

432
Radiology
Team



(12):IMAGING INVESTIGATION HEPATOBIILIARY SYSTEM

* Many thanks to 431 team for their helpful notes *



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جامعة
الملك سعود
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COLOR GUIDE: • Females' Notes • Males' Notes • Important • Additional • 431 team

Objectives

NOT GEVIN ☹

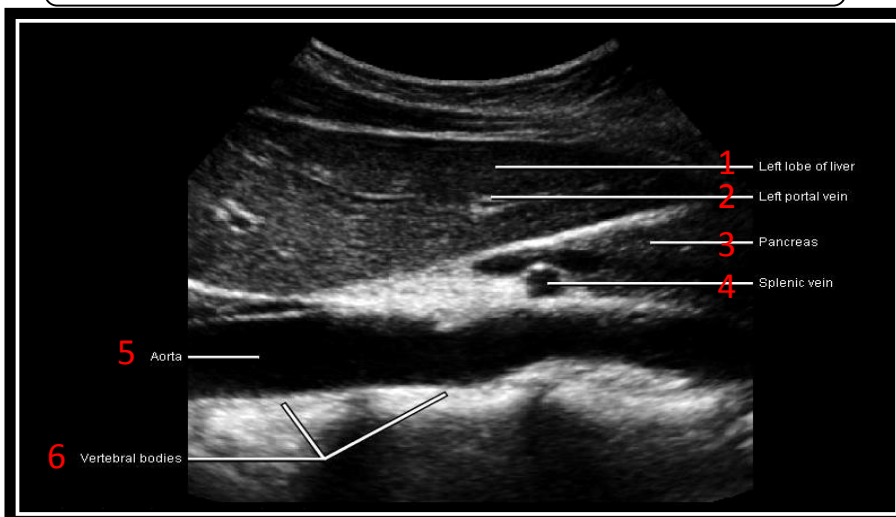
ULTRASOUND

- Not expensive
- allows comparison with the opposite side, normal side
- uses no ionizing radiation,
- performed at bed side or in the operating room.
- It is a non invasive modality

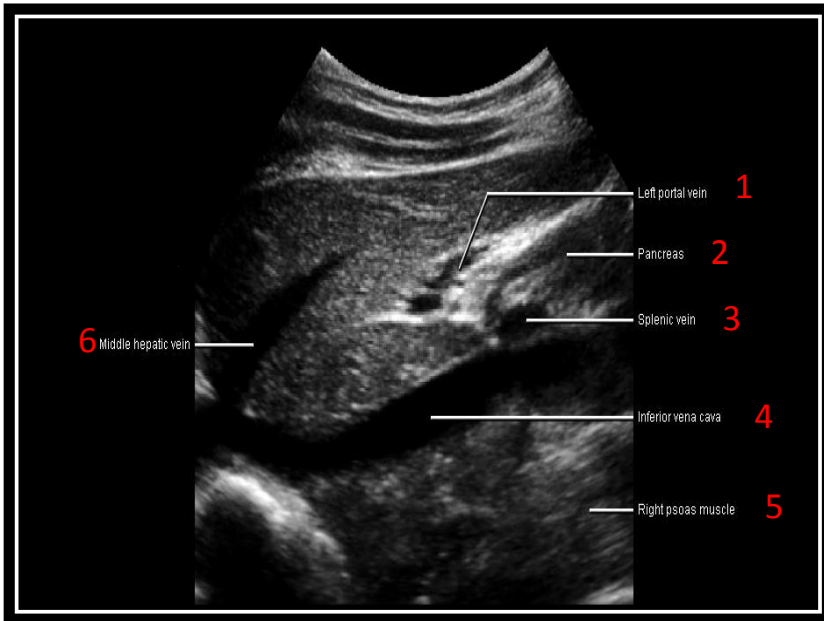
FYI: Probes are the most expensive part of the US



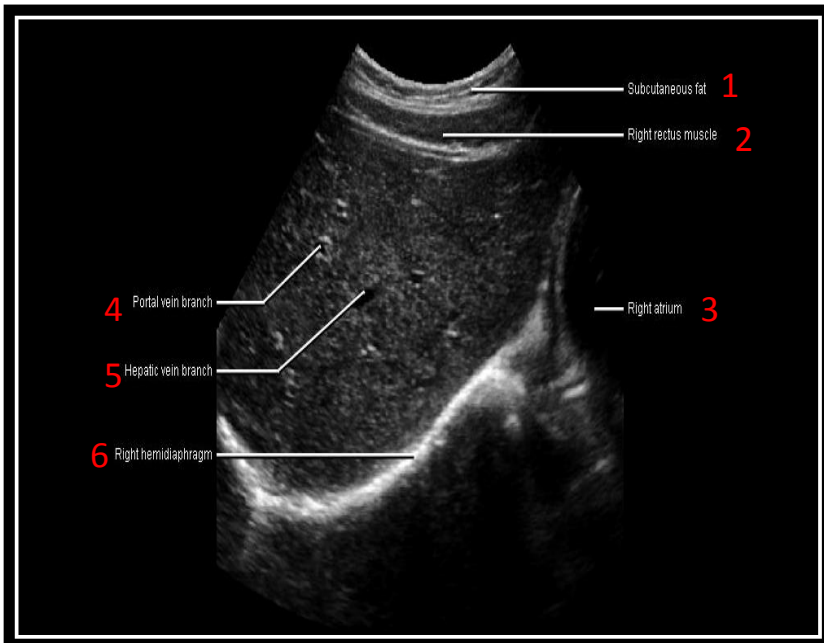
Longitudinal image of the abdomen



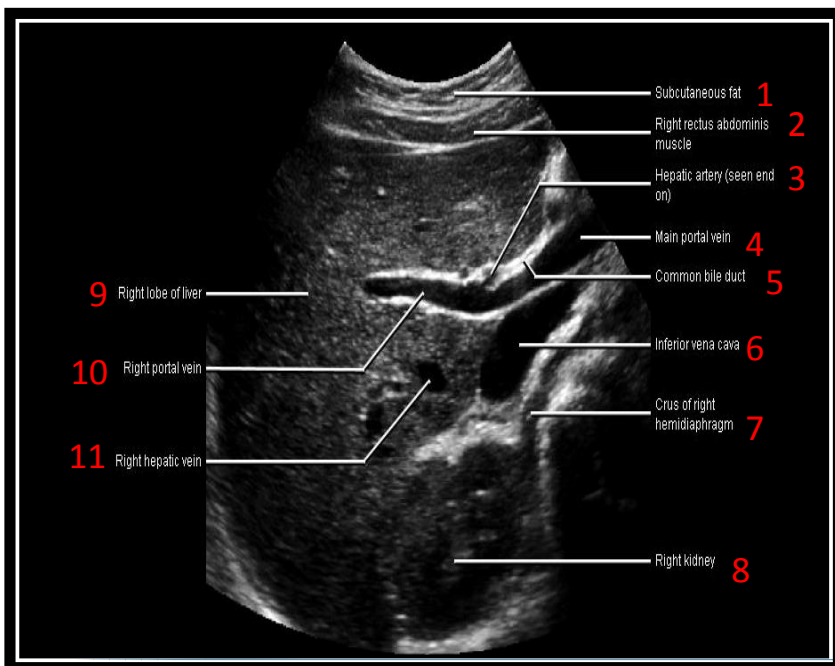
1. Left lobe of liver.
2. Left portal vein.
3. Pancreas.
4. Splenic vein.
5. Aorta.
6. Vertebral bodie



- 1) Left portal vein.
- 2) Pancreas.
- 3) Splenic vein.
- 4) Inferior vena cava.
- 5) Right psoas muscle.
- 6) Middle hepatic vein.



- 1) Subcutaneous fat.
- 2) Right rectus muscle.
- 3) Right atrium.
- 4) Portal vein branch.
- 5) Hepatic vein branch.
- 6) Right hemidiaphragm



- 1. Subcutaneous fat.
- 2. Right rectus muscle.
- 3. Hepatic artery.
- 4. Main portal vein.
- 5. Common bile duct.
- 6. Inferior vena cava.
- 7. Crus of right hemidiaphragm.
- 8. Right kidney.
- 9. Right lobe of liver.
- 10. Right portal vein.
- 11. Right hepatic vein.

