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.

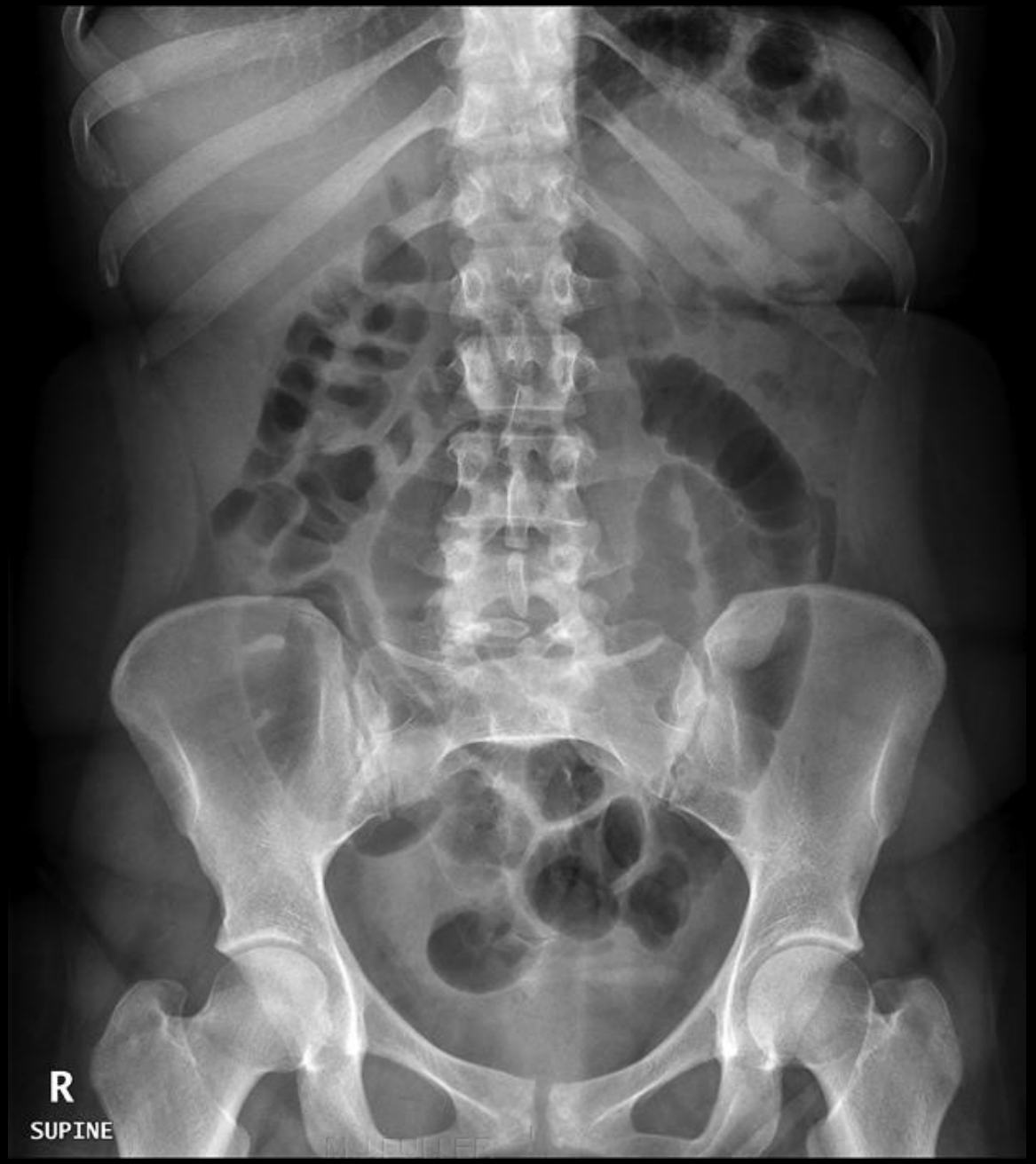
What is hepatobiliary system (HBS)?

It includes **liver**, **gallbladder** and **biliary ducts**.

What are the Radiological modalities used in imaging HBS ?

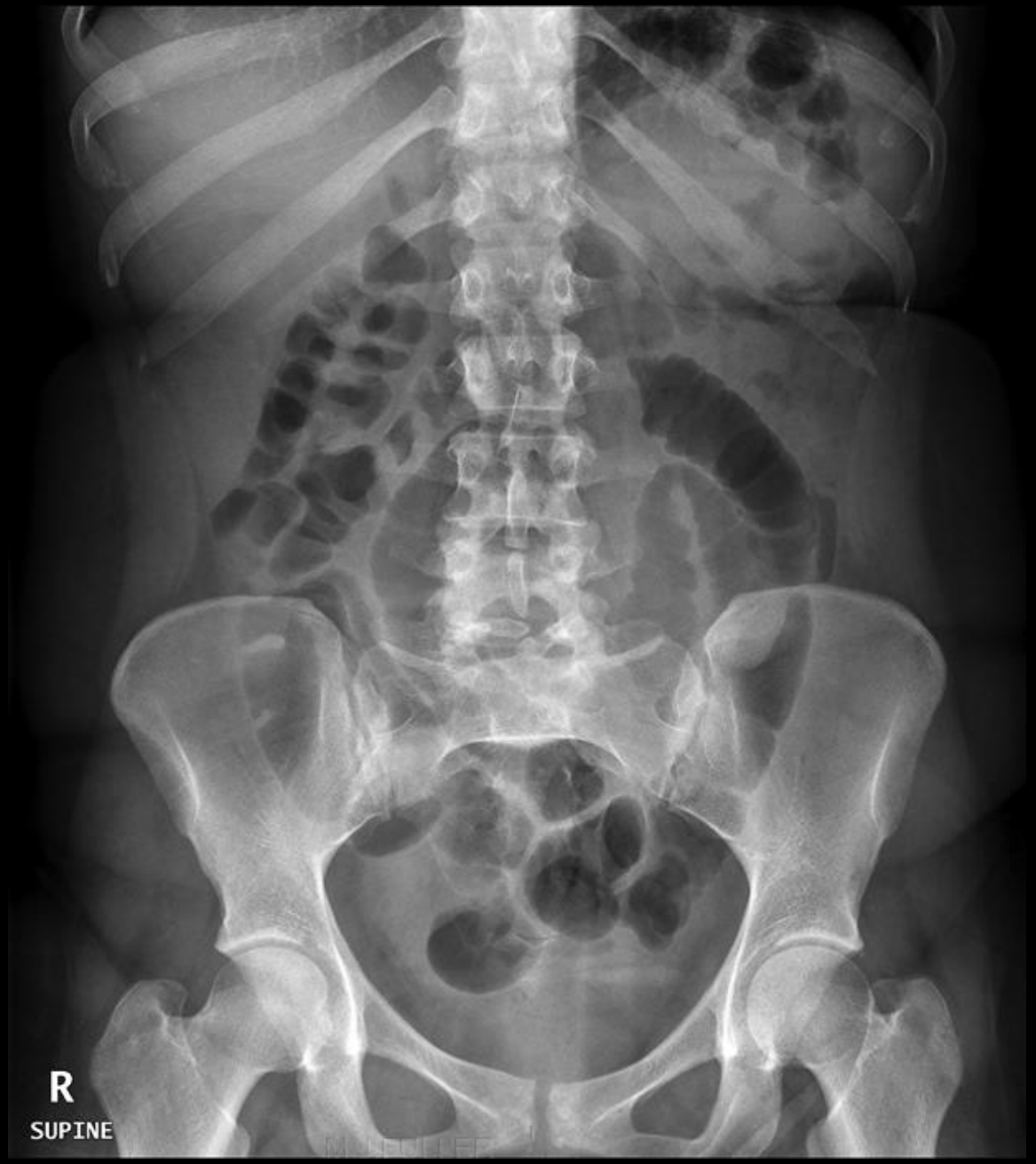
- **X Ray.**
- **Ultrasound.**
- **Computed tomography CT scan.**
- **Magnetic resonance imaging MRI.**
- **Nuclear scan.**

