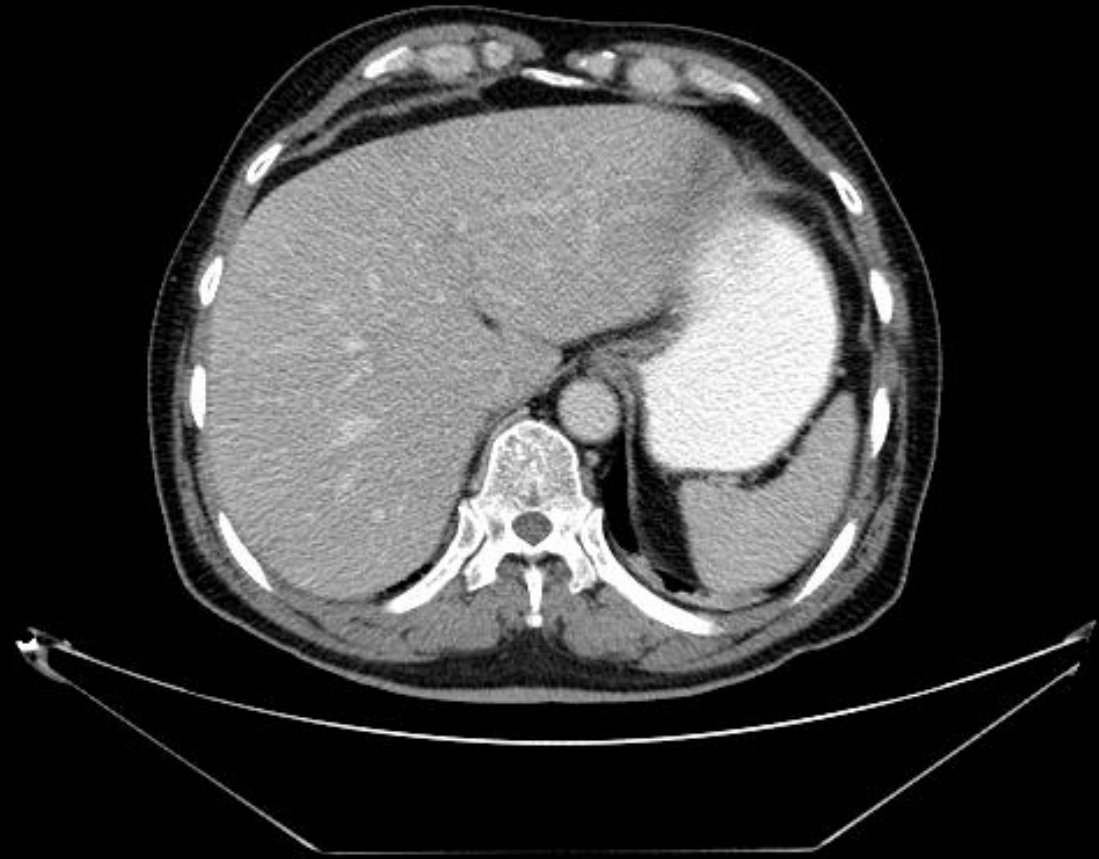
GALLBLADDER

What is this?



What is this?

**Computed Tomography
CT scan.**



What is CT scan?

- A CT scan makes use of computer-processed of many [X-ray](#) images taken from different angles to produce cross-sectional [tomographic](#) images of specific areas of a scanned object.
- CT scan can be done with and without intravenous IV contrast.
- CT scan is limited in evaluating gallstones, Why?

What is different between the two images?



What is different between the two images?



Without IV contrast



With IV contrast

Computed tomography CT scan.

Advantages:

- Very good in evaluating solid organs
- Available more than MRI

Disadvantages:

- Use ionizing radiation
- Less available than x-ray and US
- Relatively expensive
- Intravenous contrast maybe harmful

