Case Study 1

A 22 year old female arrives from Emergency for a routine Abdomen/Pelvis CT scan. The patient's history is RLQ pain for the past 48 hours, the physician is querying appendicitis.

The patient's chart indicates her blood creatinine level is normal; she is non-diabetic and a non-smoker; her pregnancy test is negative; she weighs 60 kg.

1. A) What is a normal blood creatinine range? 40 – 150 µmol/L
   B) Does this patient have any contraindications for IV contrast? No
   C) What is the oral contrast protocol (if any) for this type of scan? 1200 ml telebrix, 1-2 hr prior to scan.

2. Describe the patient position on the table. Supine, feet first

3. What projection is the scout image for a routine Abdomen/Pelvis? AP

4. What anatomy needs to be included on a routine Abdomen/Pelvis scan? Diaphragm -> Rectum

5. Describe the IV contrast protocol.
   A) What type of contrast should be used, ionic or non-ionic? Non-ionic for injection, reduce risk of allergic reaction.
   B) What is the contrast volume? 100-150 ml (100 ml for this patient)
   C) What is the contrast injection rate? 3 ml/sec
   D) What is the scan delay, post contrast injection? 45 sec

6. What are the appropriate kV and mA settings for this type of scan? 120kV, 180-250 mA

7. What are the breathing instructions for this type of scan? Suspend, preferable expiration to prevent pressure on organs

8. What reconstruction planes are used? Coronal & Sagittal

9. What is an appropriate WW and WL for an Abdomen/Pelvis scan? WW 50, WL 400

10. Describe the radiographic appearance of appendicitis on a CT scan. Appendix has an increased diameter and a thickened wall, enhancing with contrast. Surrounded by retroperitoneal fluid.

Case Study 2

A 71 year old male arrives from Emergency for a Head CT scan. The patient's history is LOC (loss of consciousness), disorientation, headache and slurred speech; the physician wants to rule out a bleed or mass in the brain.

1. What type of head scan will the Radiologist choose, enhanced or non-enhanced? Explain why. Non-enhanced as contrast could mask a bleed.

2. Describe the patient position on the table. Supine, head first

3. A) Describe the difference between conventional and helical CT scans.
   B) List one advantage of a helical scan over a conventional scan. Shorter acquisition time, less motion artifact, volume rendering allows better resolution for 3D reconstruction, lower dose.
   C) List one advantage of a conventional scan over a helical scan. More accurate data, volume rendering not used.

4. What anatomy needs to be included on a CT head? Skull base -> vertex

5. What is an appropriate scan field of view? Small, 240 mm

6. What are the appropriate kV and mA settings for this type of scan? 120 kV, 100-150 mA

7. What algorithm(s) are used for acquisition and reconstruction? Standard (ST) and bone

8. What is the reconstruction thickness and increment for this type of scan? 3 mm x 2 mm

9. What is an appropriate WW and WL for a CT head scan? Standard: WL 50, WW 200. Bone: WL 200, WW 2000

10. The following image is from this patient's CT scan.



A) What plane is this image in? Axial

B) What pathology is seen?

Subdural hematoma with mass effect

Answer Key for CT Questions

1. Site Dependant

2. *Anterior to posterior*

3.Bone +1000; Fat -100; Blood+20; Air -1000

4. Site Dependant. Approximately: 80/40-Head; 2000/500 - Bone; 1500/-700 – lung; 400/40 – Mediastinum; 350/50 – Abdomen; 700/80 - Angio

5.Window Width - Contrast

6.Window Level - Brightness

7. *A reconstruction is the structuring of a scan's raw data using algorithms/kernels and displayed with specific windows and other parameters. These are the basic axial images of the scan. A reformat is the manipulation of a reconstruction, usually into a different plane.*

8. Axial – Slice by Slice, essentially view what you acquire. Helical – Volume of data acquired as patient moves through gantry continuously. View what the computer reconstructs as a slice.

9. Axial Plain Head scans. Premonitoring/monitoring scans for Bolus tracking. High Resolution Expiration cuts. Angled scans.

10. For measuring the HU's within the area of the ROI. Bolus tracking, checking composition of anatomy (adrenal gland, mass)

11. To reduce the chance of further renal impairment/failure as an elevated creatinine can be a sign of renal insufficiency.

12. If the patient is in full renal failure and receives dialysis, this process will serve to remove the contrast from the circulatory system.