What is this?



What is this?

Abdomen x-ray
OR
Abdomen radiography



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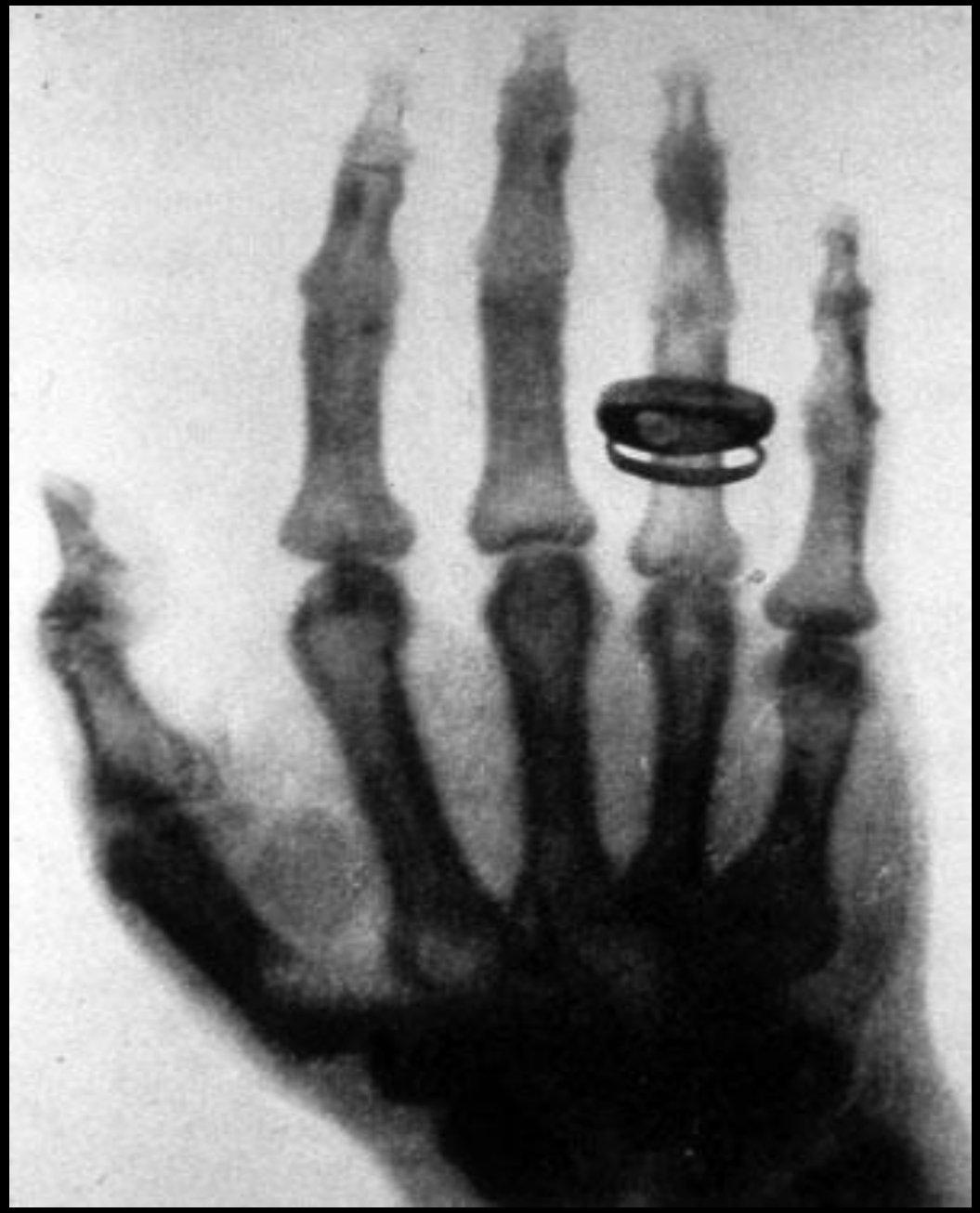