Note(s):431

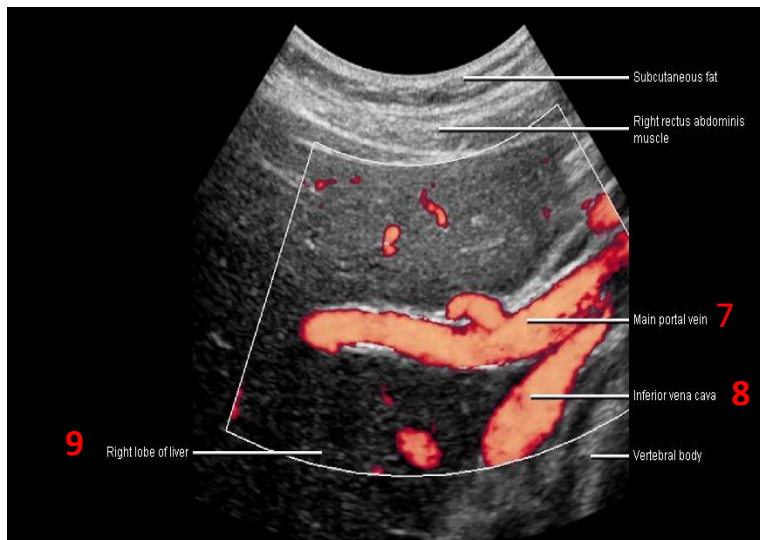
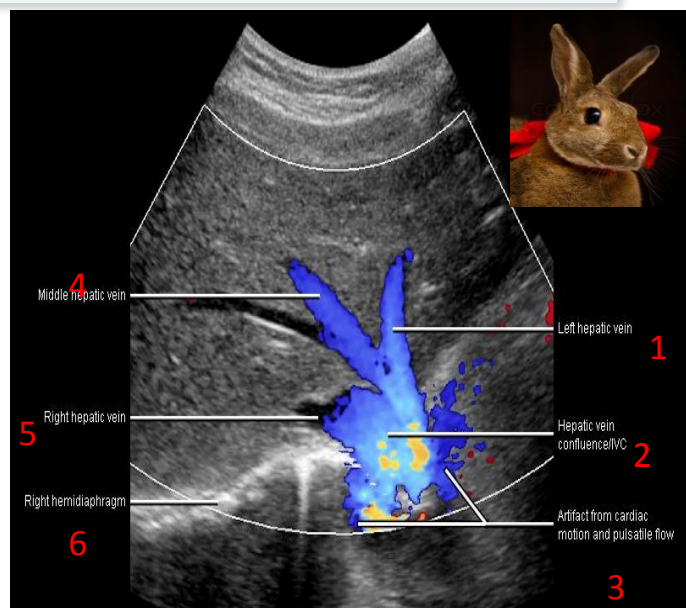
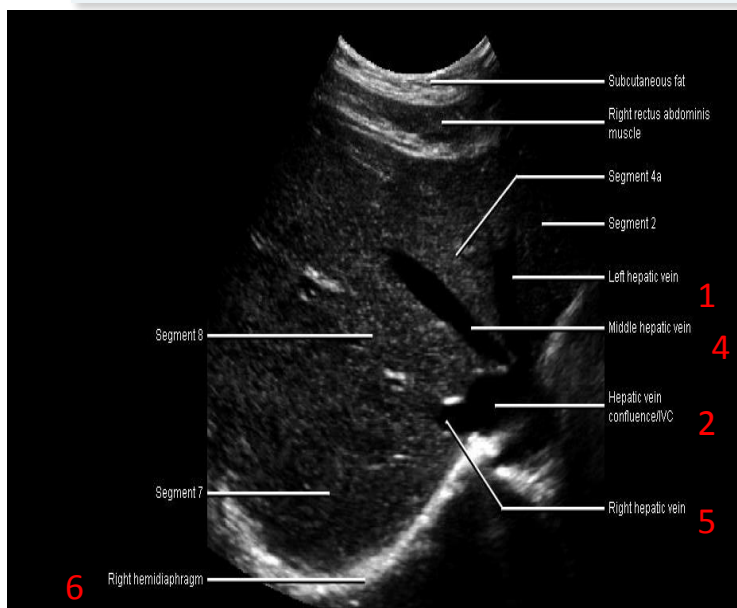
How can we differentiate between the black dots in the liver (portal, hepatic veins, other structure)?

- 1- Follow it with the scan and see if it is going to the portal system or the main hepatic veins.
- 2- The portal vein is surrounded by an echogenic (bright) line, while the hepatic vein is anechoic (no bright shadow surrounding it).

Note(s):431

The portal vein is a landmark for the hepatic artery and the common bile duct, when we want to see the hepatic artery or the common bile duct we put a color (to show blood flow) in the portal vein since it is the largest among them.

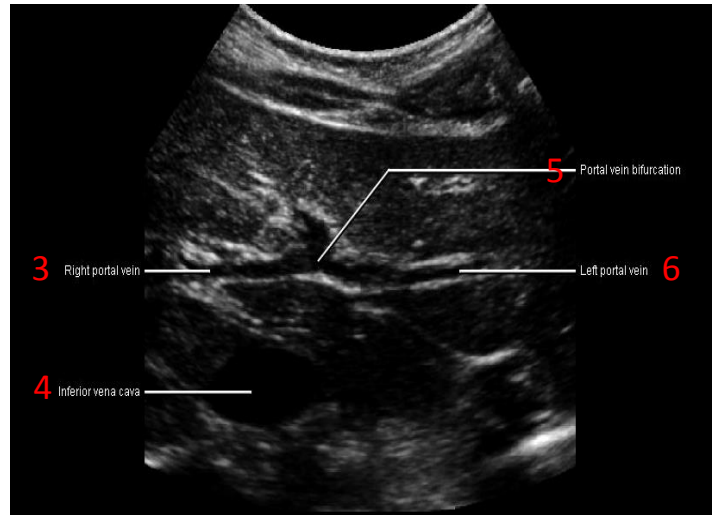
Anterior to the portal vein, there is a black line between two bright lines; this is the COMMON BILE DUCT. Normally, its diameter is less than 4 mm and it can be up to 5-6 mm in elderly and post cholecystectomy. If there's any "pathology" like obstruction, the common bile duct could appear even bigger than the portal vein.



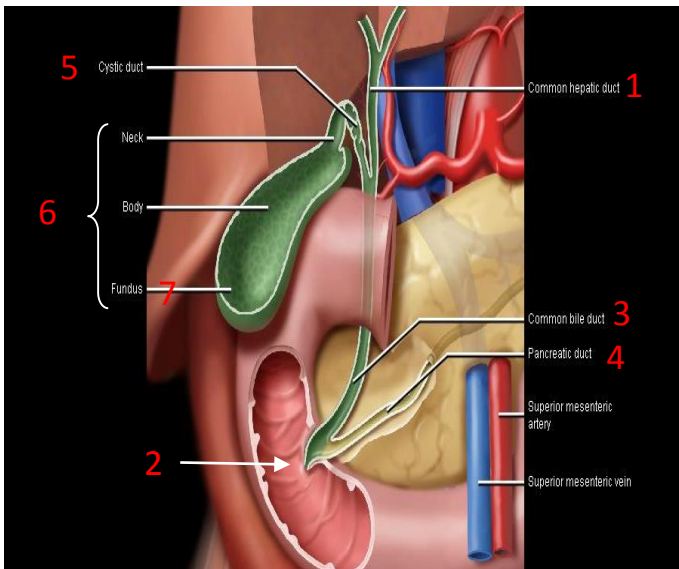
- 1) Left hepatic vein.
- 2) Hepatic vein confluence/IVC.
- 3) Artifact from cardiac motion and pulsate flow.
- 4) Middle hepatic vein.
- 5) Right hepatic vein.
- 6) Right hemidiaphragm.
- 7) Main portal vein.
- 8) Inferior vena cava.
- 9) Right love of liver.



- 1. Right hepatic vein.
- 2. portal vein



- 3. Right portal vein
- 4. Inferior vena cava.
- 5. portal vein bifurcation
- 6. left portal vein



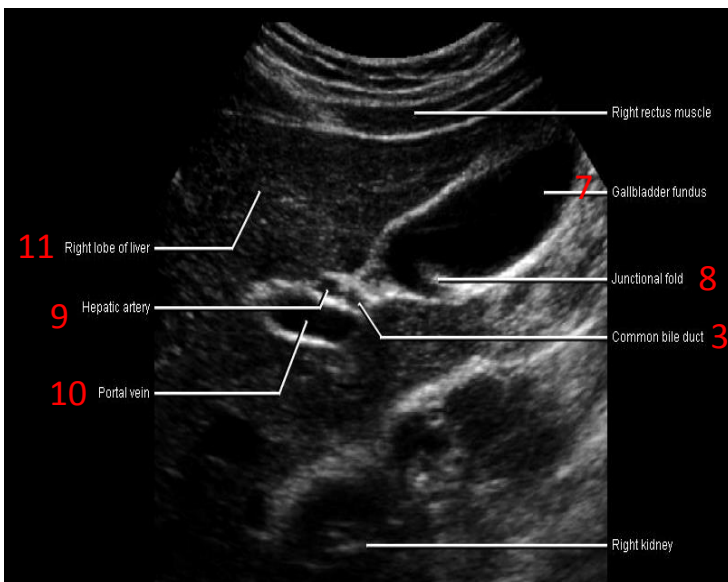
Gallbladder: anechoic structure (sac) with a bright wall .