13. A

14. A

15. C

16. C

17. C

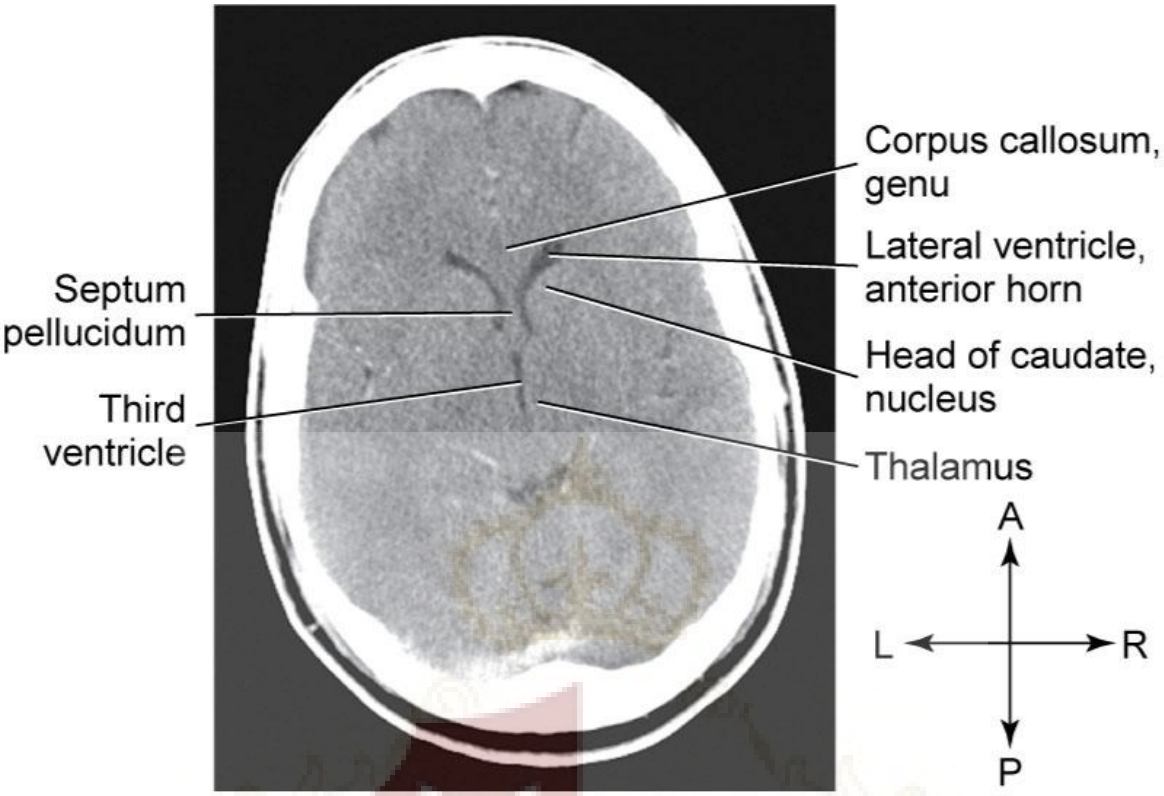
18. C

19. B

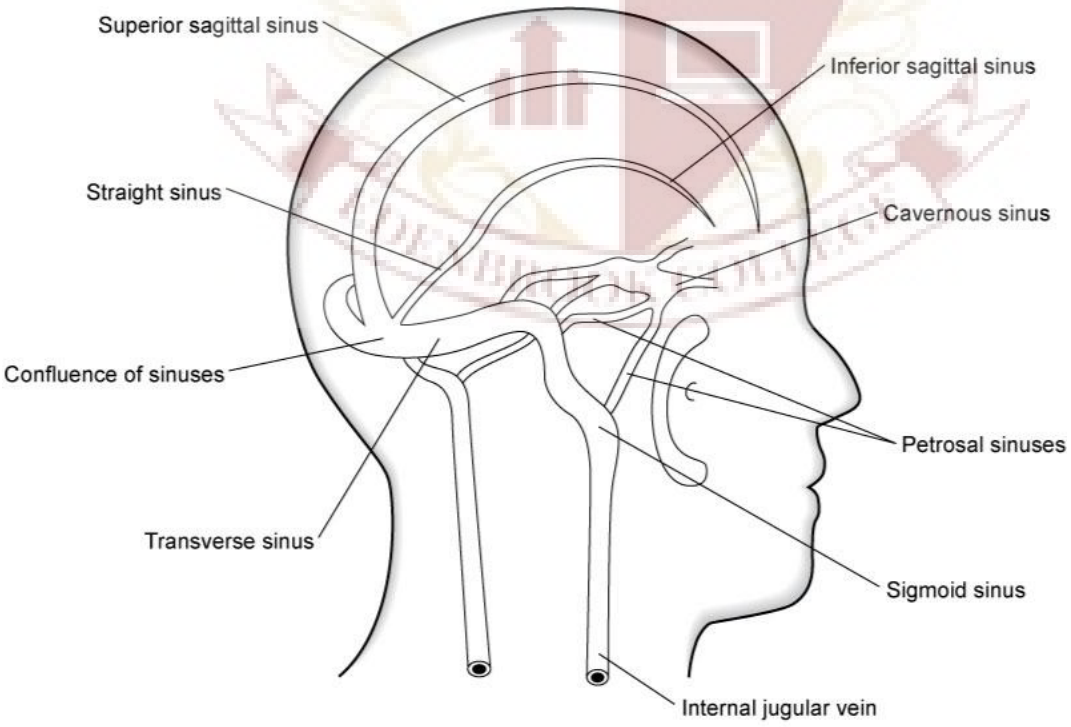
20. A

21. A

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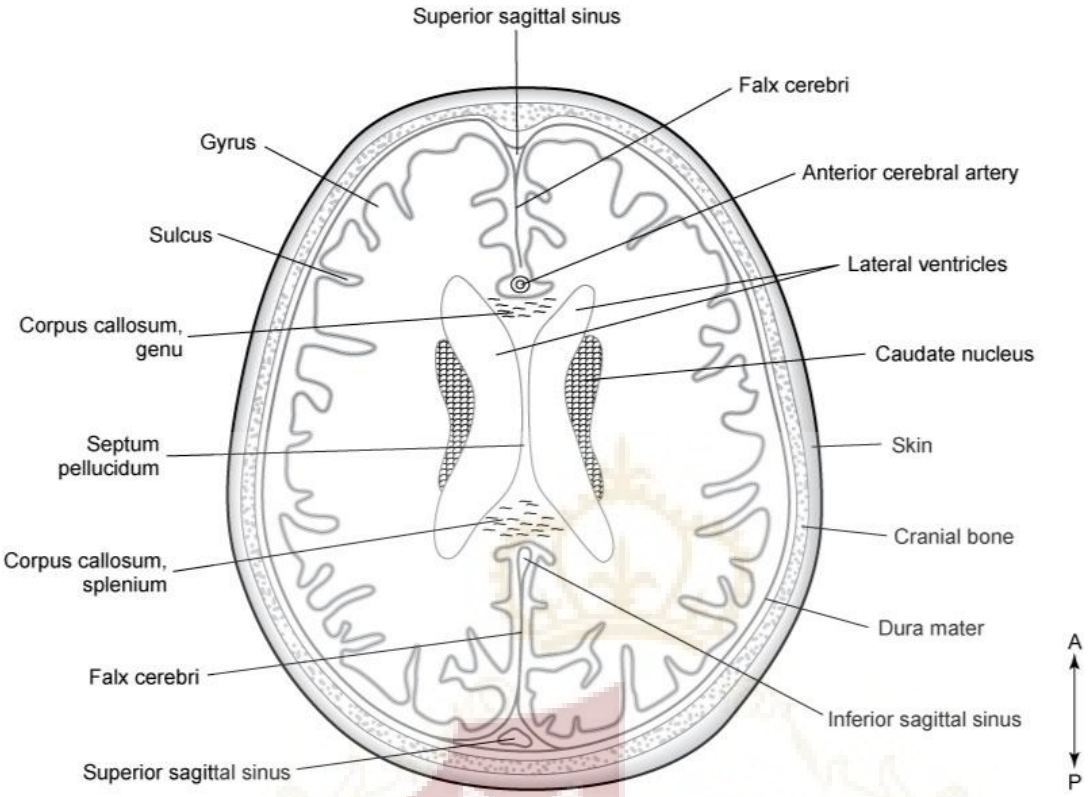