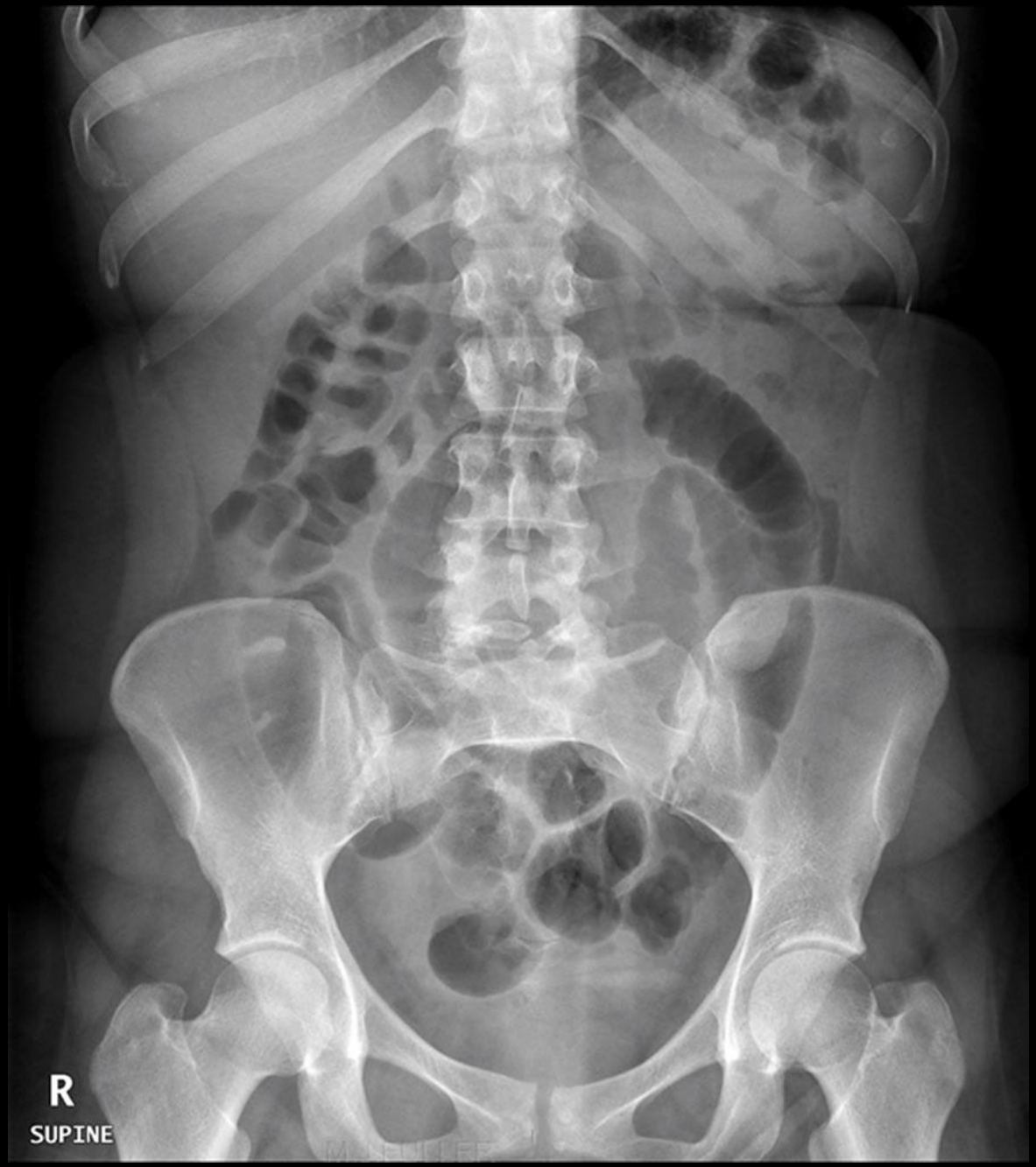
X ray was first observed and documented in **1895** by **Wilhelm Conrad Roentgen**

What is X ray?

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

X RAY language

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



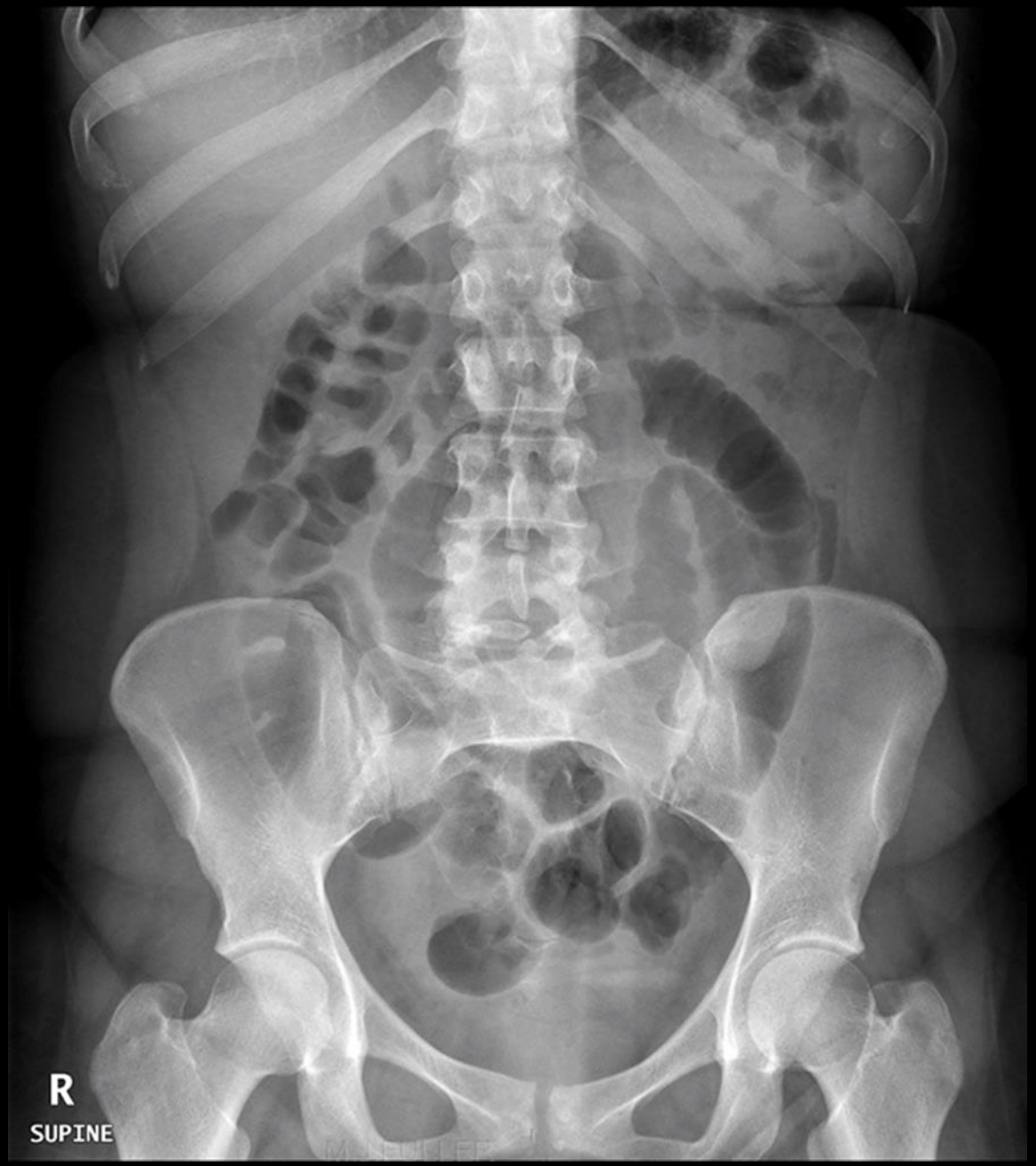
X RAY

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)