Cystic duct: drains into the common bile duct .

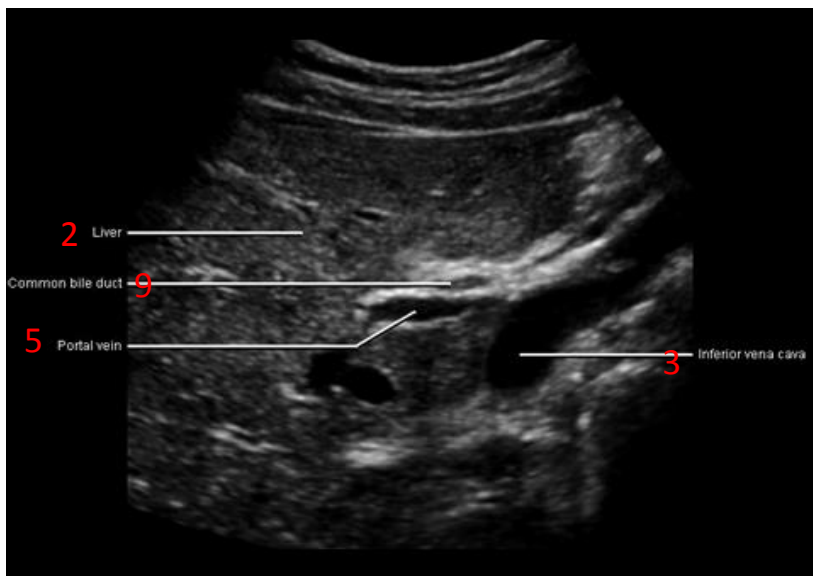
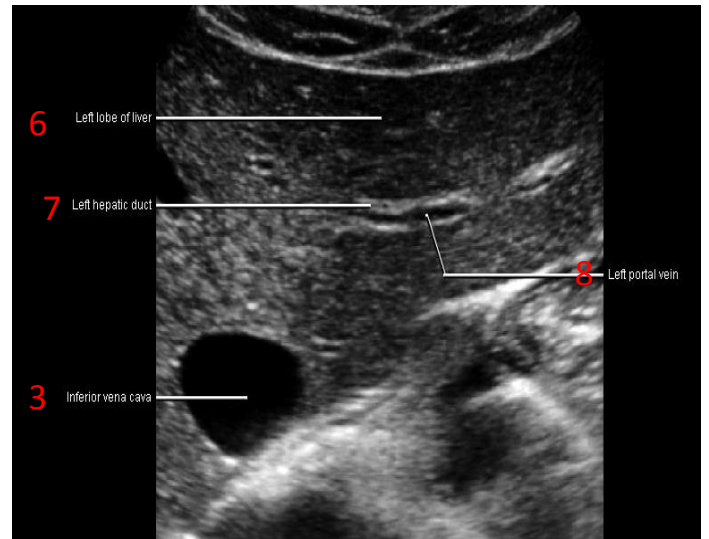
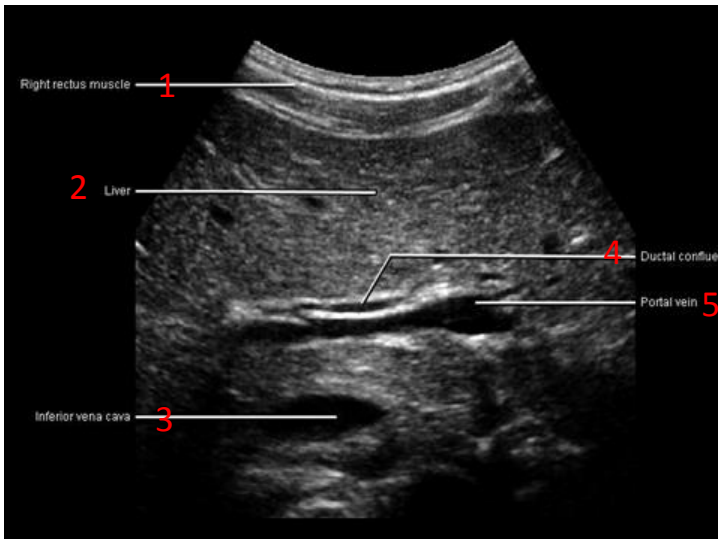
Portal vein: posterior to common bile duct and hepatic artery .

Junctional fold: an echogenic line inside the gallbladder which can be seen normally in some cases.

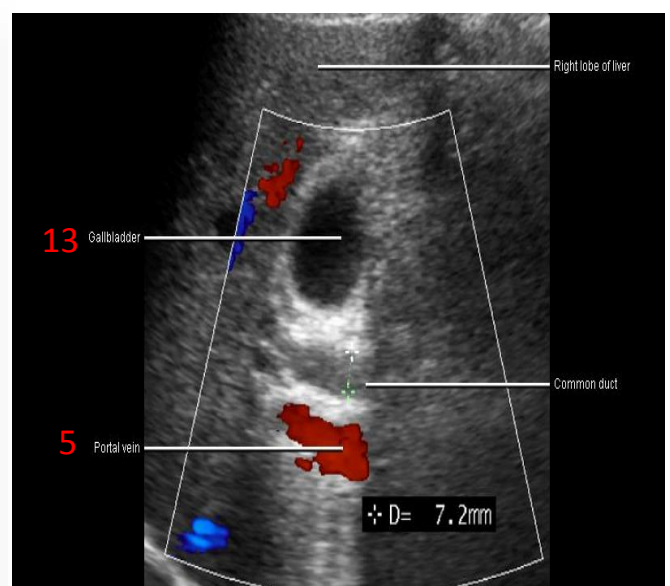
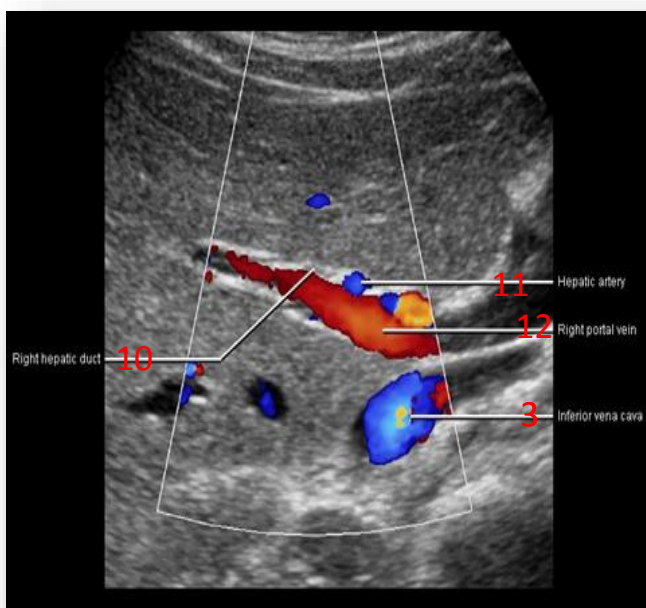
The best modality to see biliary stone is ultrasound