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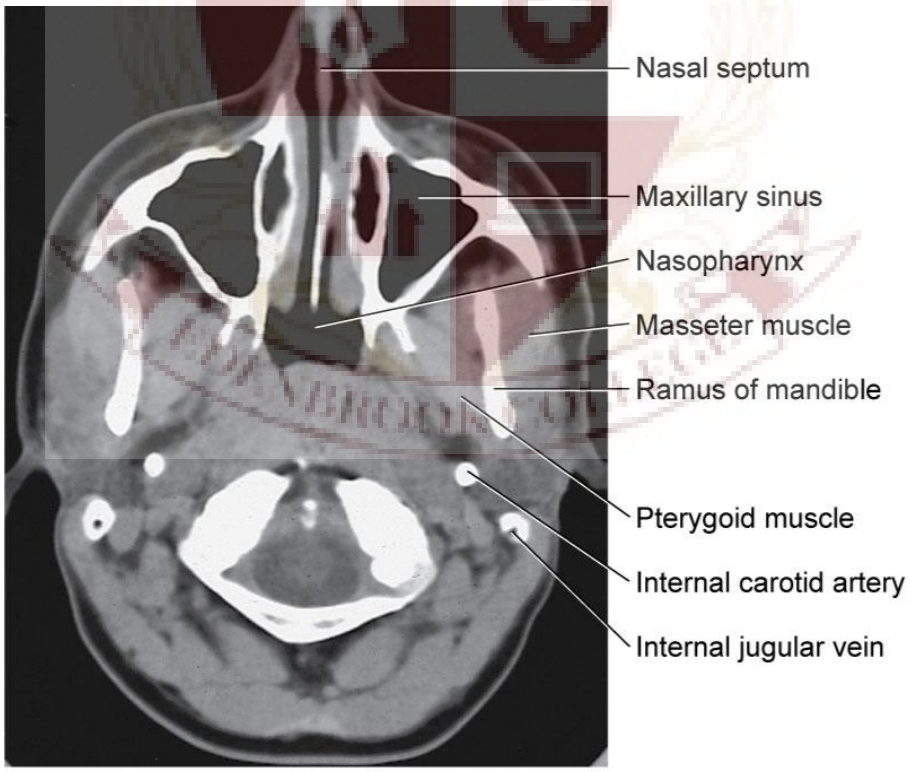


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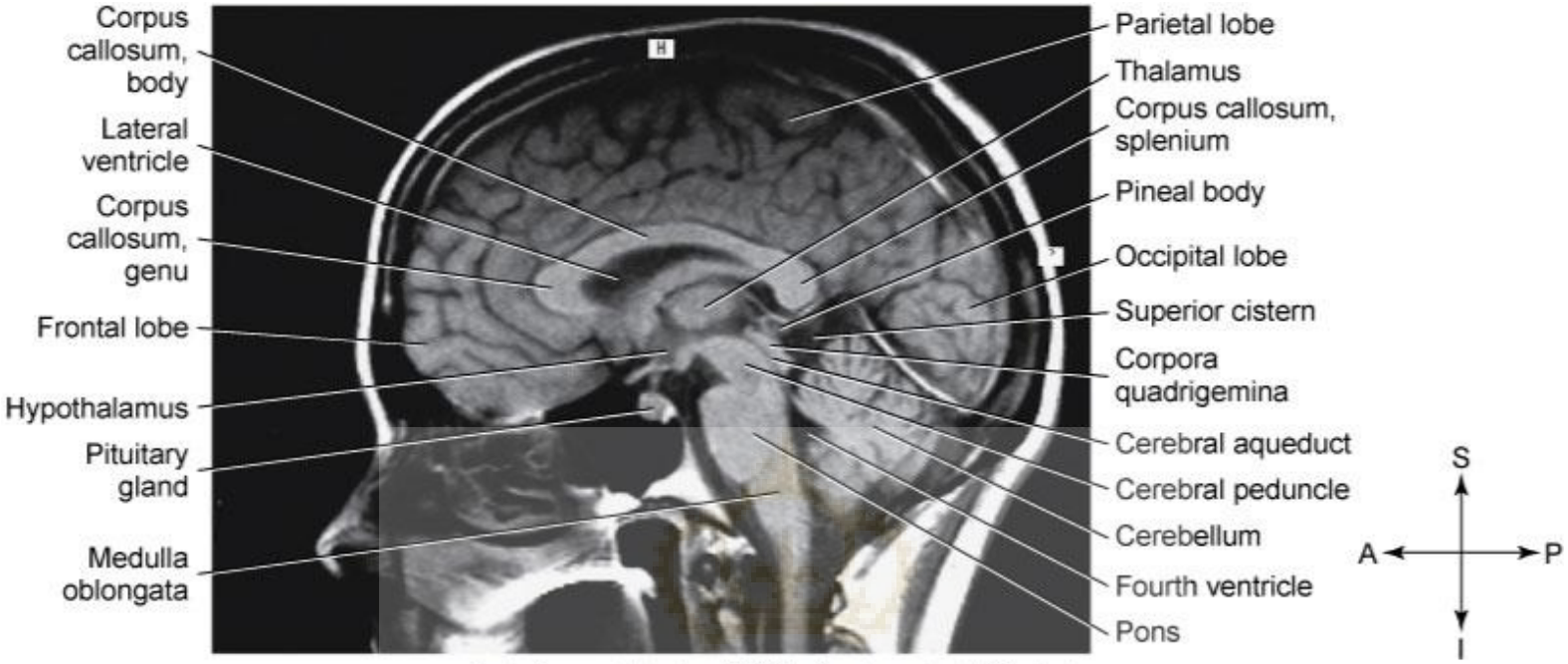


