



Cross sectional anatomy: Thorax / Abdomen



I-Klic I

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Learning points

- technical basics of cross sectional imaging
- Basic anatomy of the thorax and abdomen for use in cross sectional imaging
- Examples of thoracic and abdominal CT pathology



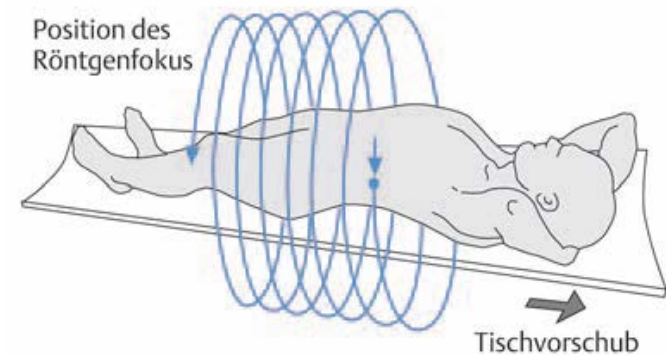
What are the possible techniques for cross sectional imaging?

Computertomography (CT)

Body is examined by the use of rotating X-ray tubes



Siemens Healthcare



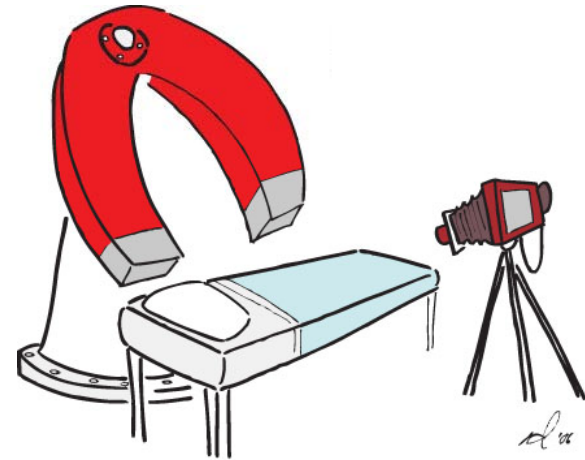
aus: Krug, Thoraxdiagnostik, Thieme 2004

Magnetic Resonance Imaging (MRI)

Imaging based on strong magnetic fields



Siemens Healthcare





What does **CT** mean for the cross sectional imaging?

Used to answer most clinical questions:

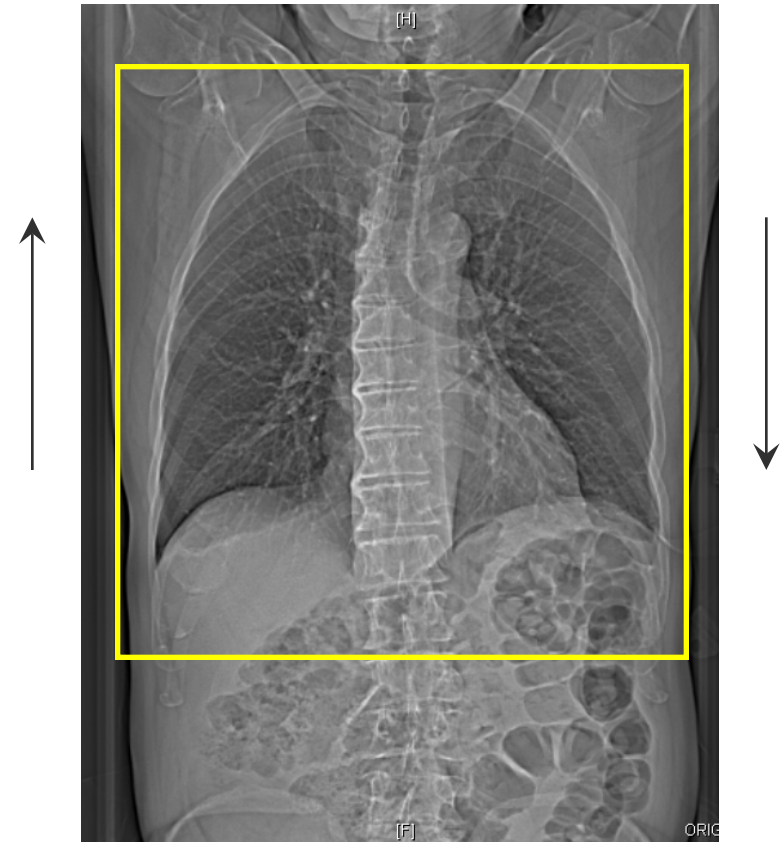
- ✓ Emergency radiology (quick imaging of the whole body)
- ✓ Oncology
- ✓ Pulmonary lung changes