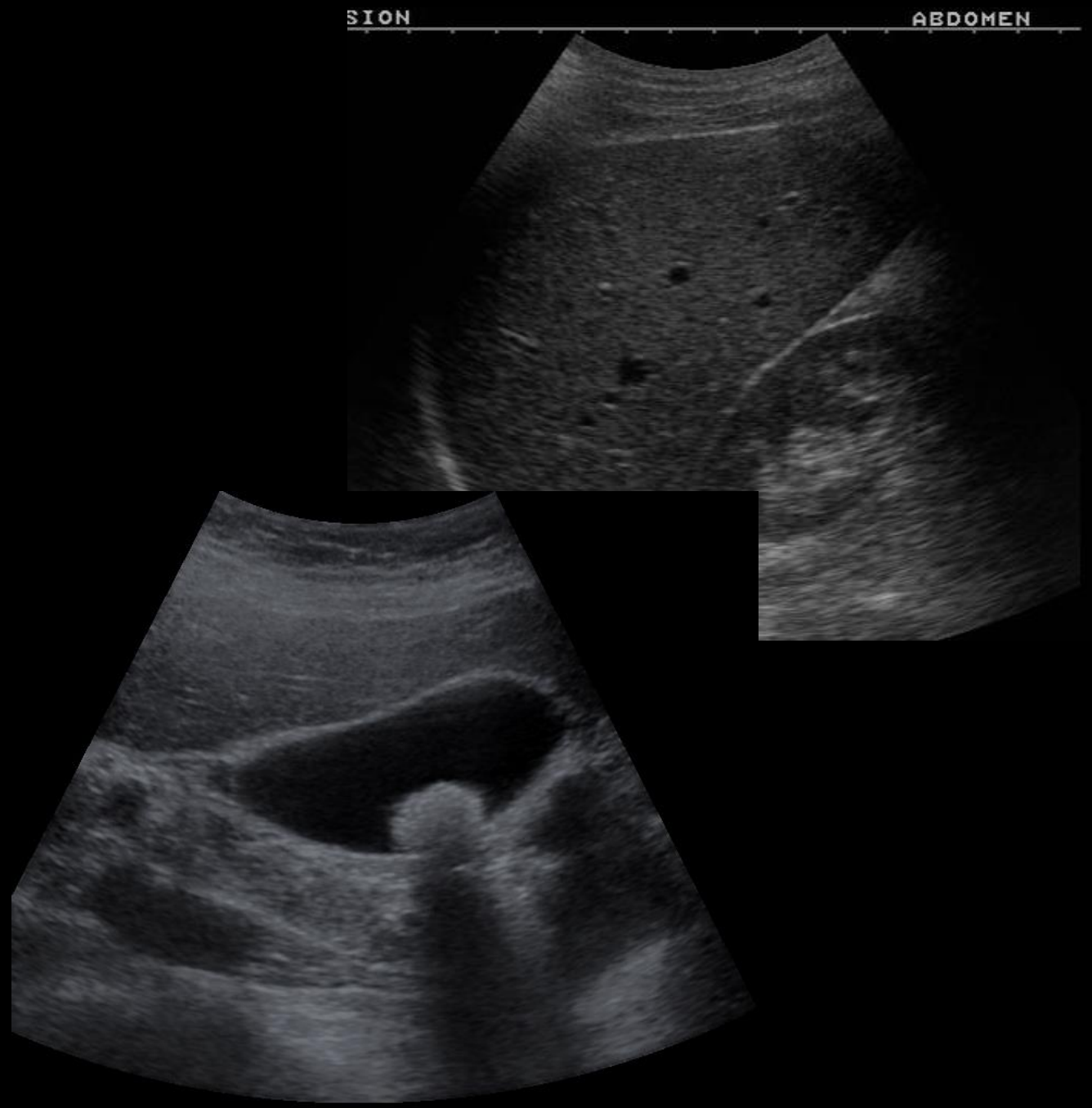
Echo patterns

Hyper-echoic = White

Hypo-echoic = Light Grey

An-echoic = Black

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



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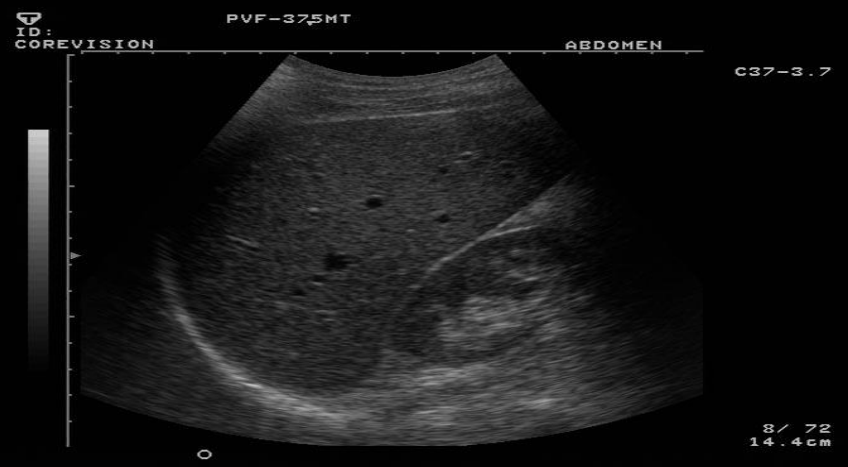
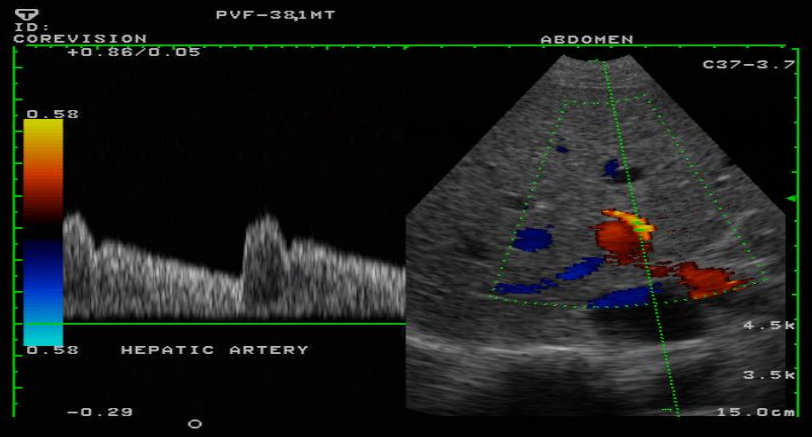
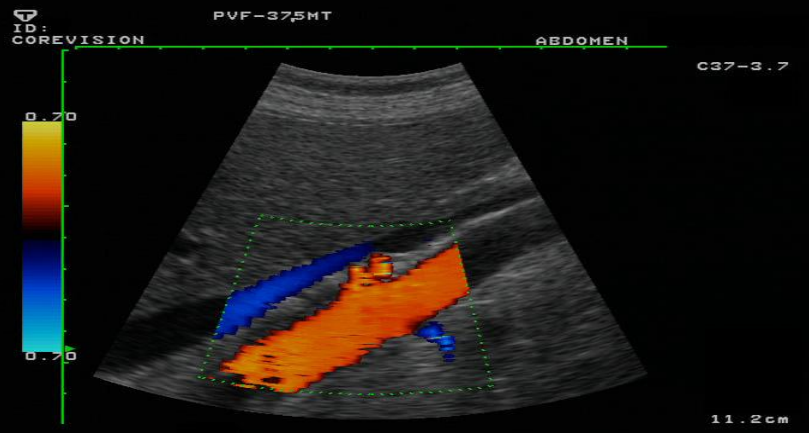