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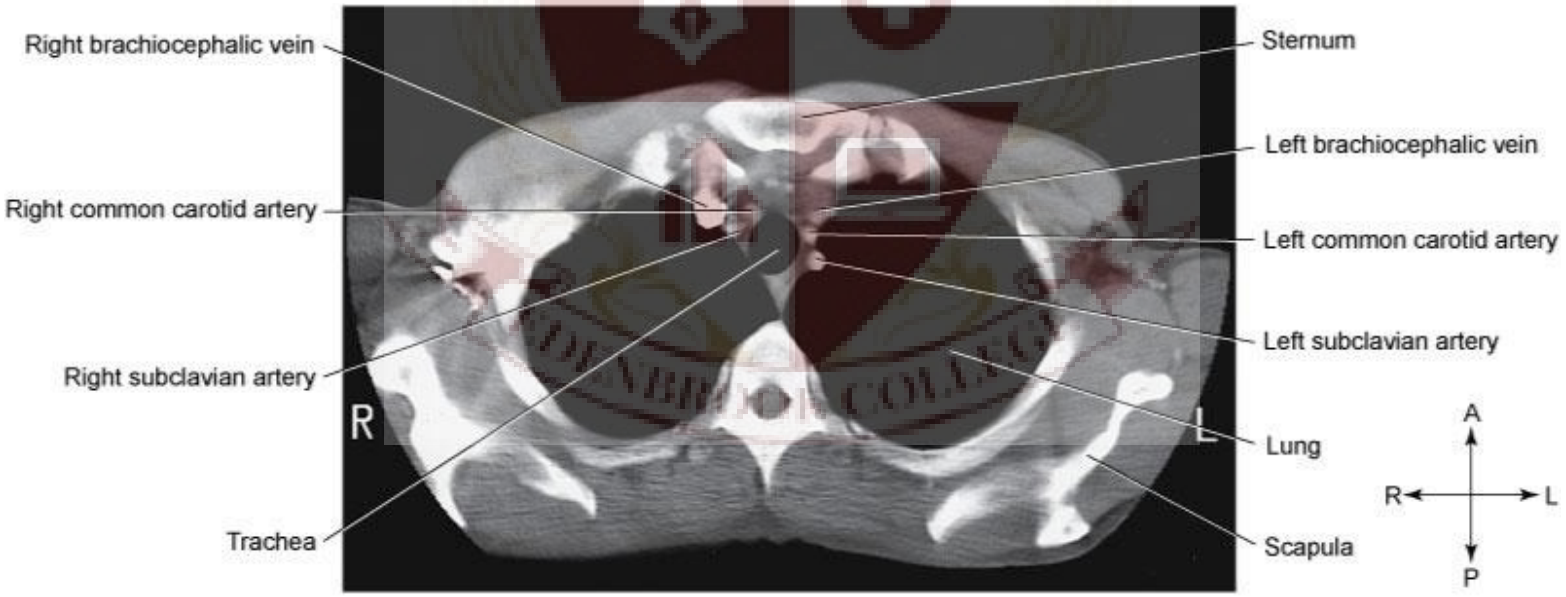


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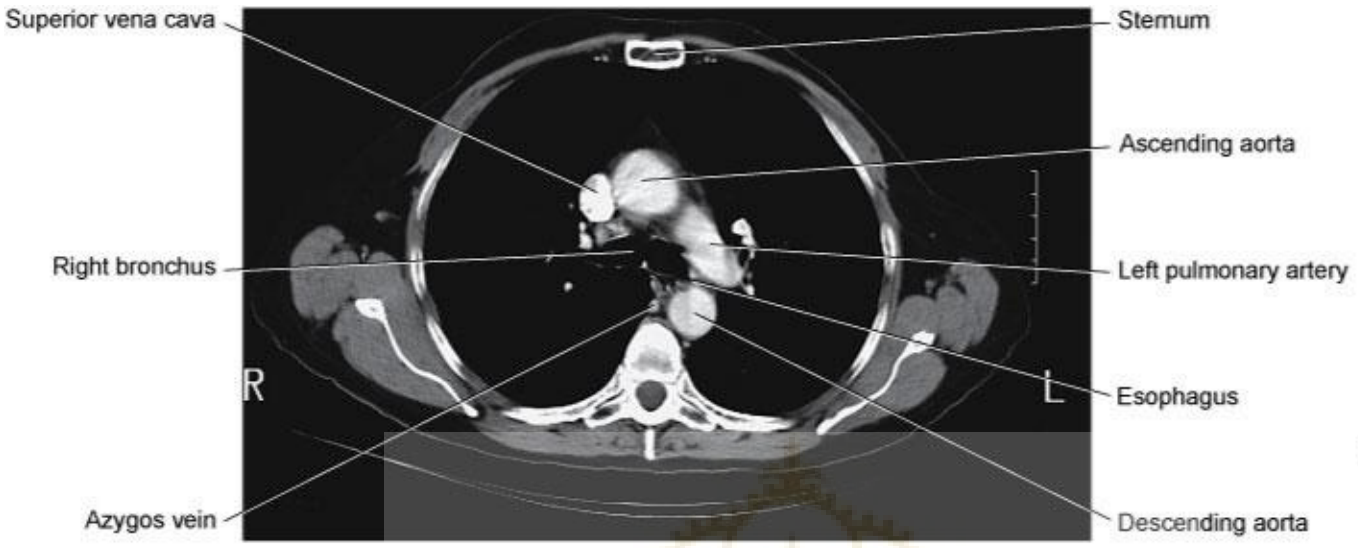