MRI used for specific questions regarding organs:

- ✓ Heart imaging
- ✓ Liver imaging
- ✓ Biliary duct imaging
- ✓ By absolute contraindication for CT (e.g. strong allergic CM reaction)

Thorax-CT

- Start approx. 2 cm above the sternal notch to diaphragm
- Spiral-CT-technique in caudocranial or craniocaudal direction
- Slice thickness 3(-5) mm
- Deep inspiration with raised arms lying on the back
- duration: < 10 sec



Topogramm (syn. Scout view)

Abdomen-CT

- Scan-Area: diaphragm to iscial tuberosity
- Slice thickness 3-5 mm
- inspiration with raised arms lying on back
- NB: **radiation exposure**
- 10-20 mSv! Depending on scanner type, patient constitution, scan settings, etc.
- If required oral contrast (water, iodine CM)



Topogramm (syn. Scout view)



Which possible ways of utilising contrast media are there?

- Oral and rectal:
 - water soluble, iodine: Amidotrizoat (Gastrografin®)
(*positive CM*) → suspicion of perforation, abscess, fistula
 - Water / Mannitol (*negative CM*) → investigation of gastric/intestinal wall, e.g. tumor, inflammation, ischaemia
- Intravenous (i.v.):
 - CT-angiography (vascular imaging)
 - vascular identification (to differentiate from lymph nodes)
 - interstitial CM-take up (Inflammation and tumor diagnosis)
 - Anionic, low molarity iodine CM = today's standard

What does intravenous contrast media look like?



What does intravenous contrast media look like?

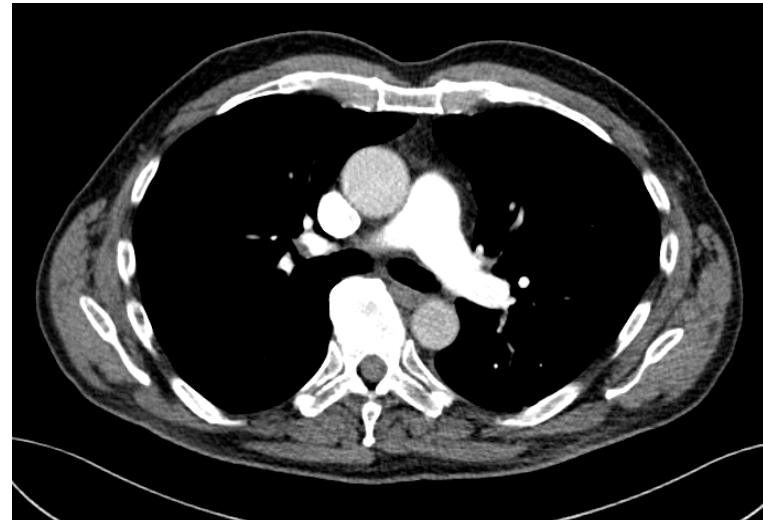
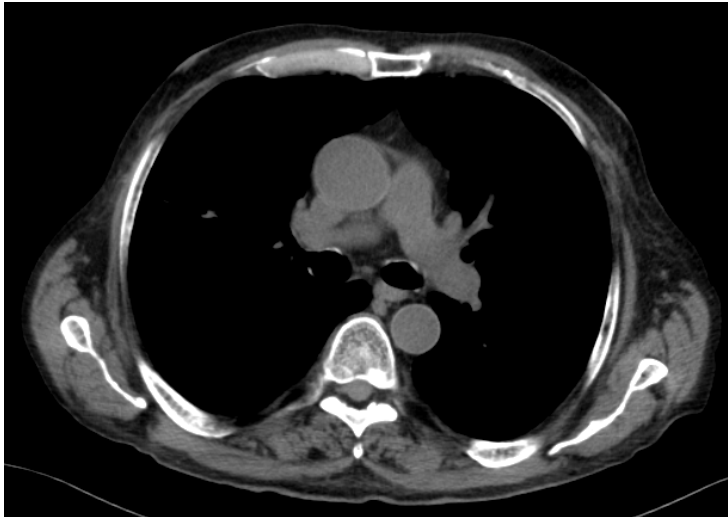


Normal or contrast enhanced ?