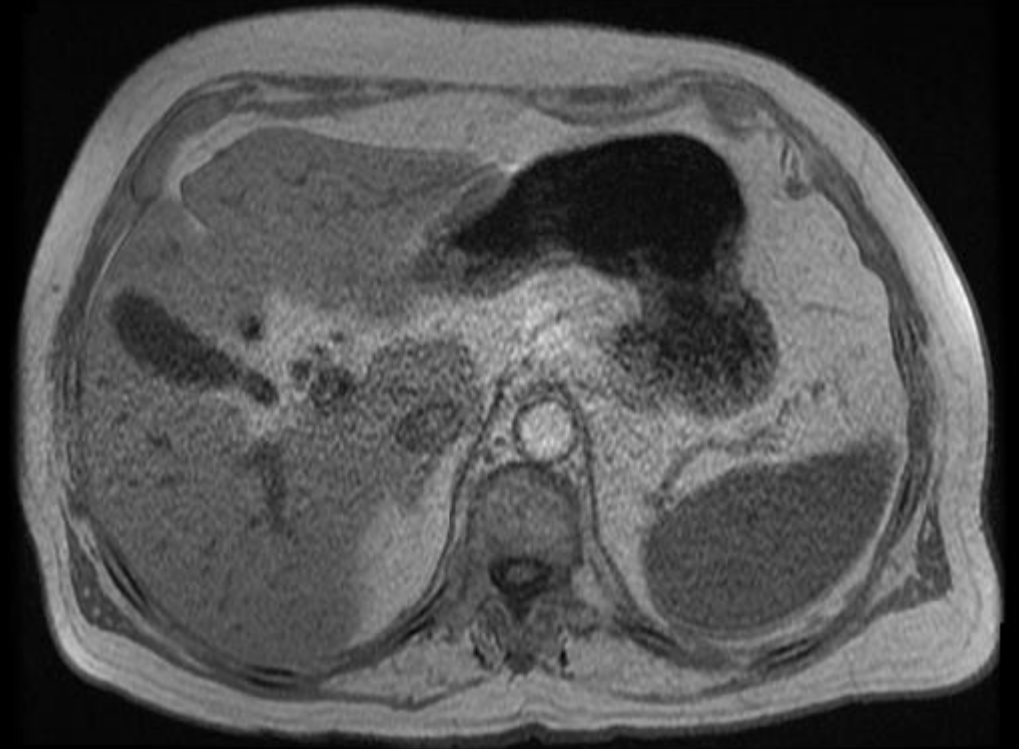


CT language

- **Hyper-dense = white**
- **Hypo-dense=black to grey**

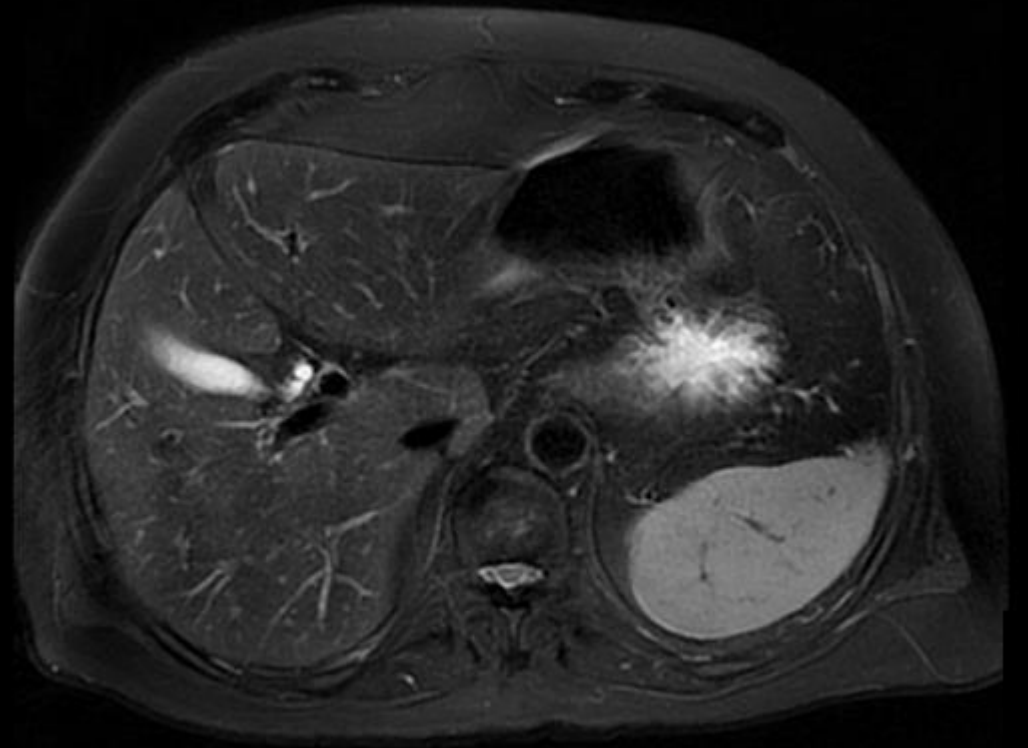


What is this?