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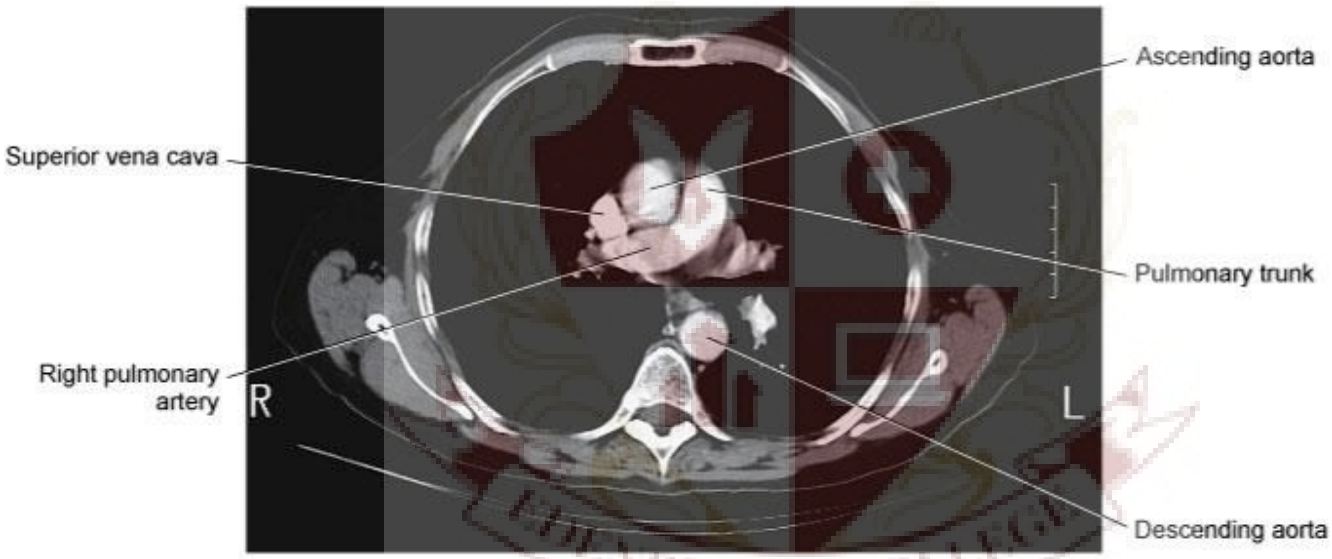


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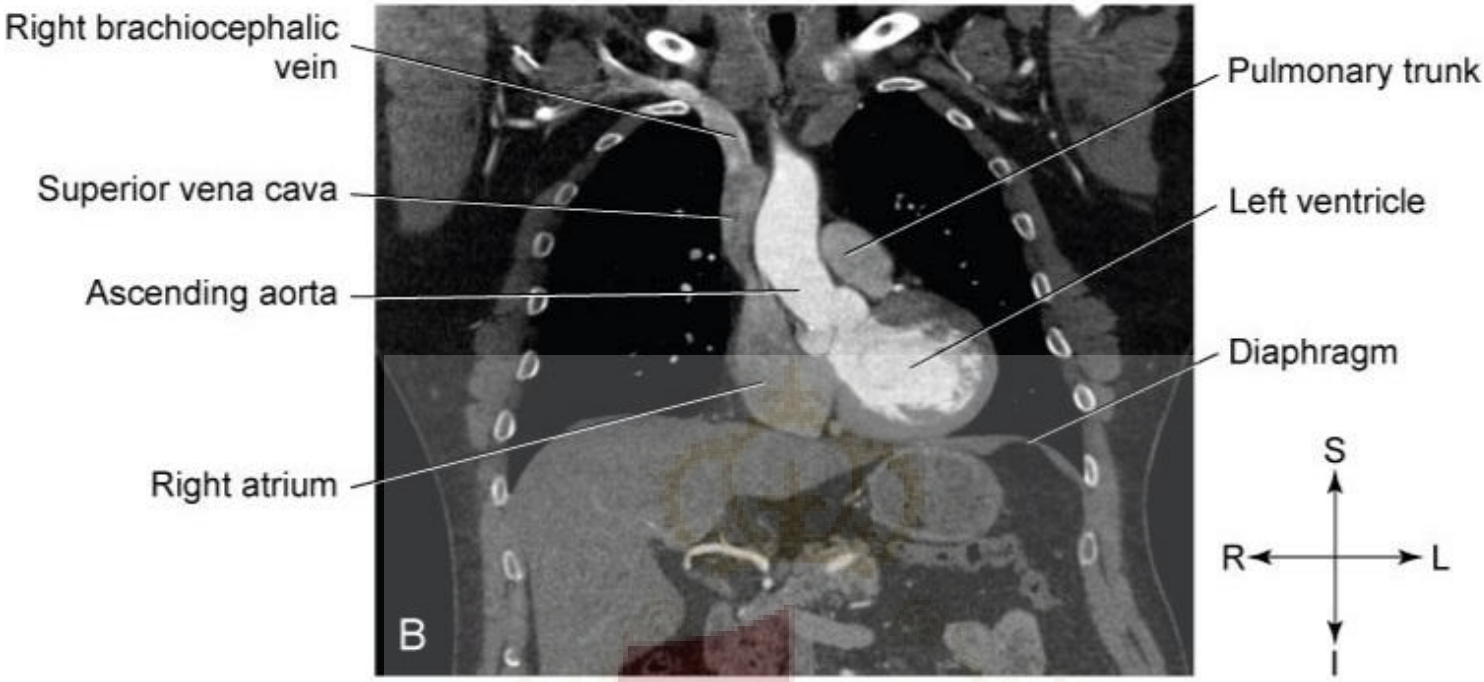