DUPLEX



COLOR DOPPLER



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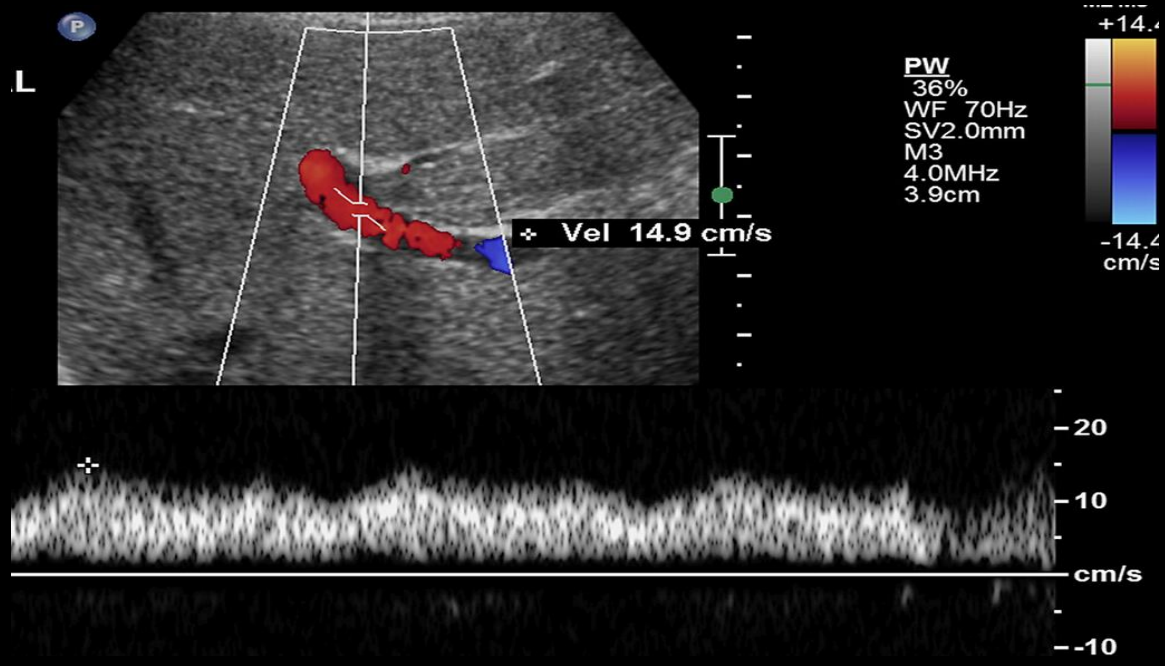

DUPLEX


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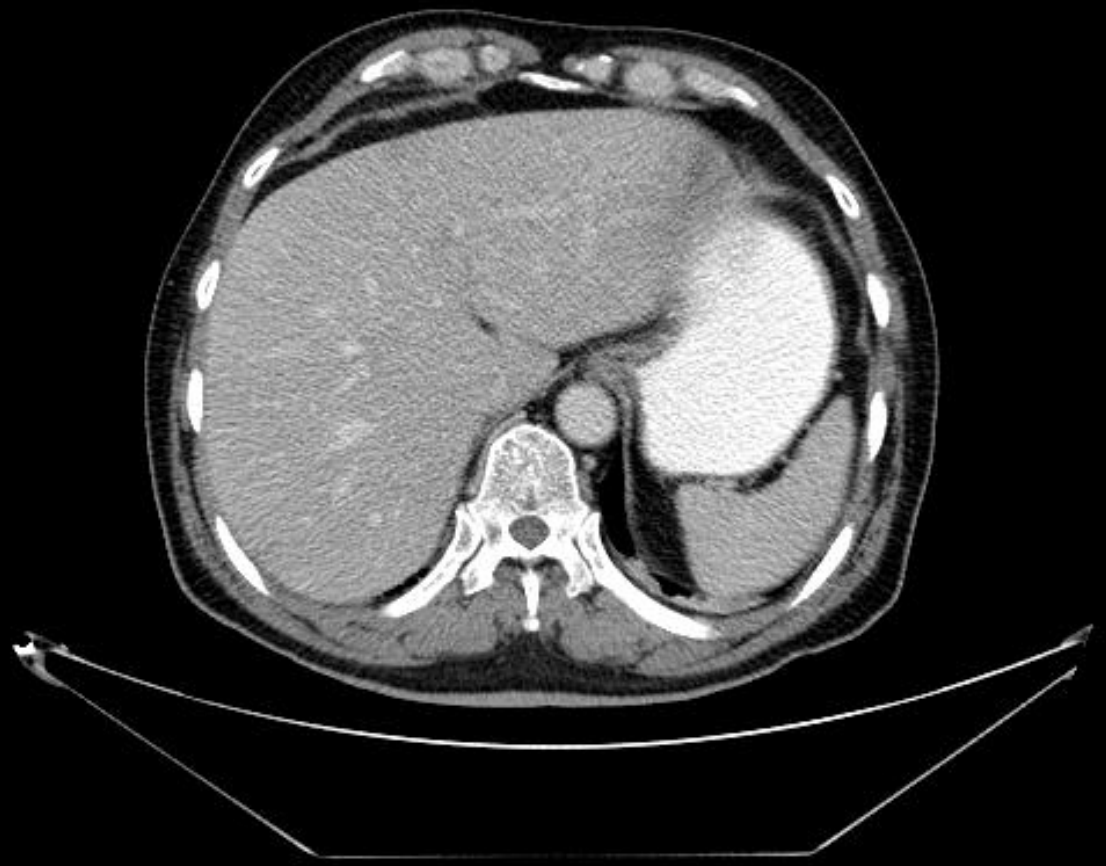
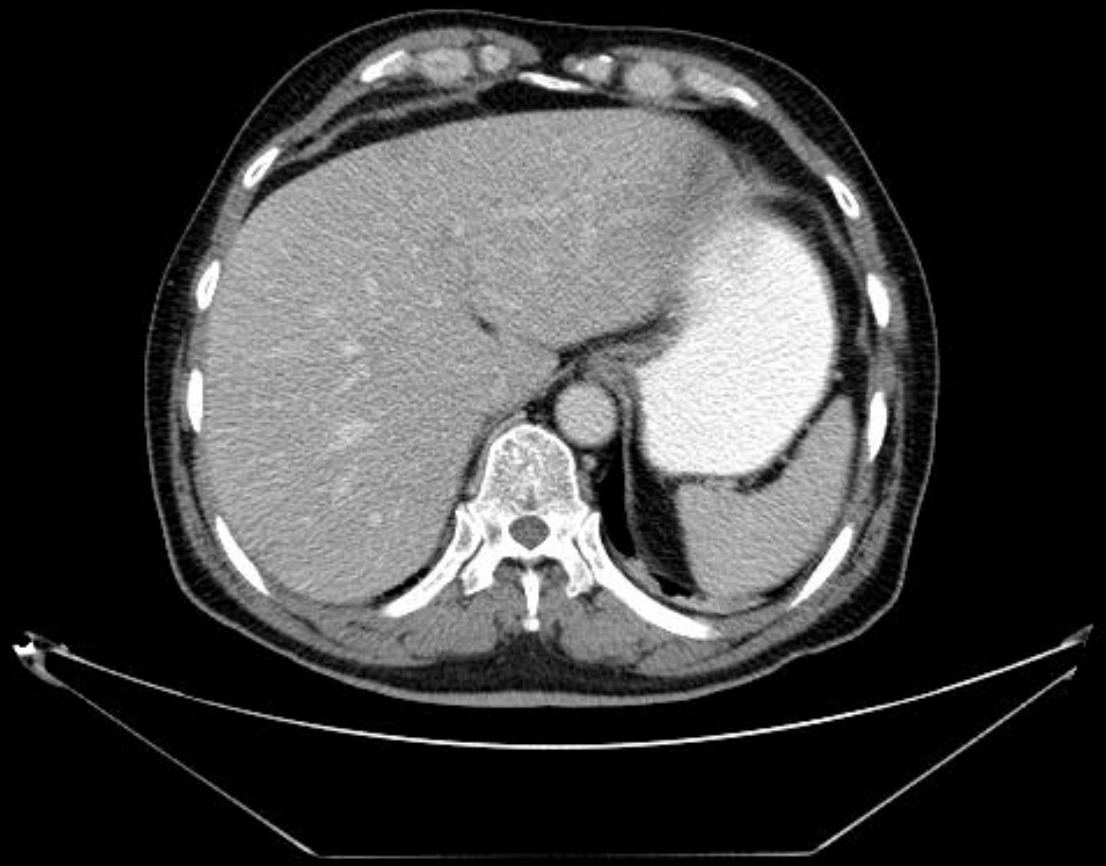
GALLBLADDER