Which body region?

CT or MRI ?

What does intravenous contrast media look like?

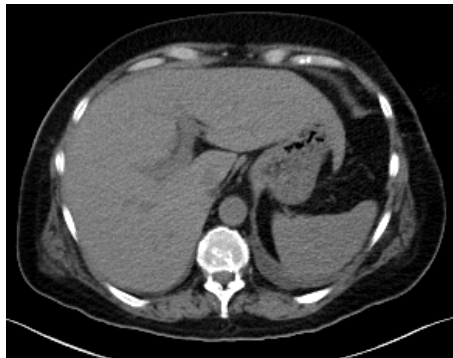


Injection in cubital vein, speed of flow mostly
2-3 ml/s by pump



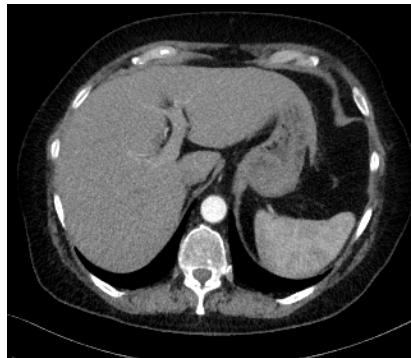
Quelle: Medrad Bayer Healthcare

Upper abdomen - no
contrast



- foreign material
- plaques
- haematoma

arterial – approx 20 s
after start of injection



- arteries
- hypervascular
lesions

Portal vein –. 60-90 s
after start of injection



parenchymal phase

- Lesions
- portal vein

Urological phase –
5-15 min after start of injection



- drainage

Window Settings

The depth of grey scaling within a CT ranges from -1000 to +3000, however the human eye can only differentiate between 30 - 40 greyscales.

Pulmonary-window

1500 / -500

Soft tissue -window

350 / 50

bone-window

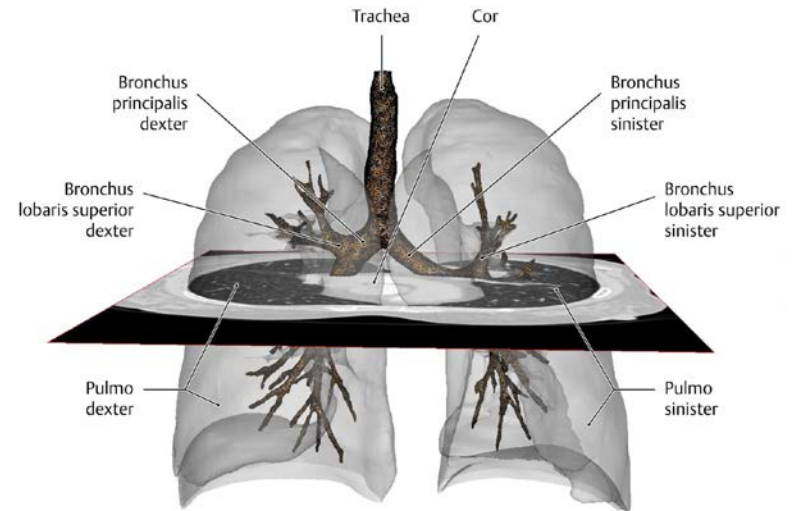
2000 / 200

Window width W / window central C

→ The window settings must therefore be appropriate for the structures being analysed.