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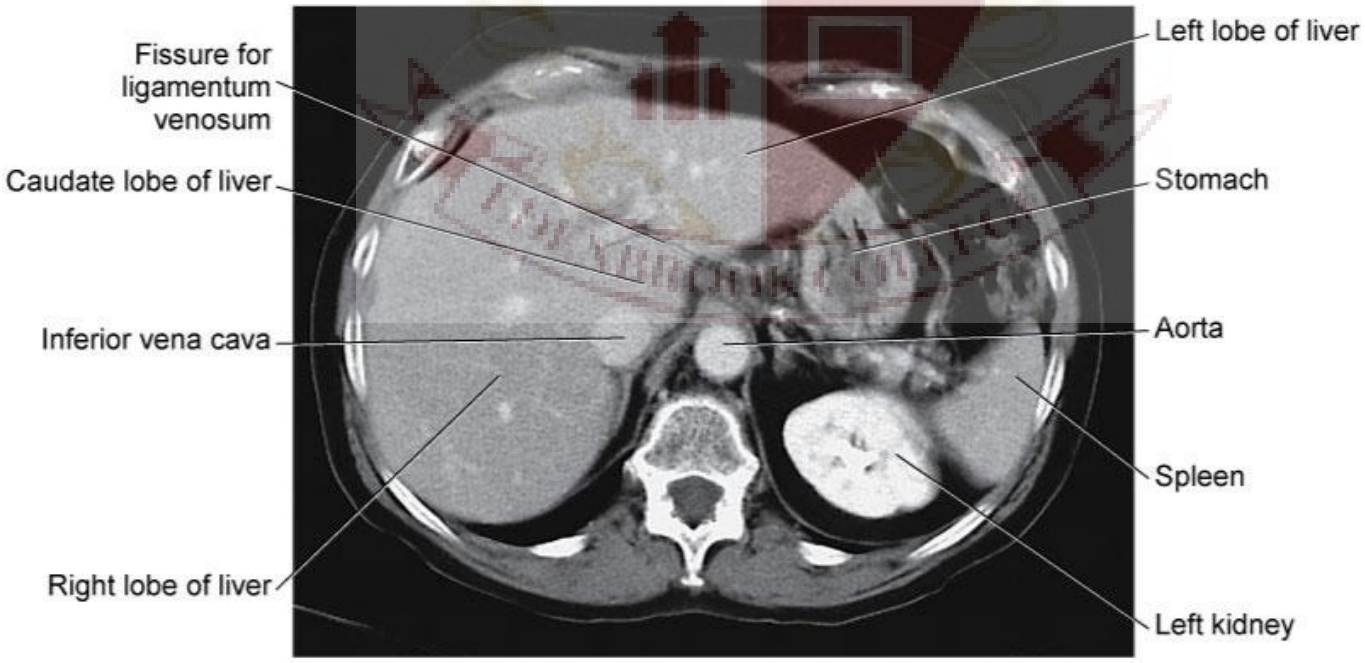


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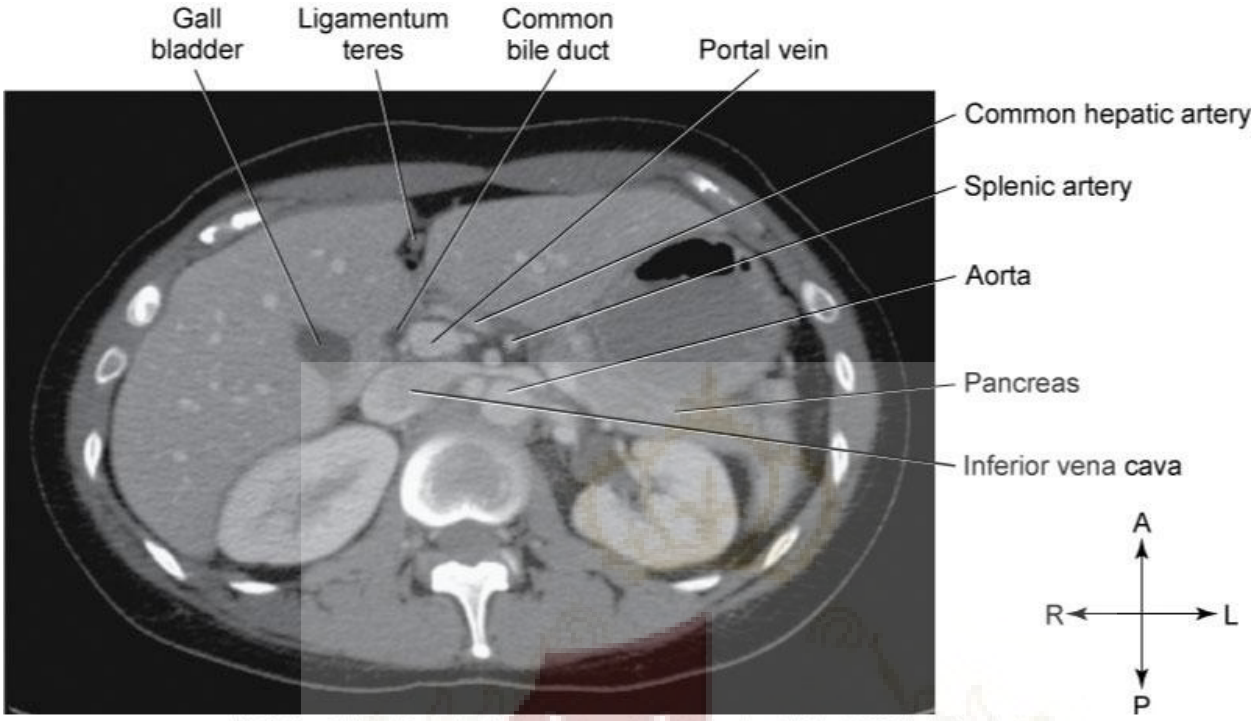