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 limmited in evaluating gallstones, Why?

What is different between the tow iamges?

What is different between the tow iamges?

Without IV contrast

With IV contrast

Computed tomography CT scan.

Advantages:

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

Disadvantages:

- Use ionizing radiation
- Less available then x-ray and US
- Relatively expansive
- Intravenous contrast maybe harmfull

CT language

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

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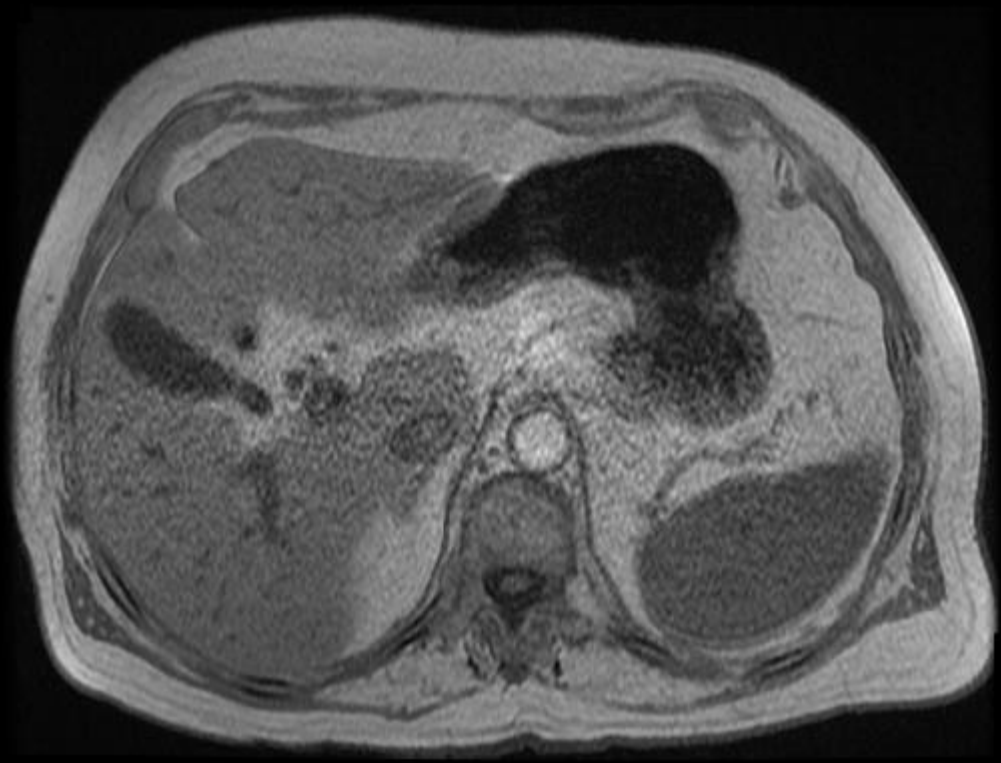
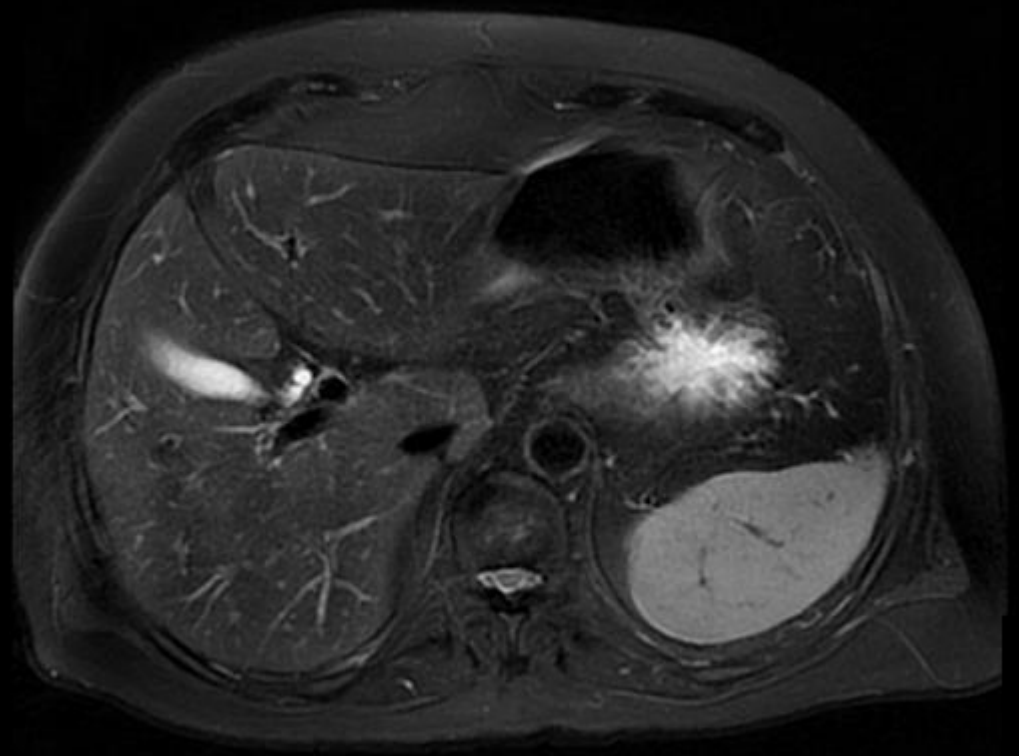


What is this?