Conventional view is from
the foot of the patient

→ the left side of the
image is the patient's
right



Thieme Radbase

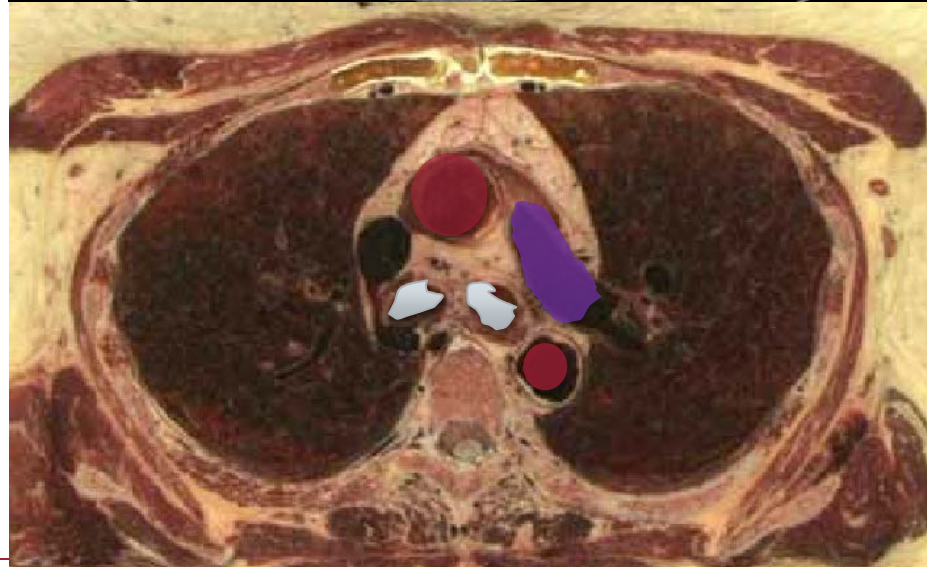
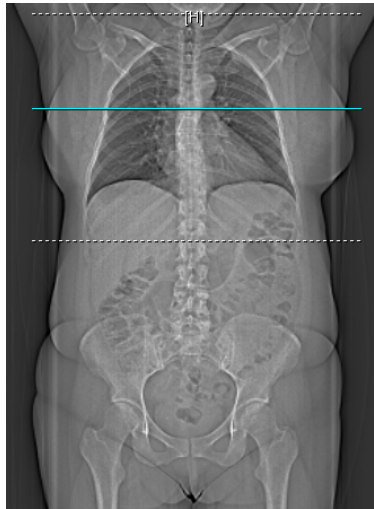