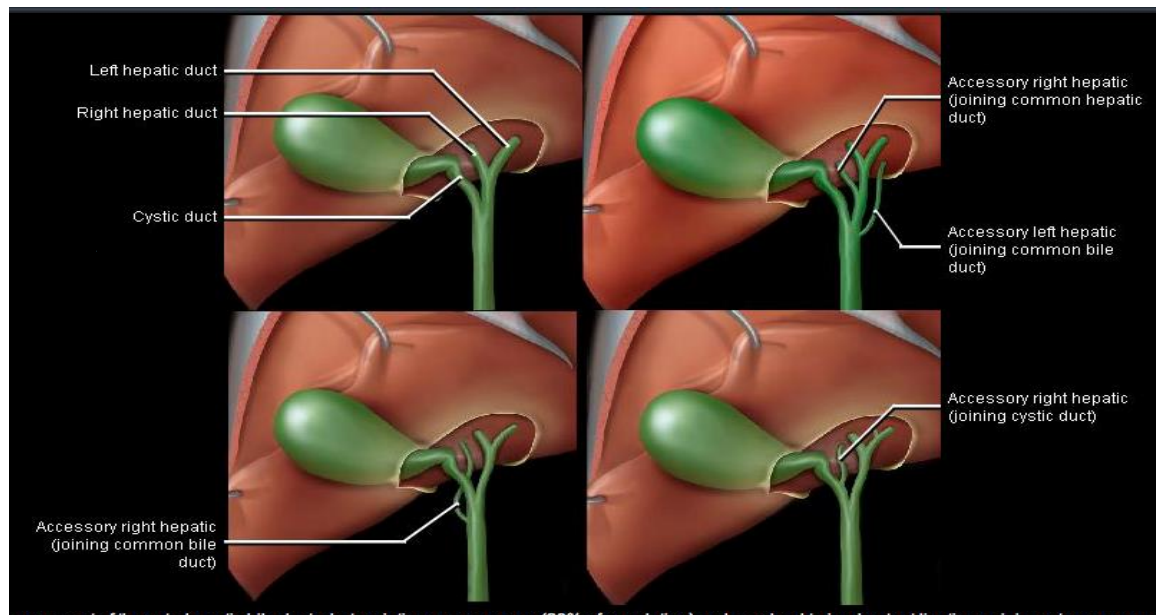


- 1) Common hepatic duct.
- 2) Ampulla of Vater.
- 3) Common bile duct.
- 4) Pancreatic duct.
- 5) Cystic duct.
- 6) Gallbladder.
- 7) Gallbladder fundus.
- 8) Junctional fold.
- 9) Hepatic artery.
- 11) Right lobe of liver.



1. Right rectus muscle
2. Liver.
3. Inferior vena cava.
4. Ductal confluence.
5. Portal vein.
6. Left lobe of liver
7. Left hepatic duct
8. Left portal vein
9. Common bile duct
10. Right hepatic duct
11. Hepatic artery
12. Right portal vein
13. Gallbladder





COMPUTED TOMOGRAPHY

COMPONENTS

-X ray source

-Detectors

- Computer data

Processing system



What is CT Scanning

- CT scanning—sometimes called CAT scanning—is a noninvasive, painless medical test that helps physicians diagnose and treat medical conditions.
- CT imaging uses special x-ray equipment to produce multiple images or pictures of the inside of the body and a computer to join them together in cross-sectional views of the area being studied. The images can then be examined on a computer monitor or printed.
- CT scans of internal organs, bone, soft tissue and blood vessels provide greater clarity than conventional

What are some common uses of the procedure Abdomen and pelvis

- This procedure is typically used to help diagnose the cause of abdominal pain and diseases of the [bowel](#) and colon, such as:
- abscesses in the abdomen
- inflamed colon
- cancers of the colon, liver, pancreas and kidneys
- pancreatitis
- lymphoma
- staging for cancer
- [diverticulitis](#)
- [appendicitis](#)
- **scanning of the abdomen/pelvis is also performed to:**

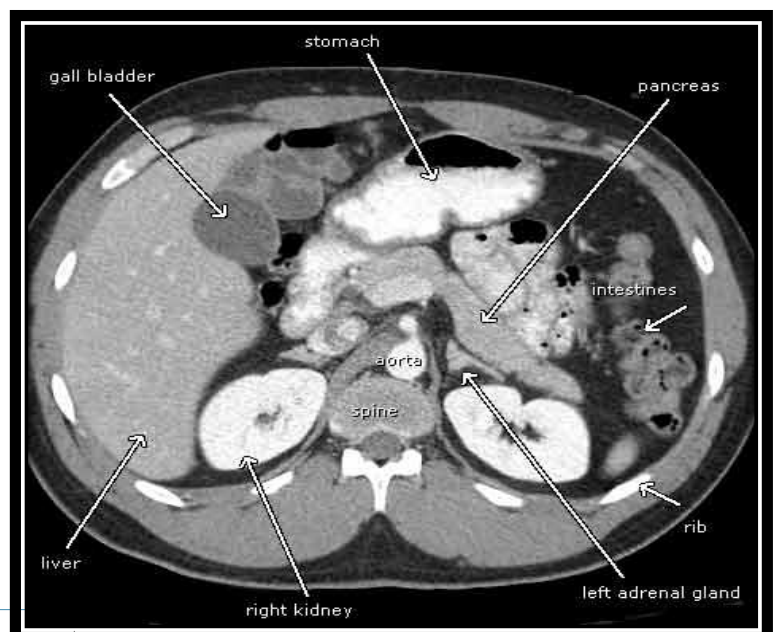
Advantage: Very detailed image especially for bones .

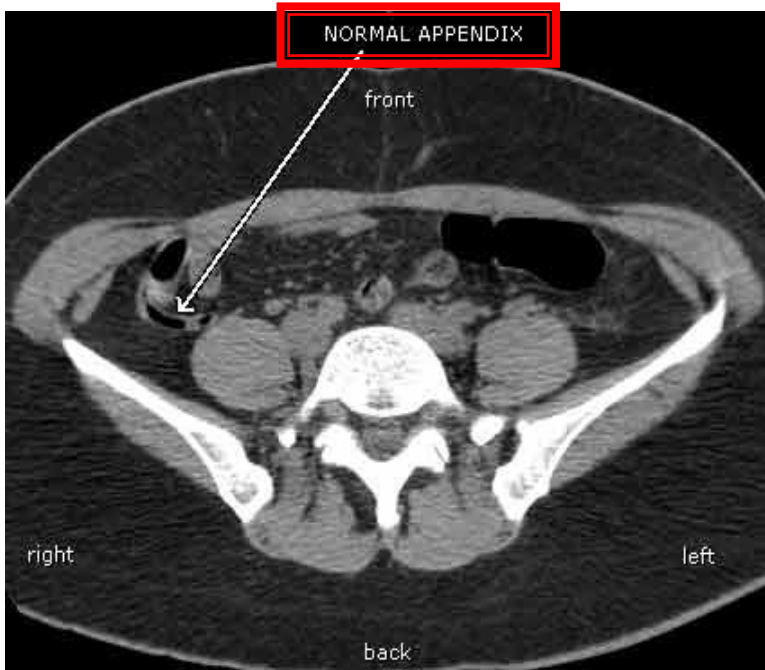
Disadvantage: Radiation (not safe in pregnancy)

- visualize the liver, spleen, pancreas and kidneys
- plan and properly administer radiation treatments for tumors
- guide biopsies and other minimally invasive procedures
- CT imaging can also play a significant role in the detection, diagnosis and treatment of vascular disorders that can lead to stroke, gangrene or kidney failure.

In many ways CT scanning works very much like other x-ray examinations. X-rays are a form of radiation—like light or radio waves—that can be directed at the body. Different body parts absorb the x-rays in varying degrees.

In a conventional x-ray exam, a small burst of radiation is aimed at and passes through the body, recording an image on photographic film or a special image recording plate. Bones appear white on the x-ray; soft tissue shows up in shades of gray and air appears black.





CT imaging is sometimes compared to looking into a loaf of bread by cutting the loaf into thin slices. When the image slices are reassembled by computer software, the result is a very detailed multidimensional view of the body's interior.

Refinements in detector technology allow new CT scanners to obtain multiple slices in a single rotation. These scanners, called "multislice CT" or "multidetector CT," allow thinner slices to be obtained in a shorter period of time, resulting in more detail and additional view capability

Note(s):

Appendix: Tubular like structure: Normally:

1- Filled with air or contrast

2- Not distended (less than 6 mm)