- 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:

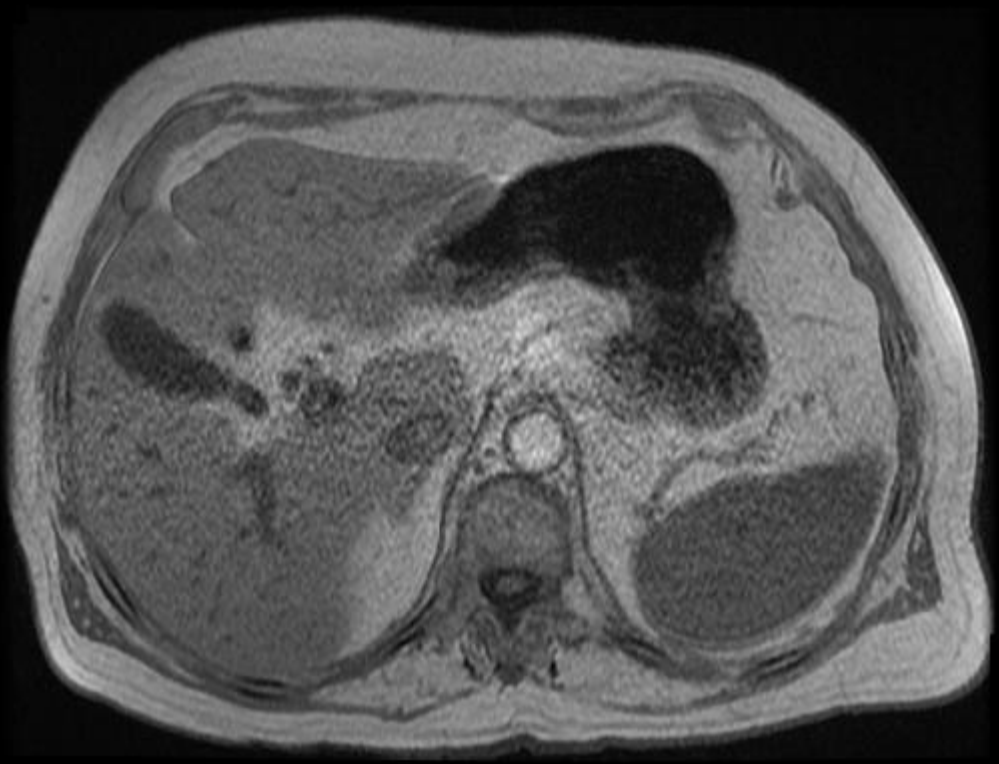
- Excellent in tissue details
- No ionizing radiation

Disadvantages:

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

MRI language

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



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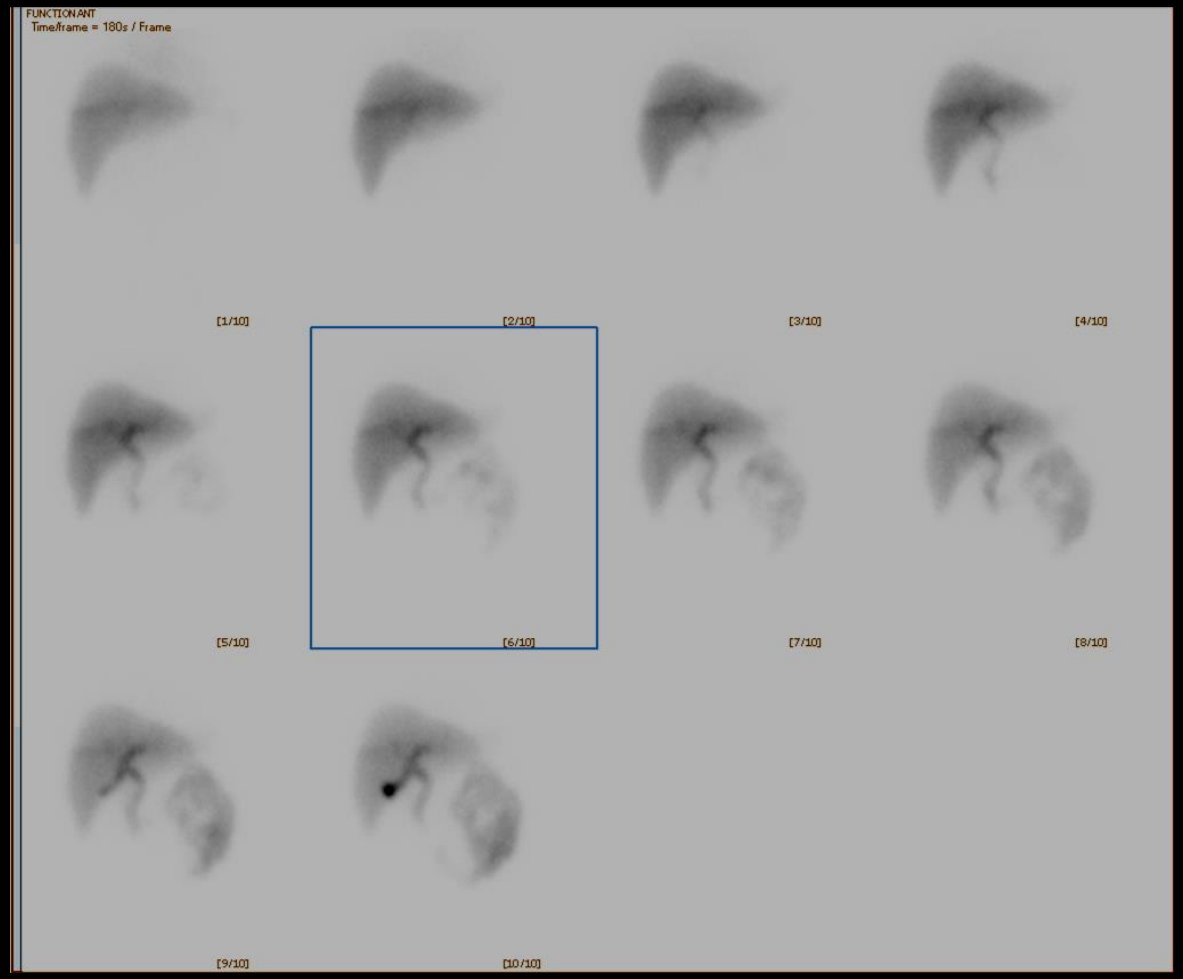
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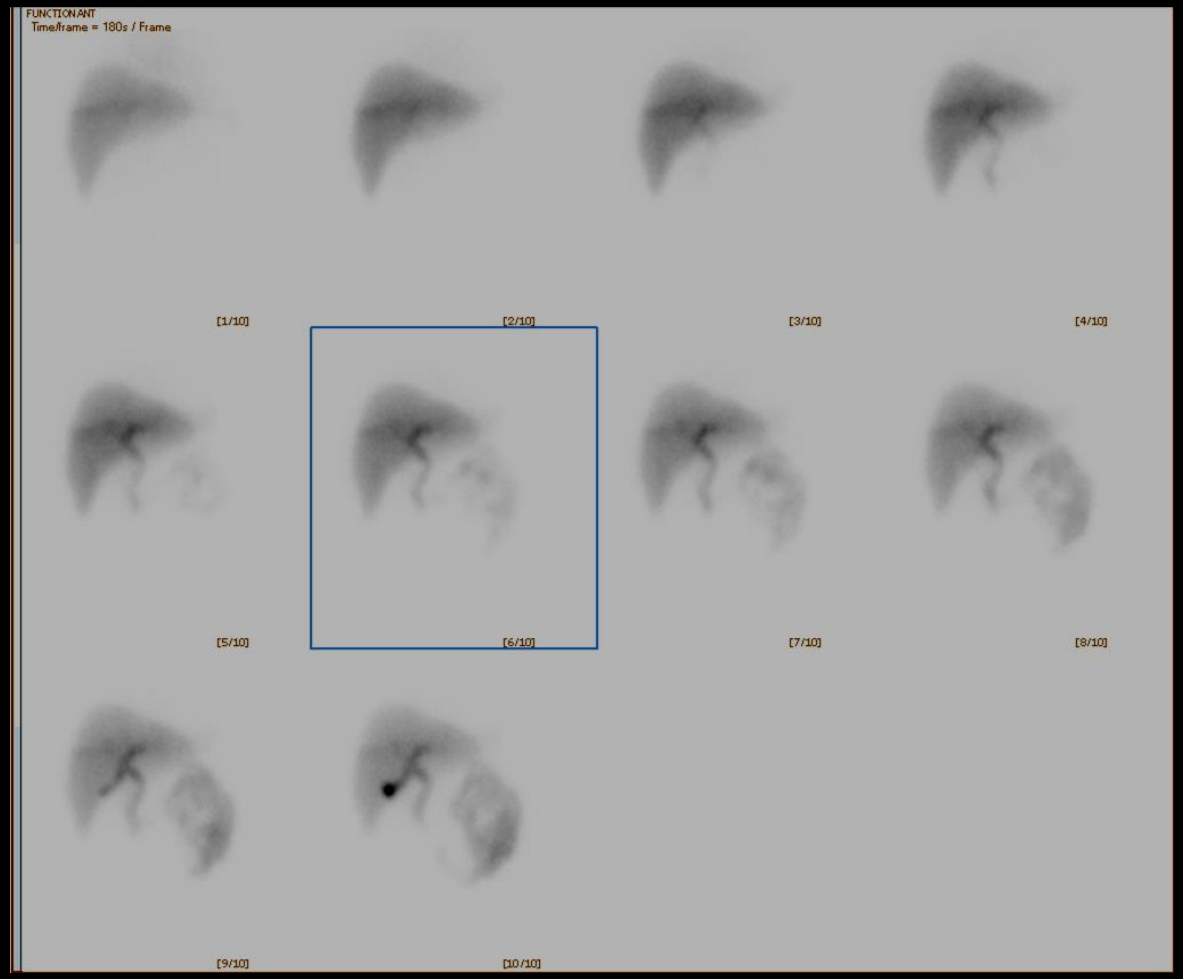
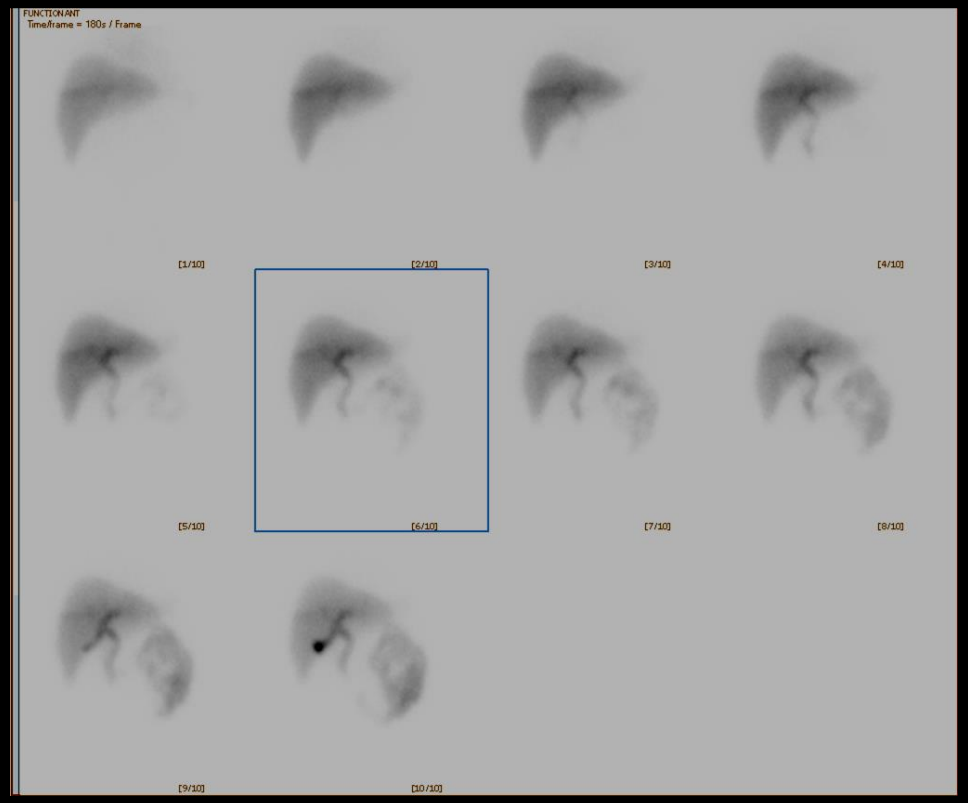
What is this?

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 oragn function/physiology

Disadvantages:

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

THANK YOU