What is this?

- Magnetic resonance imaging MRI



- A medical imaging technique used in radiology to form pictures of the anatomy using strong magnetic fields and radio waves.
- It has no radiation.

Magnetic resonance imaging MRI

Advantages:

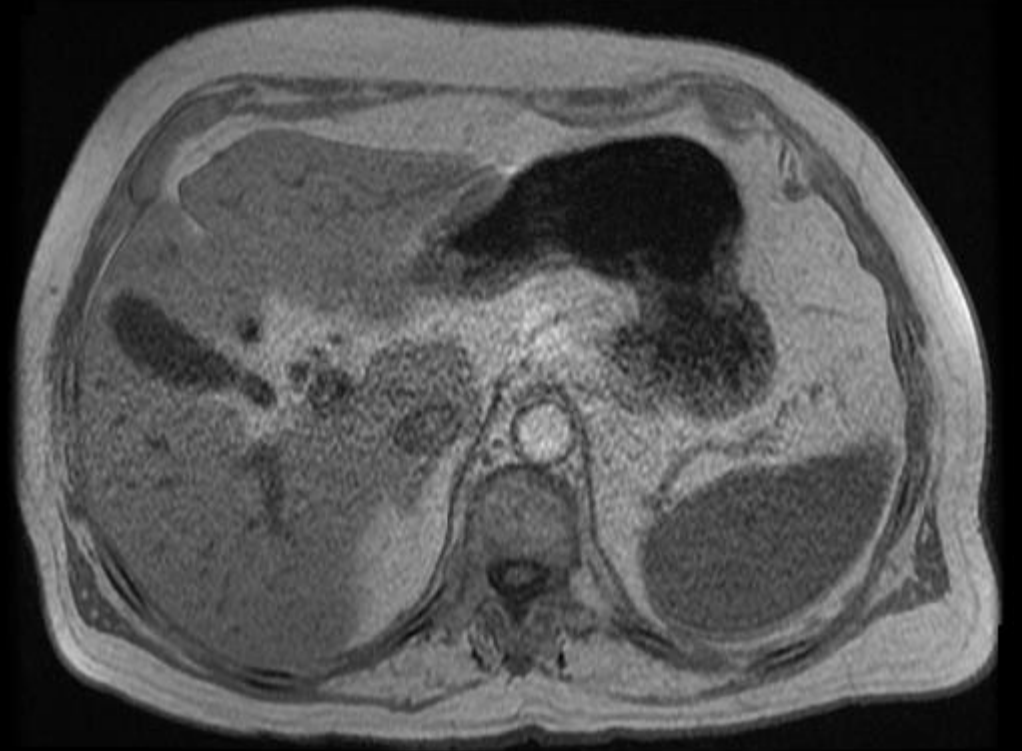
- Excellent in tissue details
- No ionizing radiation

Disadvantages:

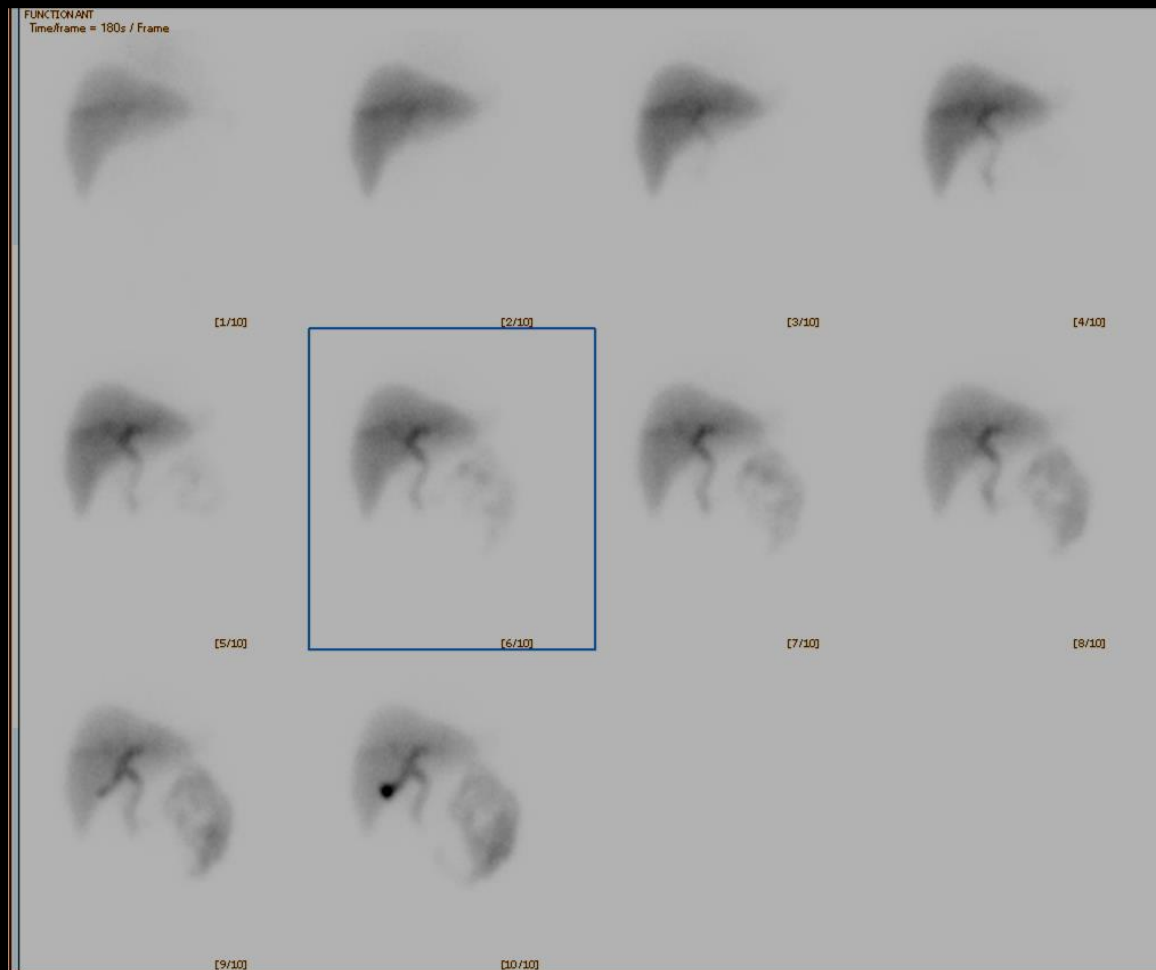
- Expensive
- Long scan time
- Less available than other modalities
- Intravenous contrast is not safe with poor renal function.