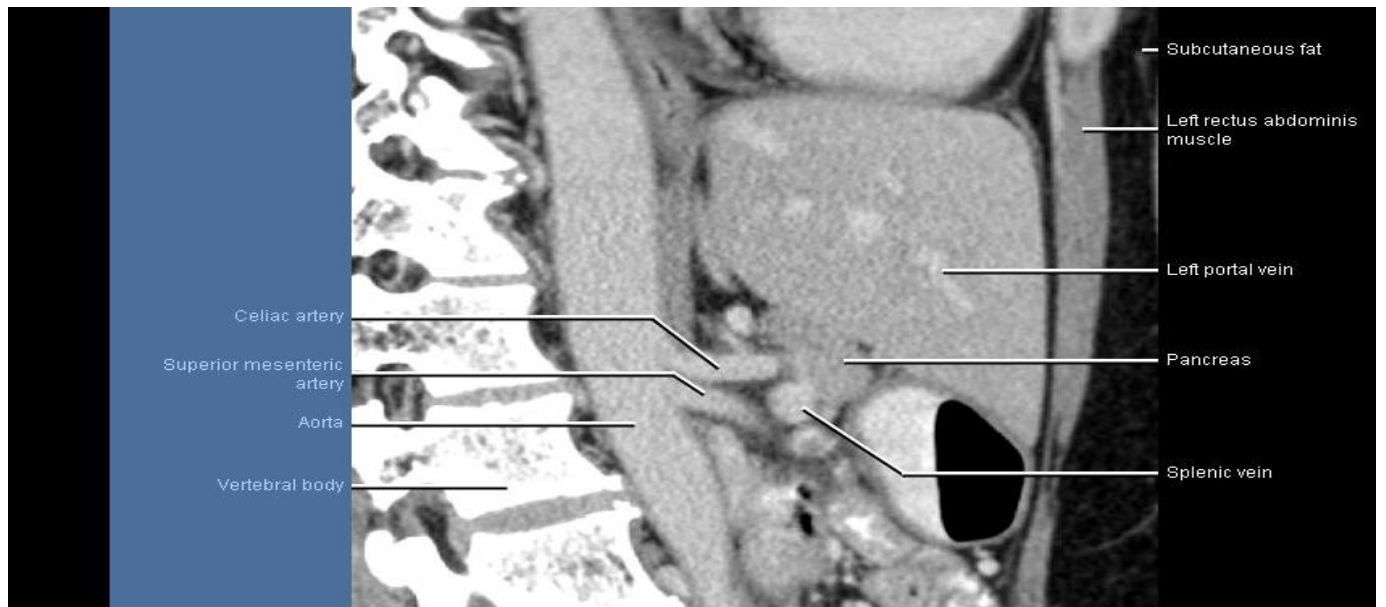
3- No thick wall (less than 3 mm)

Abnormal appendix: distended, dilated, thickened and hyperdense (appendicolith)

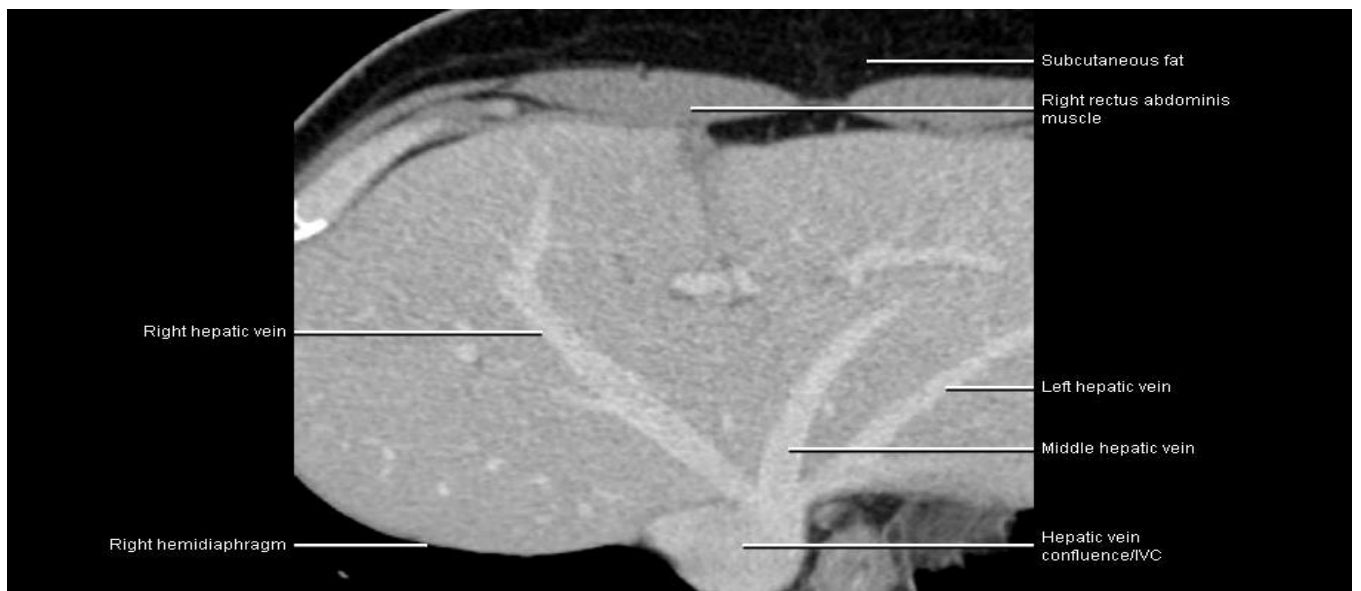
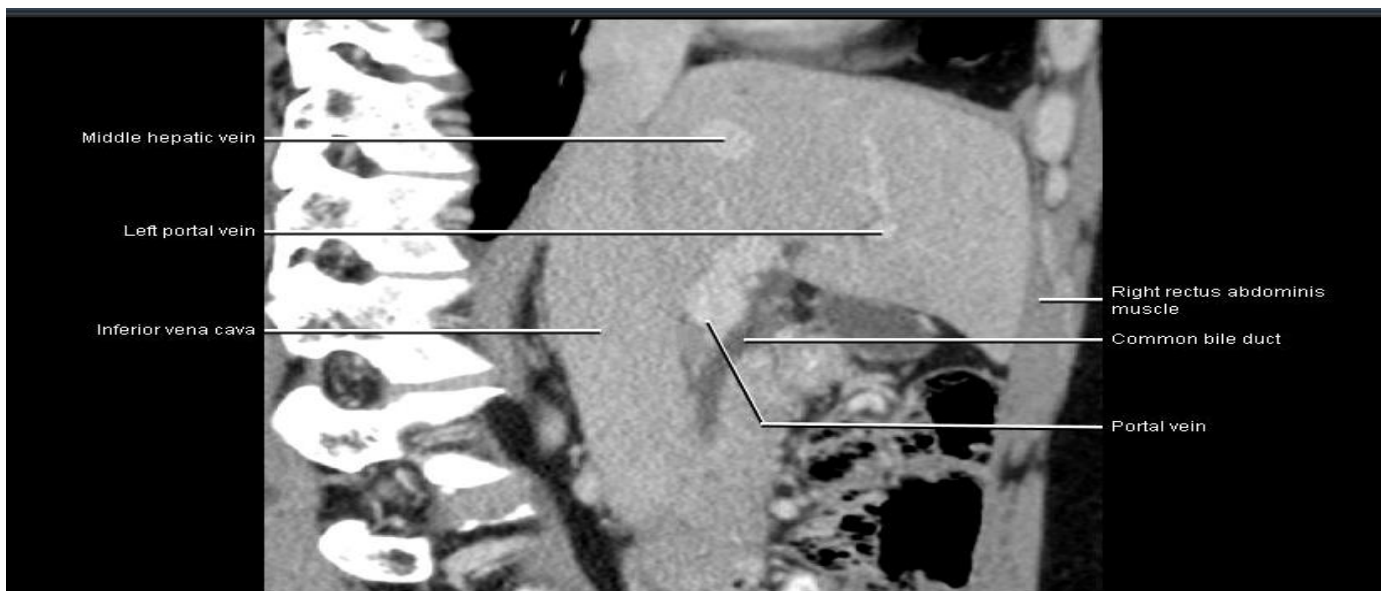
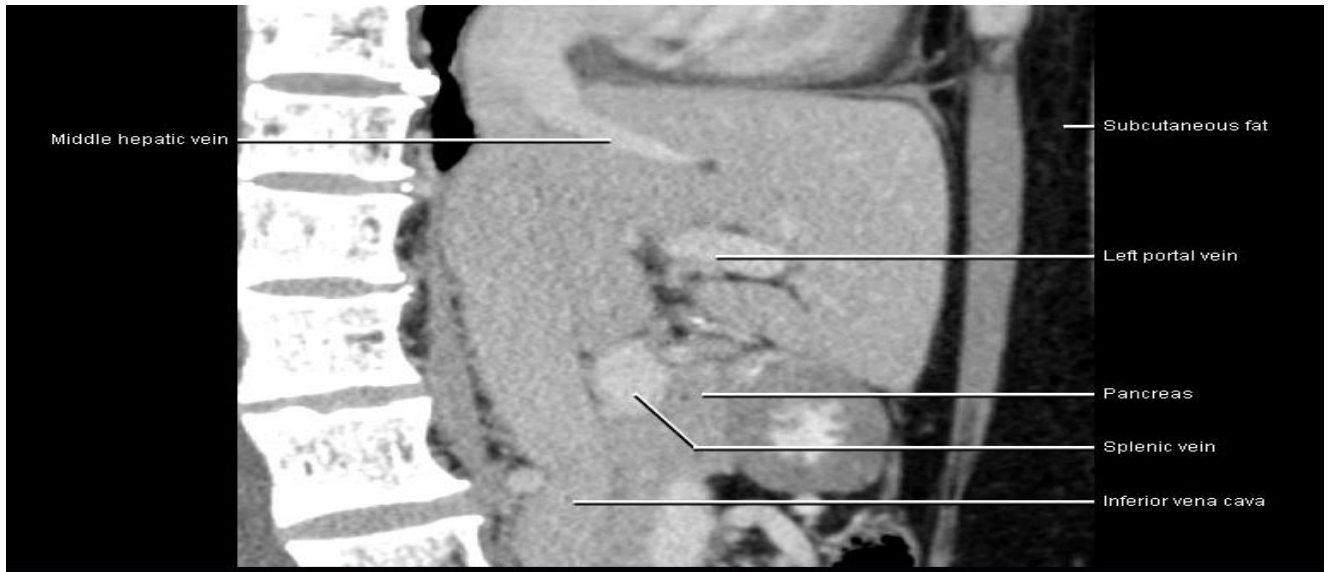