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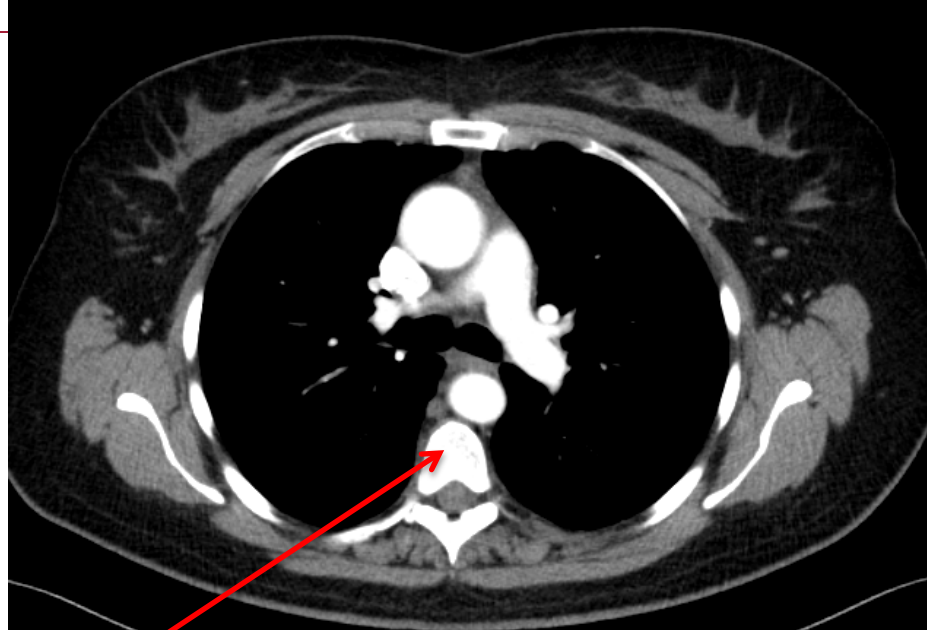
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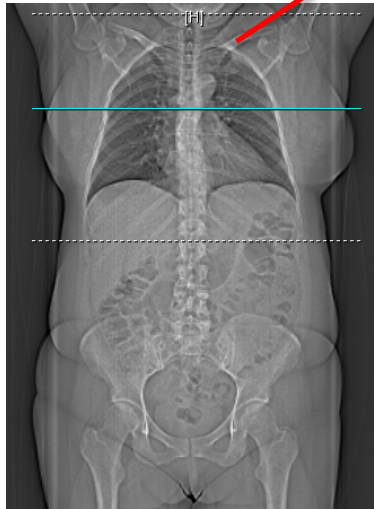
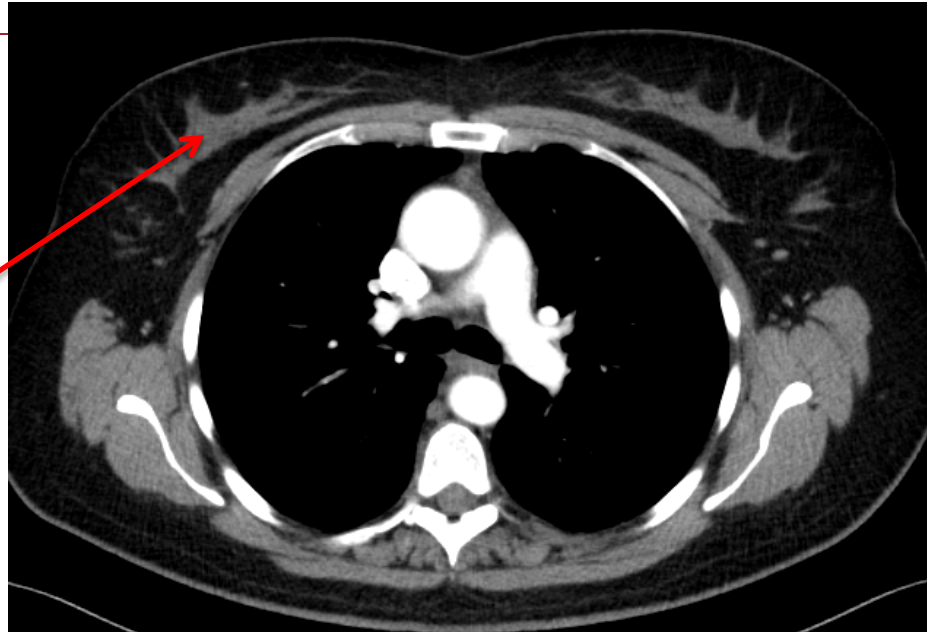