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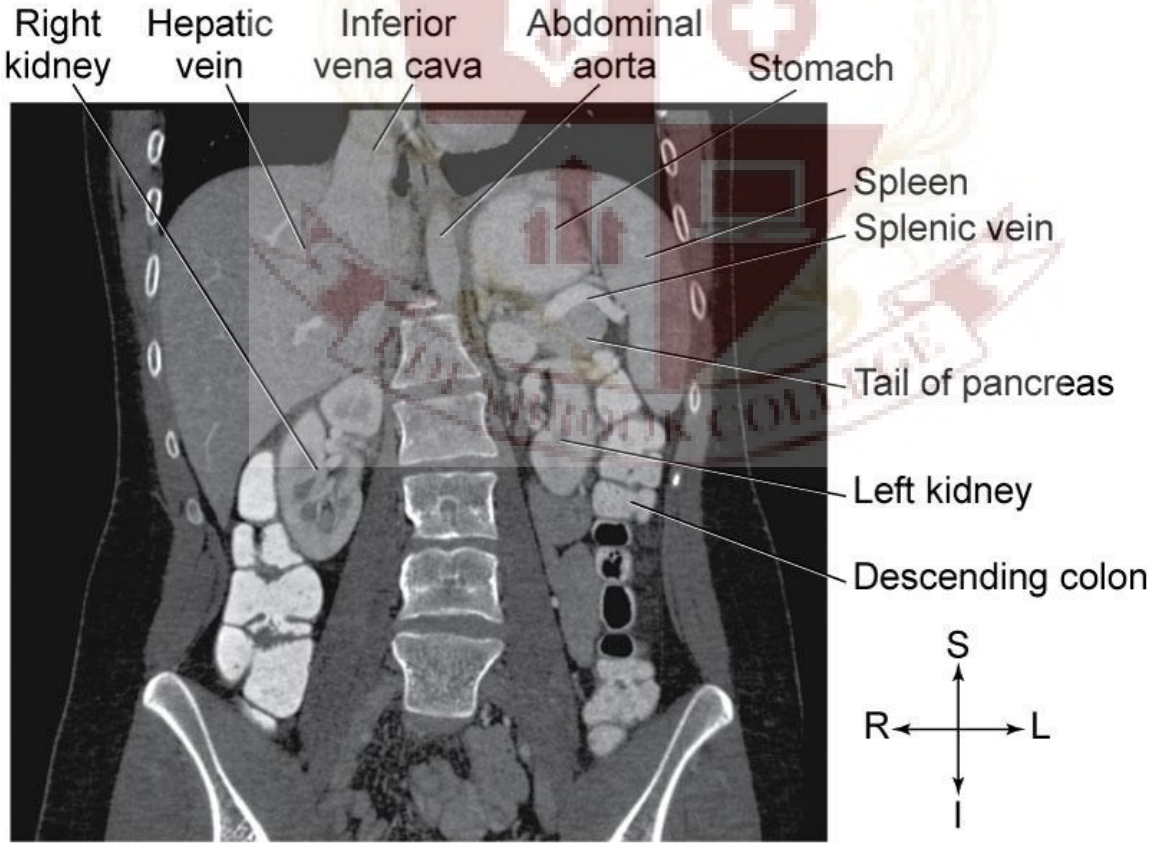


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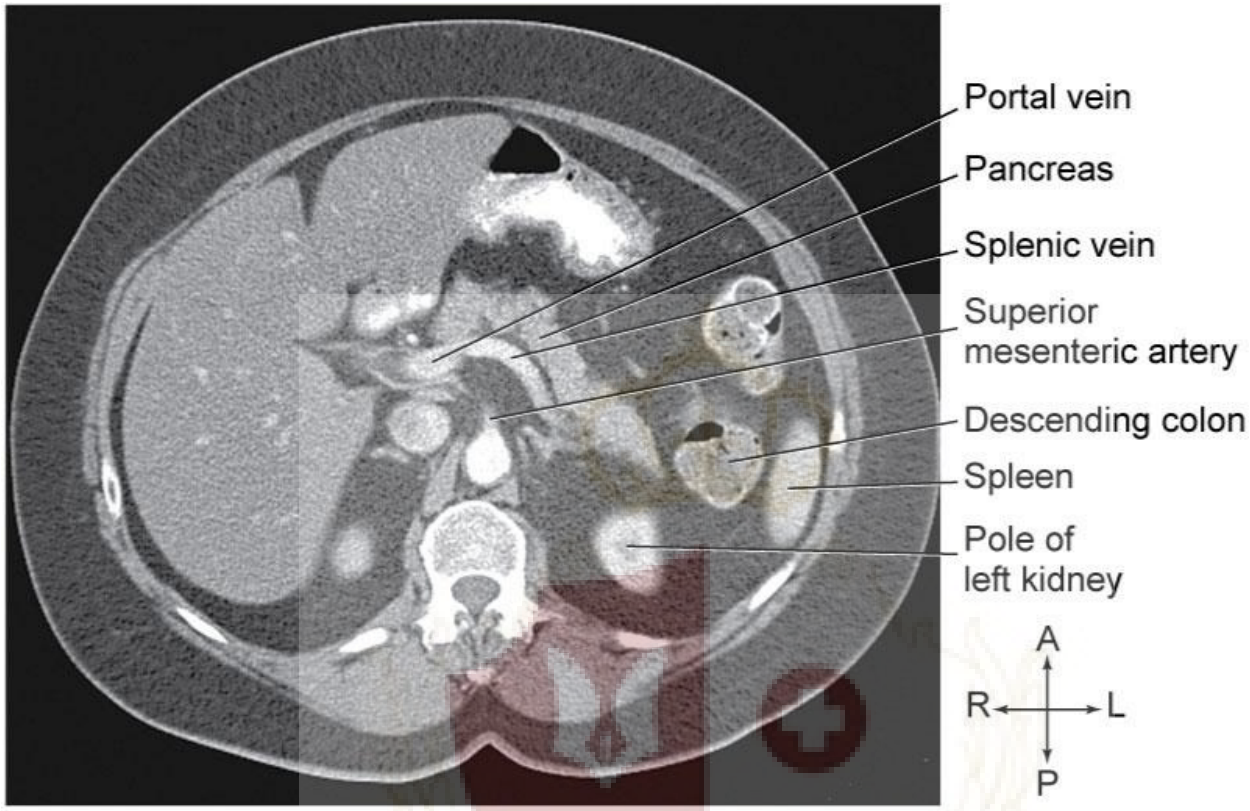