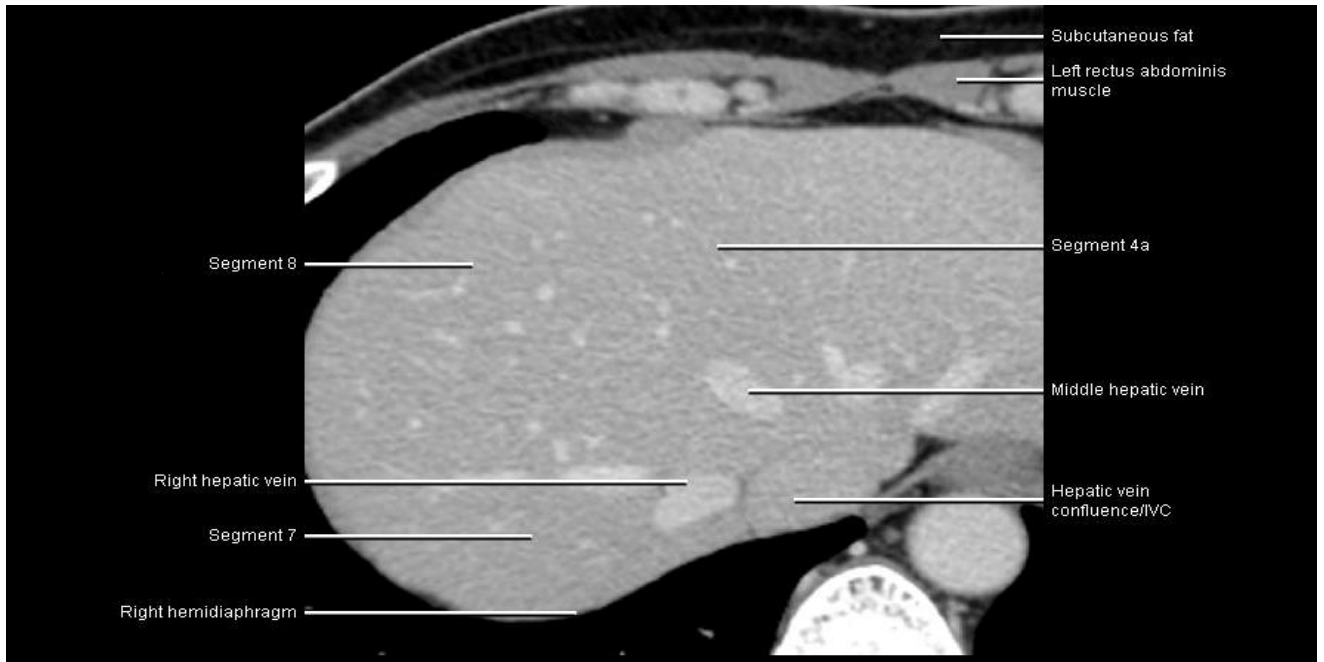
Modern CT scanners are so fast that they can scan through large sections of the body in just a few seconds. Such speed is beneficial for all patients but especially children, the elderly and critically ill.

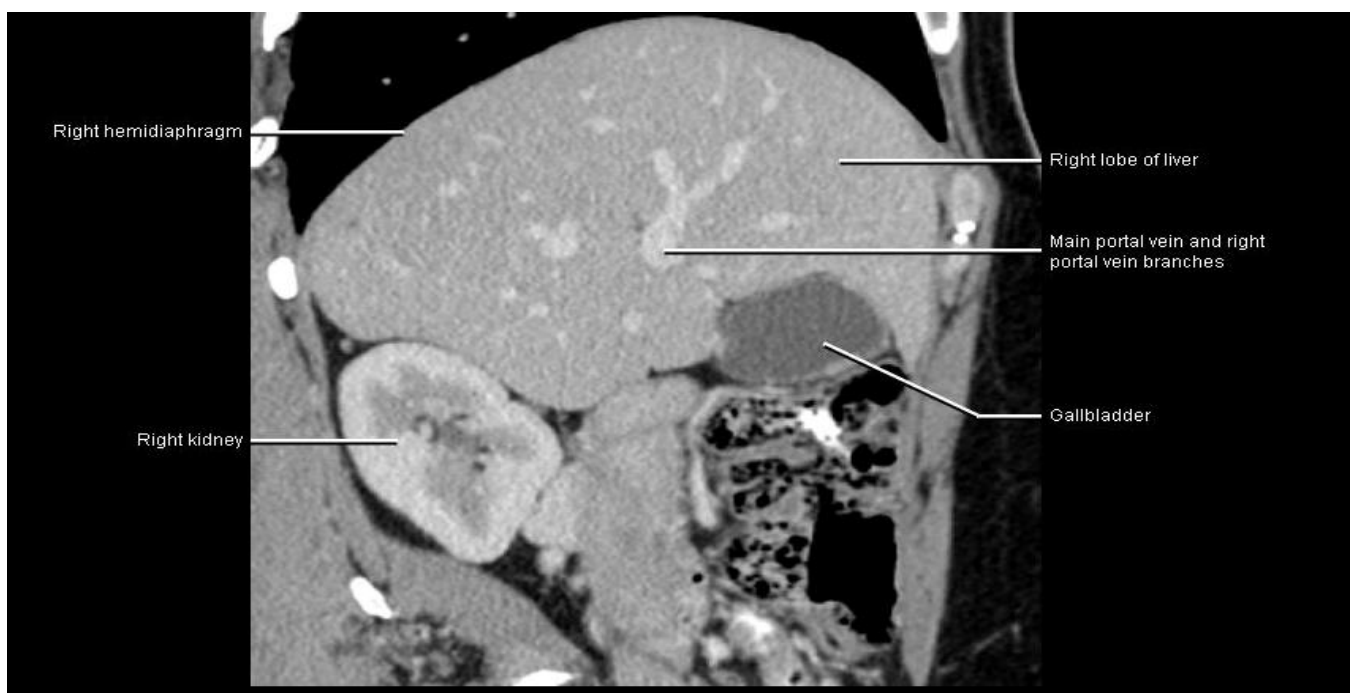
For some CT exams, a contrast material is used to enhance visibility in the area of the body being studied