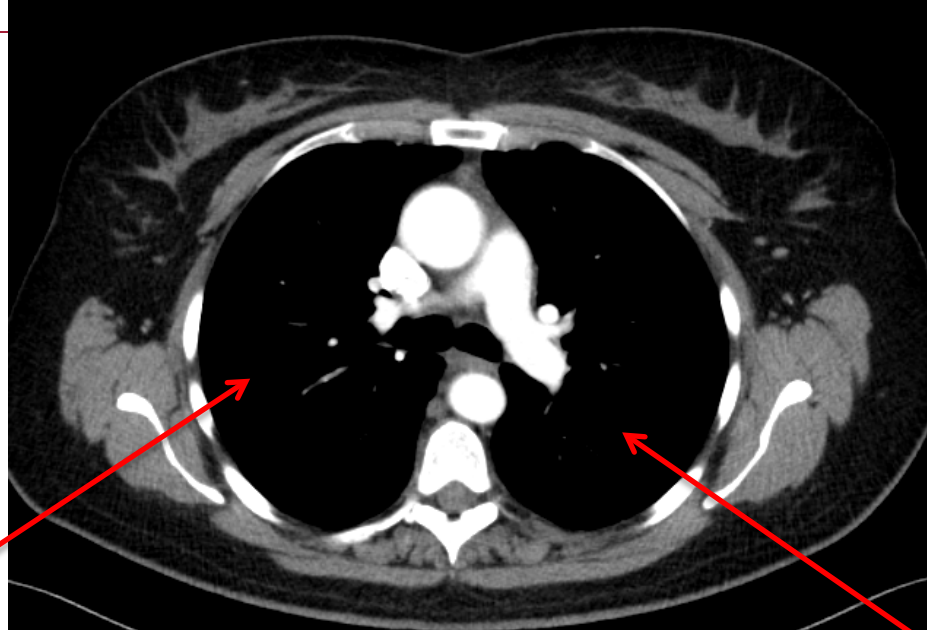
Anatomy of the Thorax

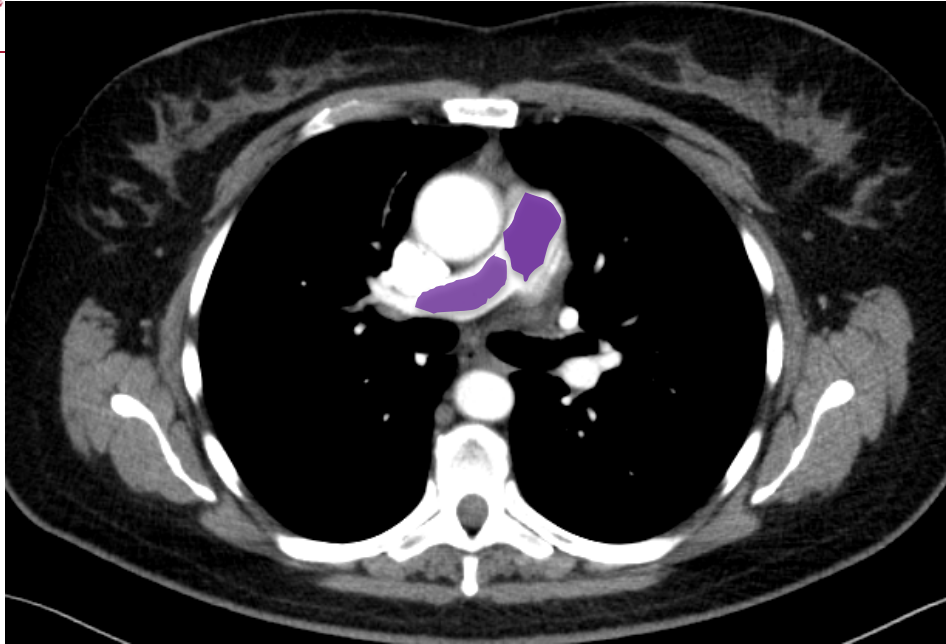


Ascending Aorta
Descending Aorta
Pulmonary trunk
Left pulmonary artery
Main bronchi
Carina