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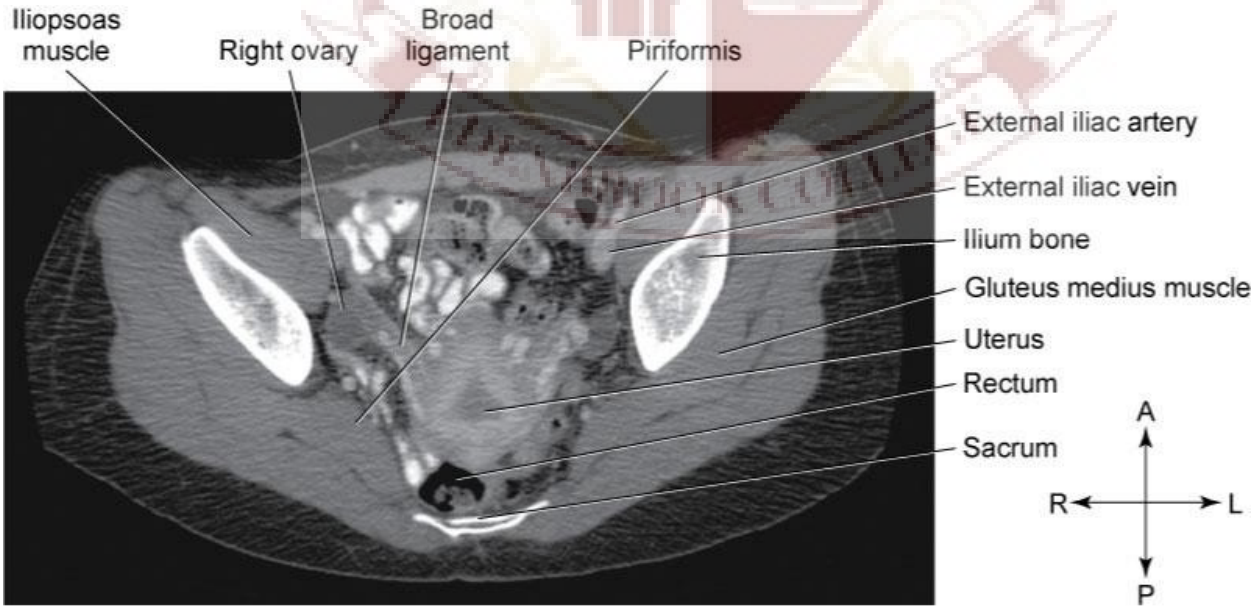


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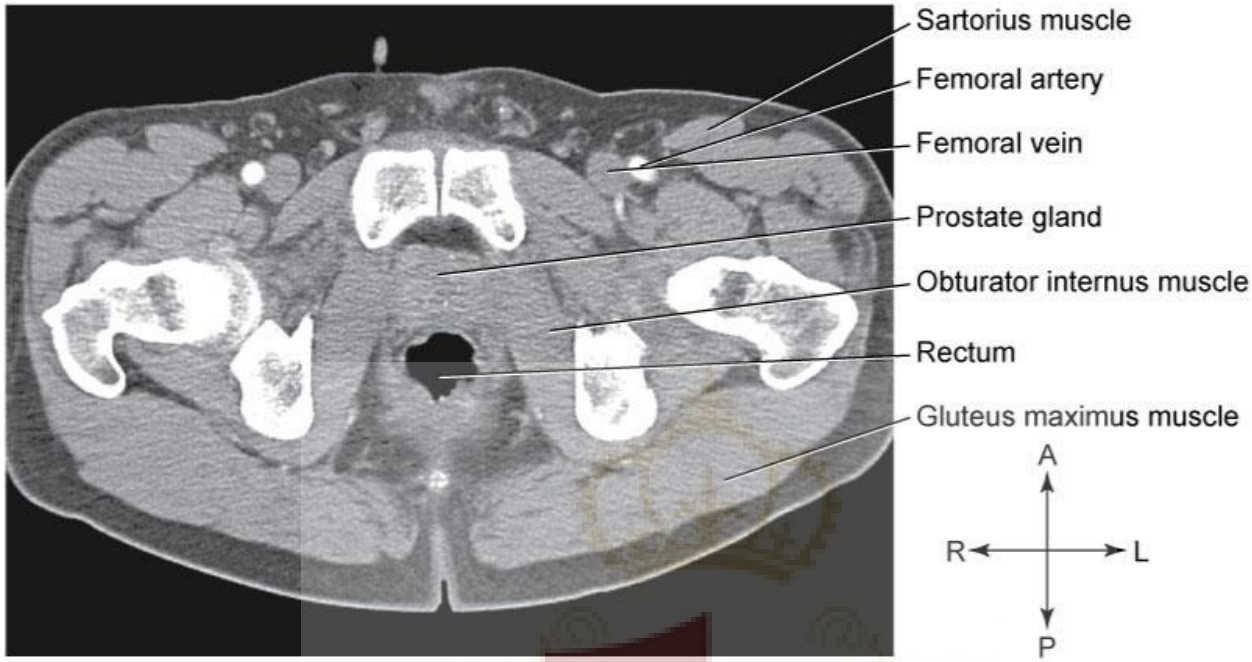


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