He just mention the organs very fast

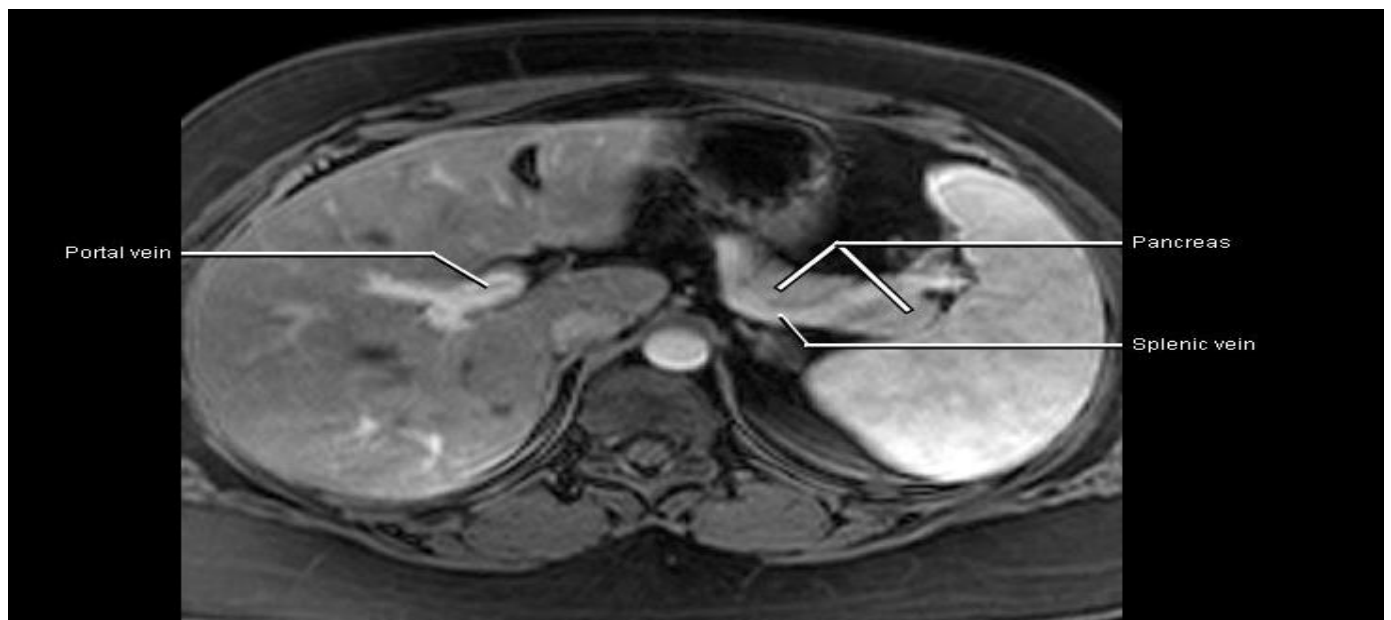
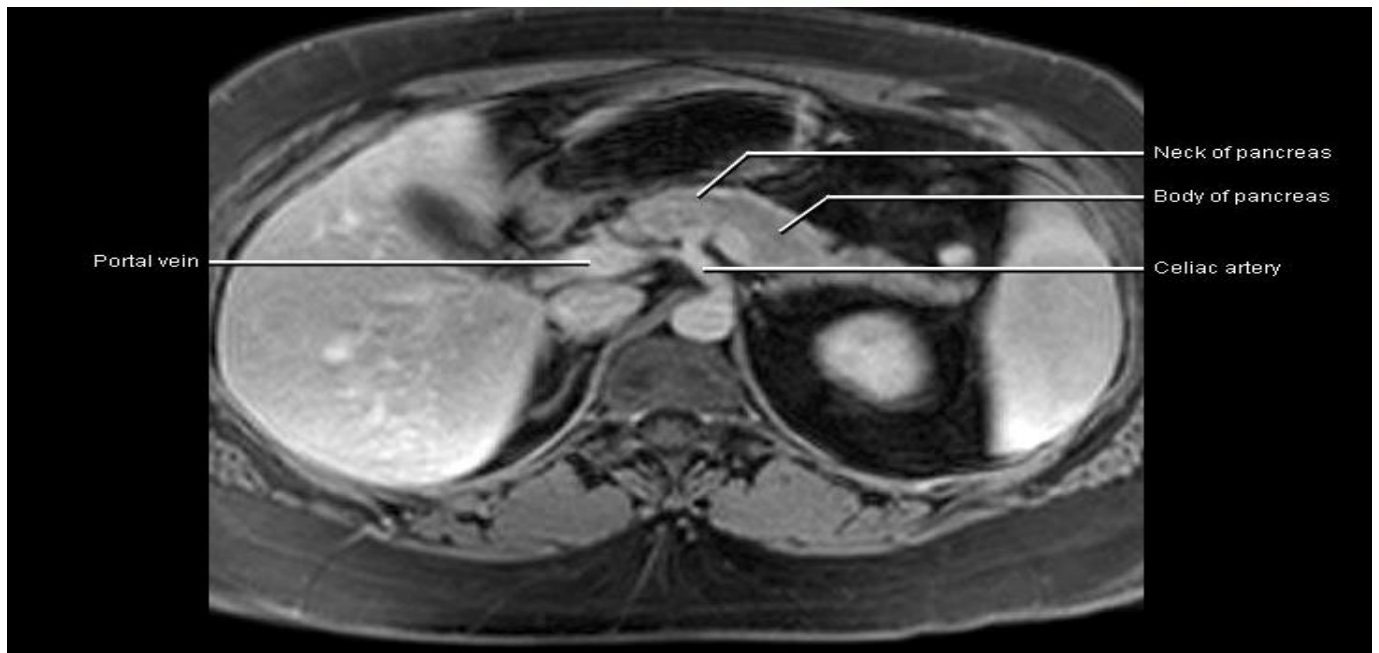