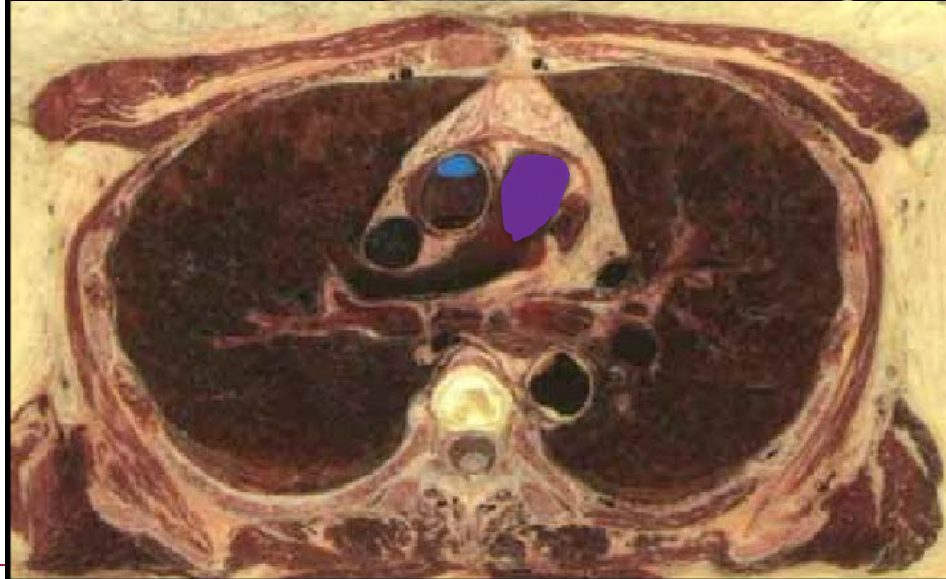


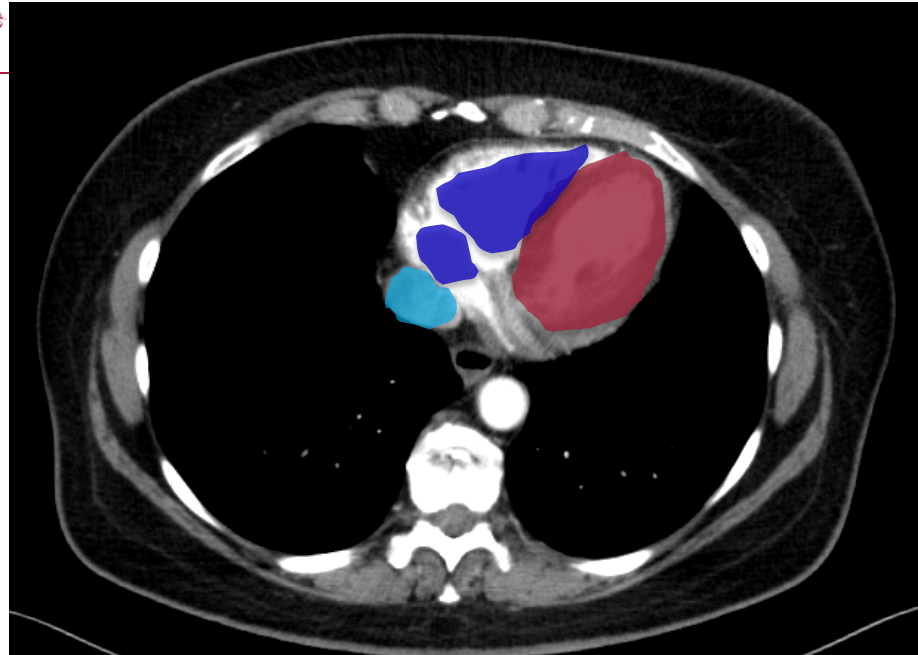




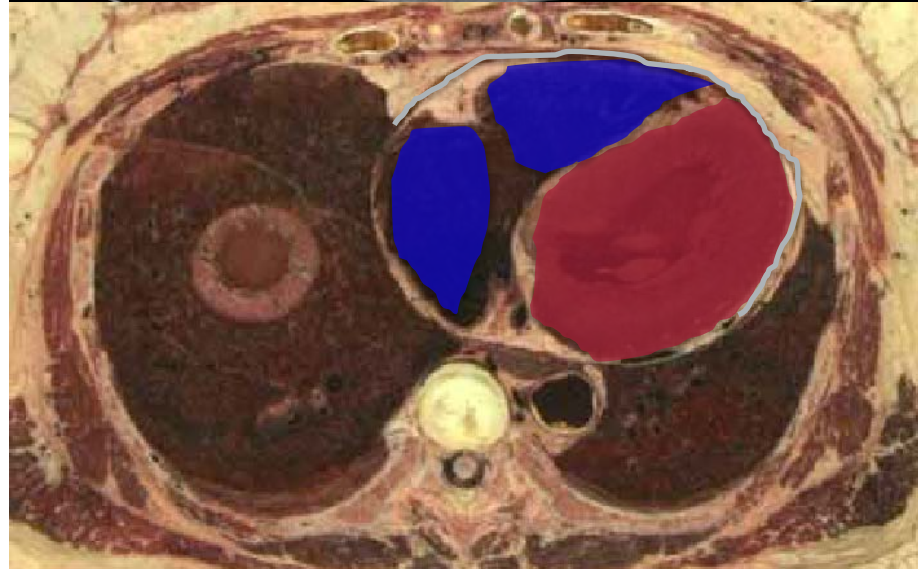


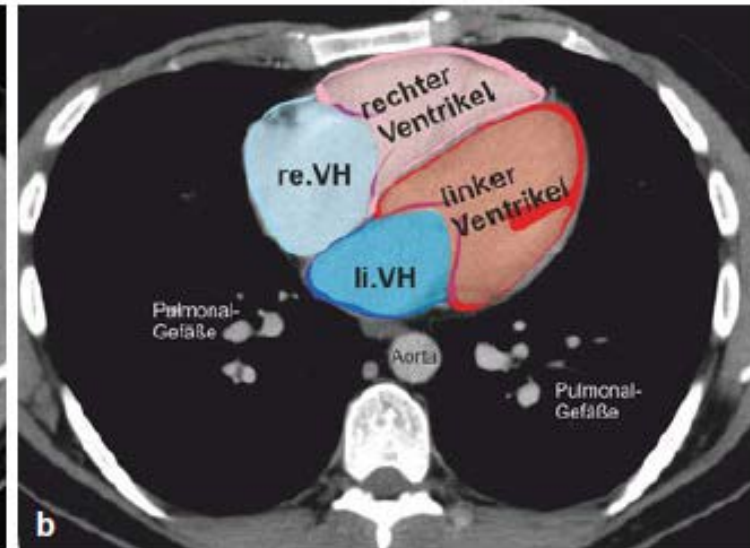