MRI language

- Hyper intense signal = more white
- Hypo intense signal = more grey/black

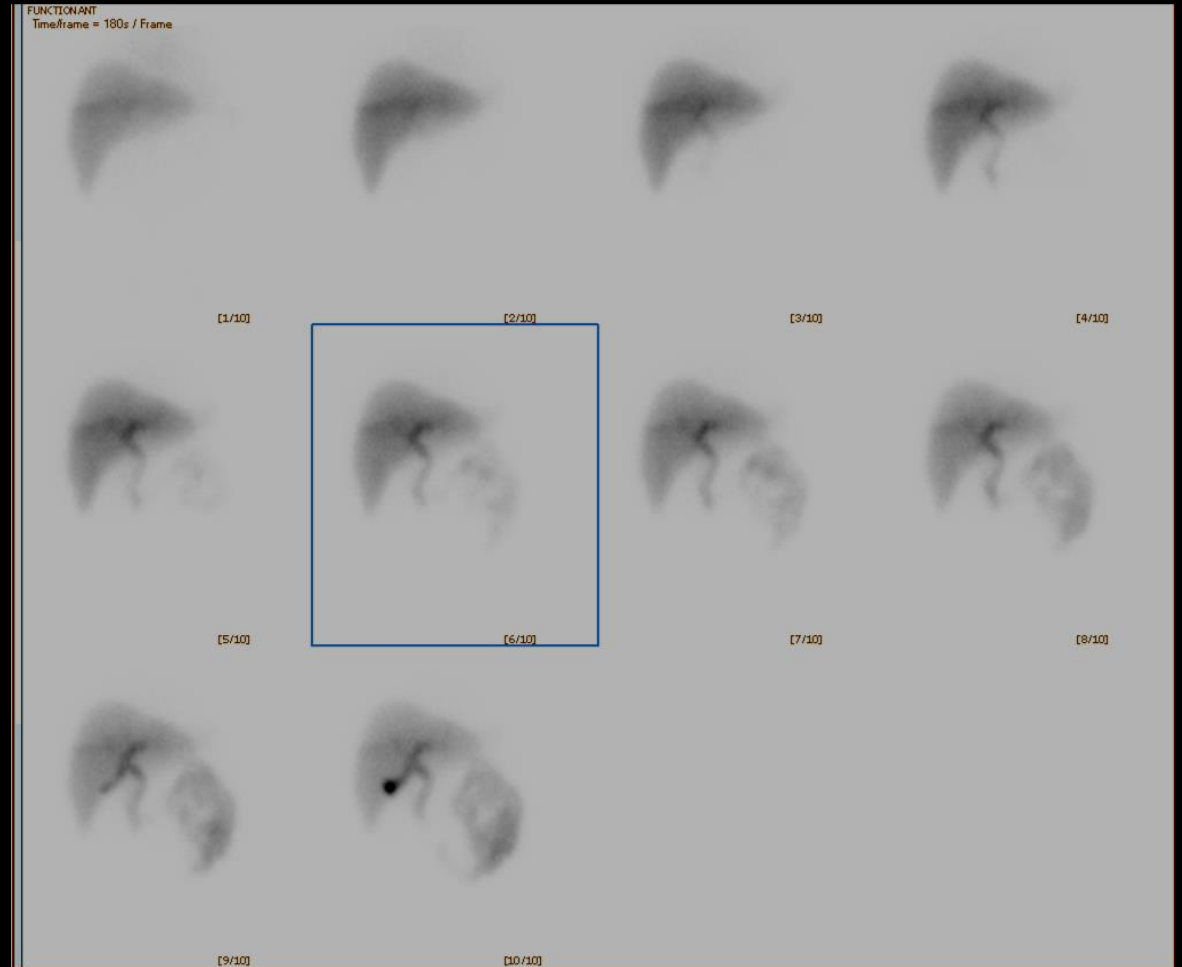


What is this?



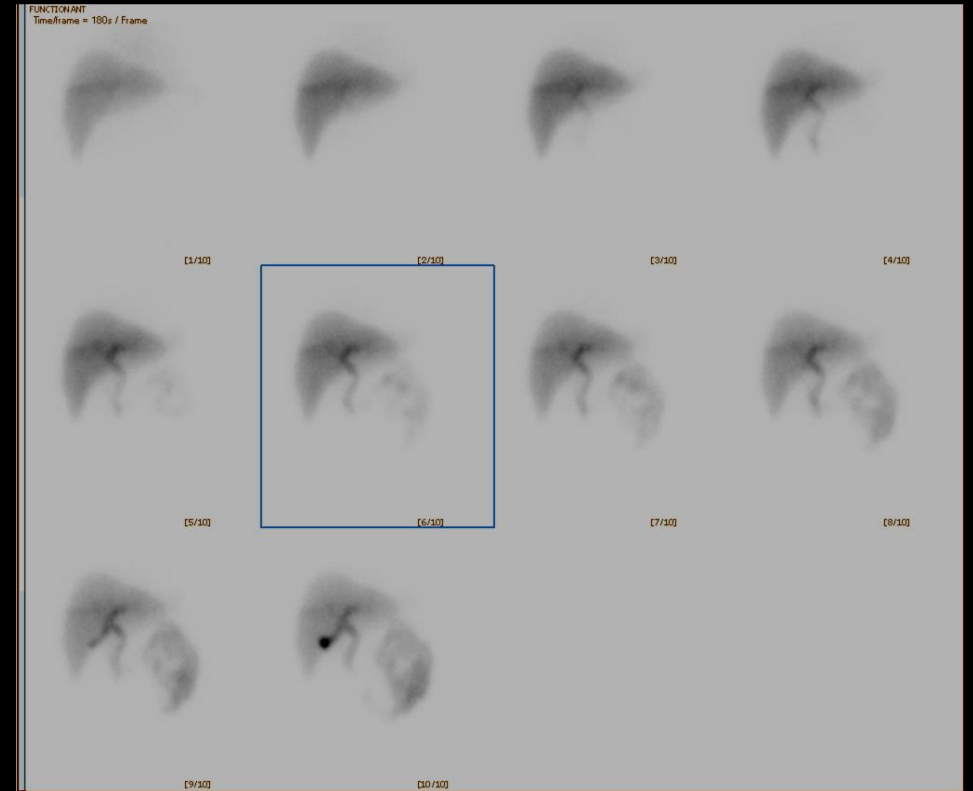
What is this?

Nuclear scan



What is nuclear medicine?

- Medical specialty involving the application of radioactive substances in the diagnosis and treatment of disease.



Nuclear medicine:

Advantages:

- Excellent in evaluating organ function/physiology

Disadvantages:

- Use ionizing radiation
- Not widely available
- Very poor in evaluating anatomy

THANK YOU