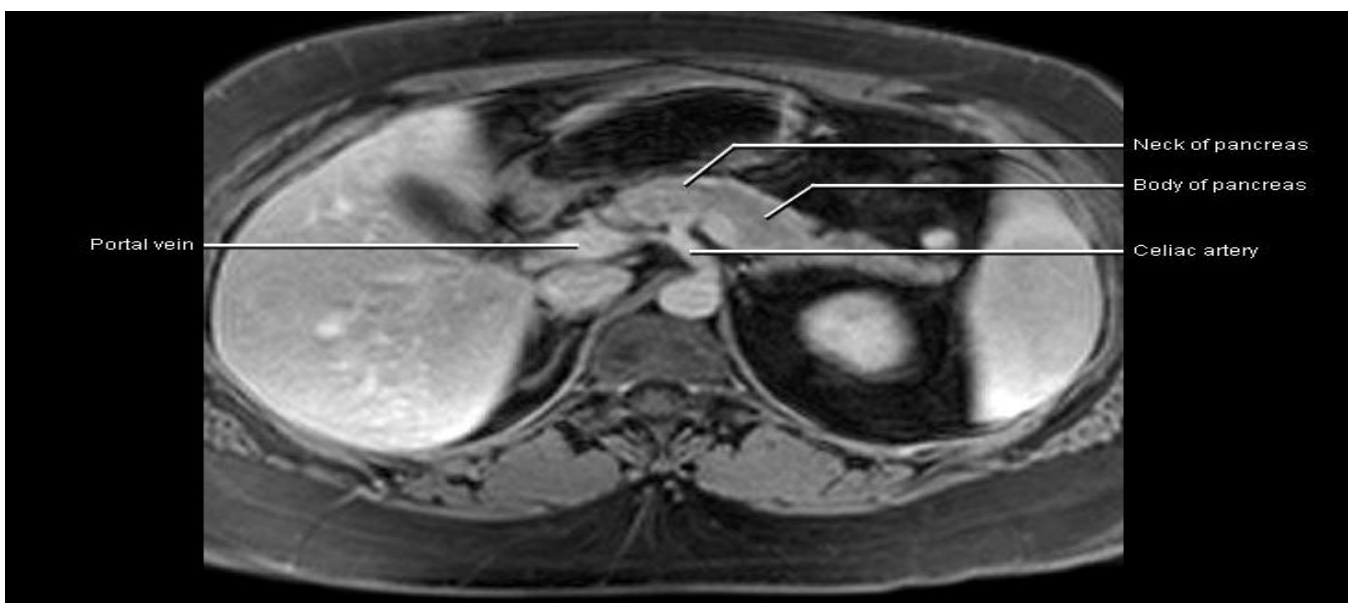
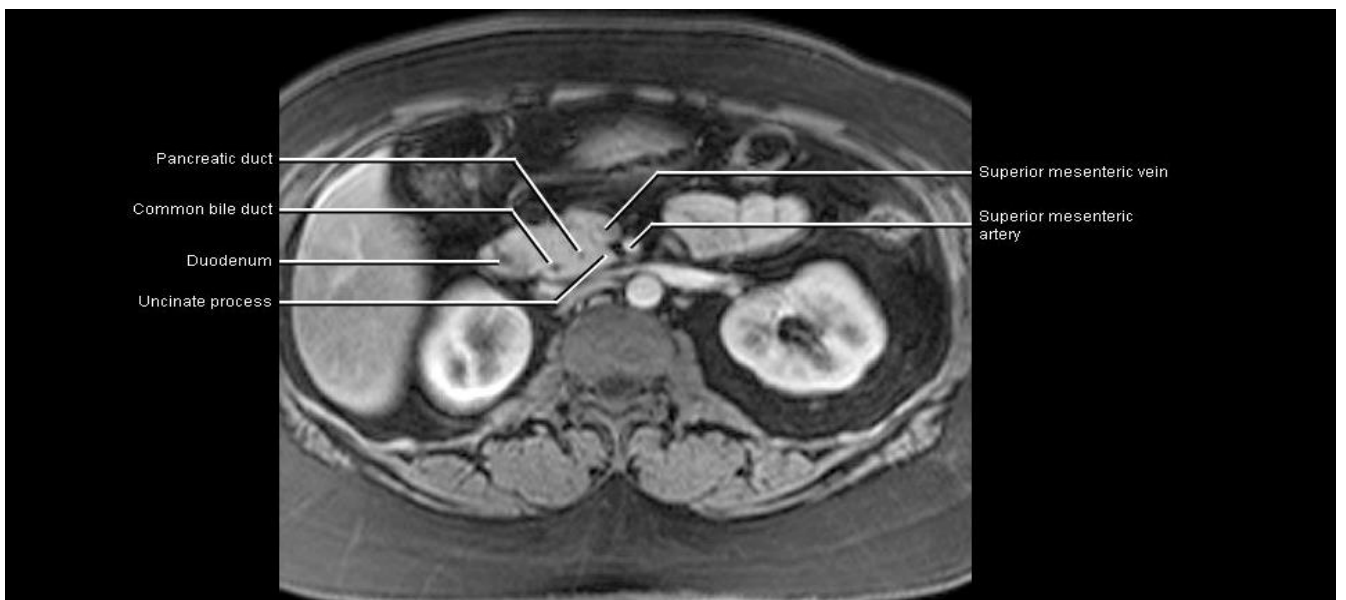
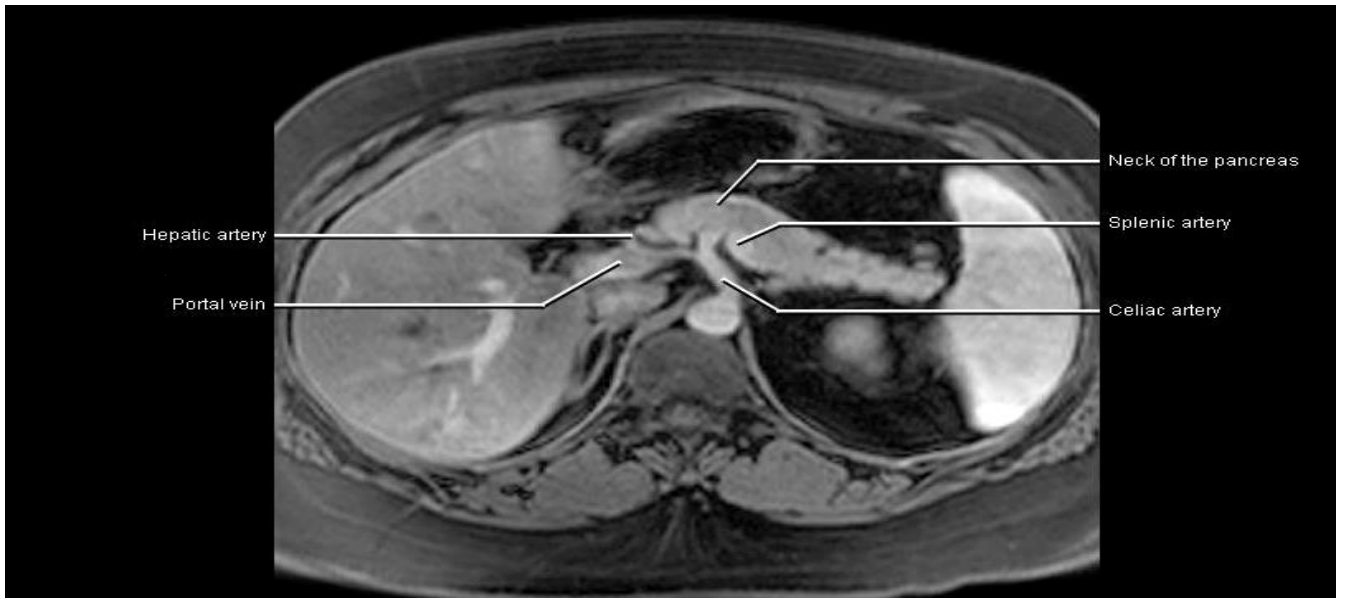


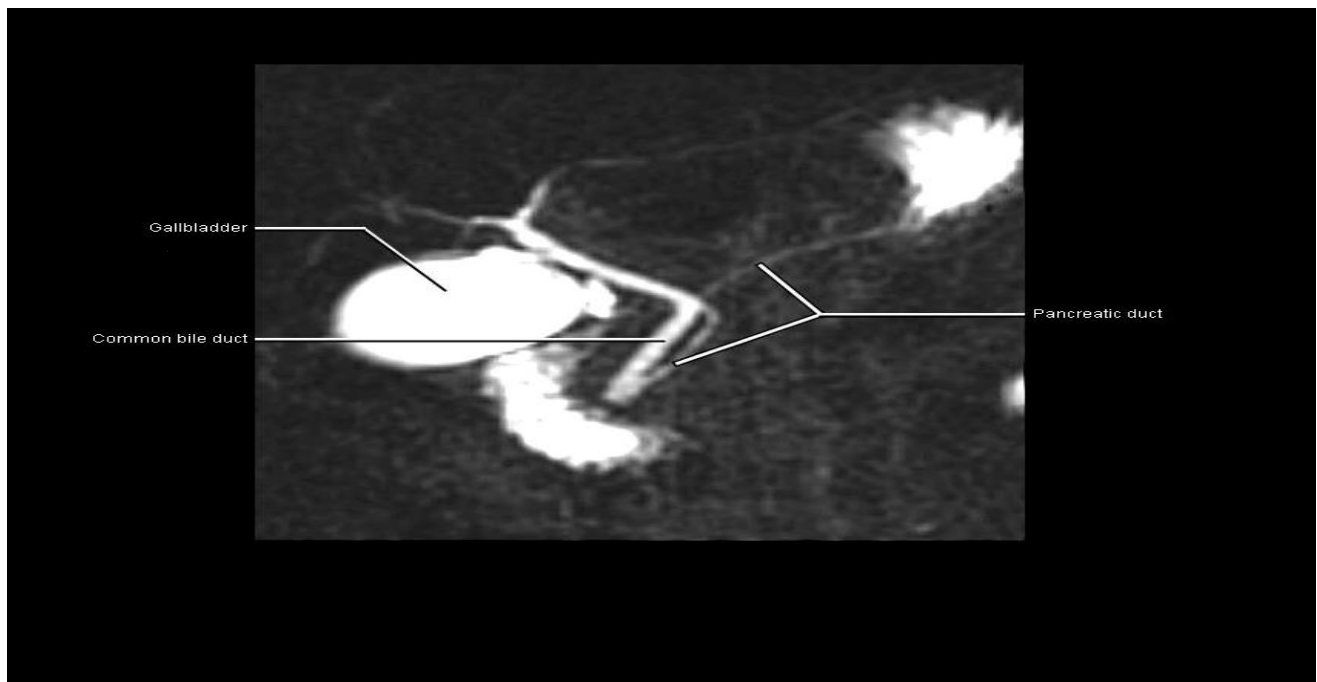
MRI

- Magnet
- RF coils
- Computer



.A landmark for the pancreas is that the splenic vein is posterior to it





MRCP: we can assess biliary radicals by MRI without the need of endoscopy

SUMMARY

The investigations that we use in hepato-biliary system:

1. Ultrasound: **The best modality for biliary stones.**
(In case of CBD obstruction the CBD will appear Bigger than Portal Vein)
2. COMPUTED TOMOGRAPHY
3. MRI (Magnet, RF coils ,Computer)
4. In abnormal Appendix: the wall thickness +3, the tubular Diameter +6(Dilatation) and hyperdense(Appendicolith).
5. The Splenic Vein lies posterior to the pancreases and serve as a landmark.
6. MRCP: is a non-Invasive MRI imaging to assess the biliary tree.

Questions

- 1) A patient presenting with acute abdomen and is suspected to have gall stones,whats the initial Diagnostic abdominal imaging to evaluate the patient?
 - a. CT-Scan.
 - b. MRI.
 - c. X-ray.
 - d. Ultrasound.

- 2) A young Female presented with acute abdomen and jaundice. Her pregnancy test was positive,whats the safest modality in her condition?
 - a. CT scan with oral and IV contrast.
 - b. CT scan without contrast.
 - c. Endoscopic retrograde cholangiopancreaticogrphahy(ERCP)
 - d. Magentic Reasonance choalngiopancreaticography(MRCP)

432 Radiology Team Leaders

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Answers:

1st Questions:D

2nd Questions:D

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