Pulmonary trunk
Right pulmonary
artery



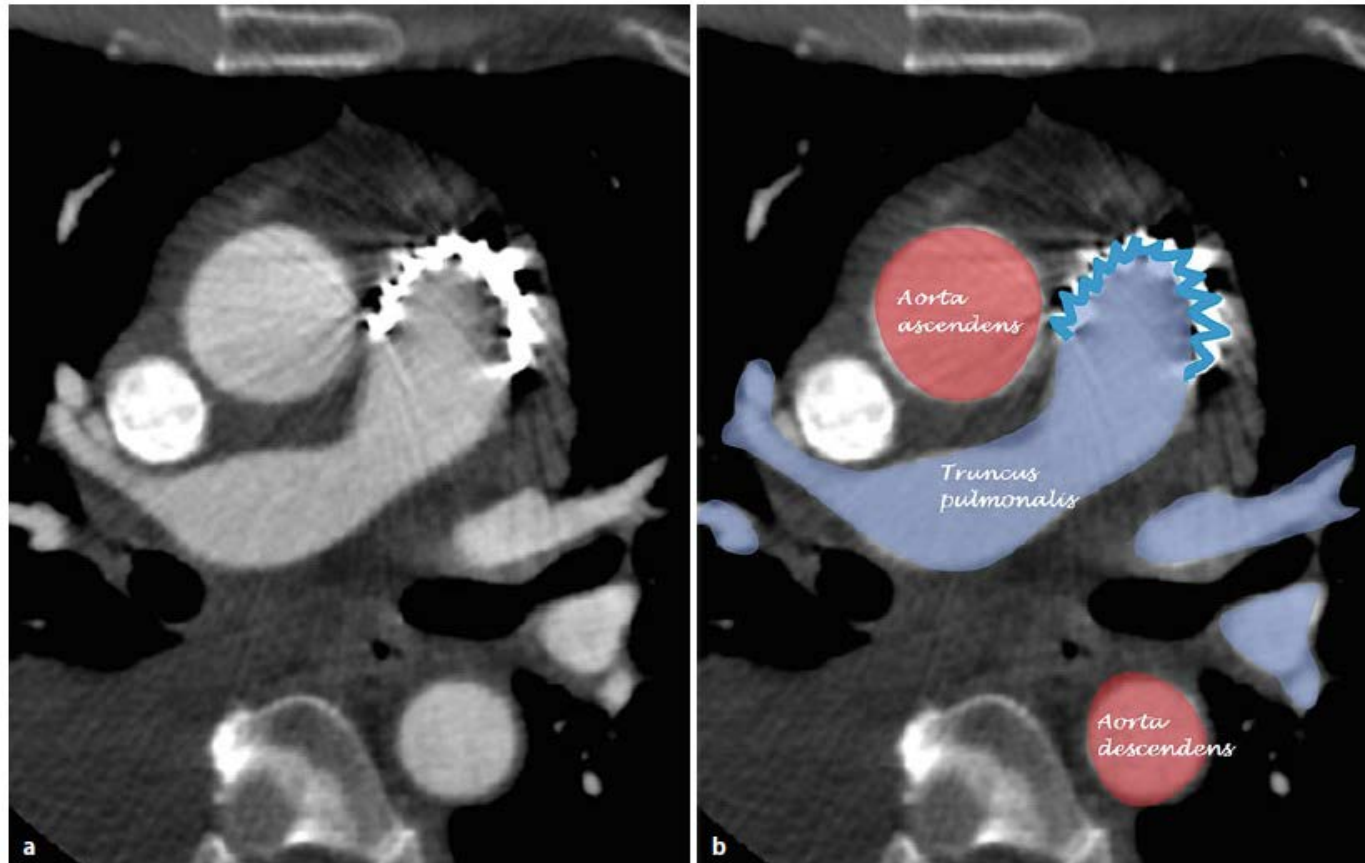


Left Ventricle
Right Ventricle
Vena cava inferior
Right Atrium





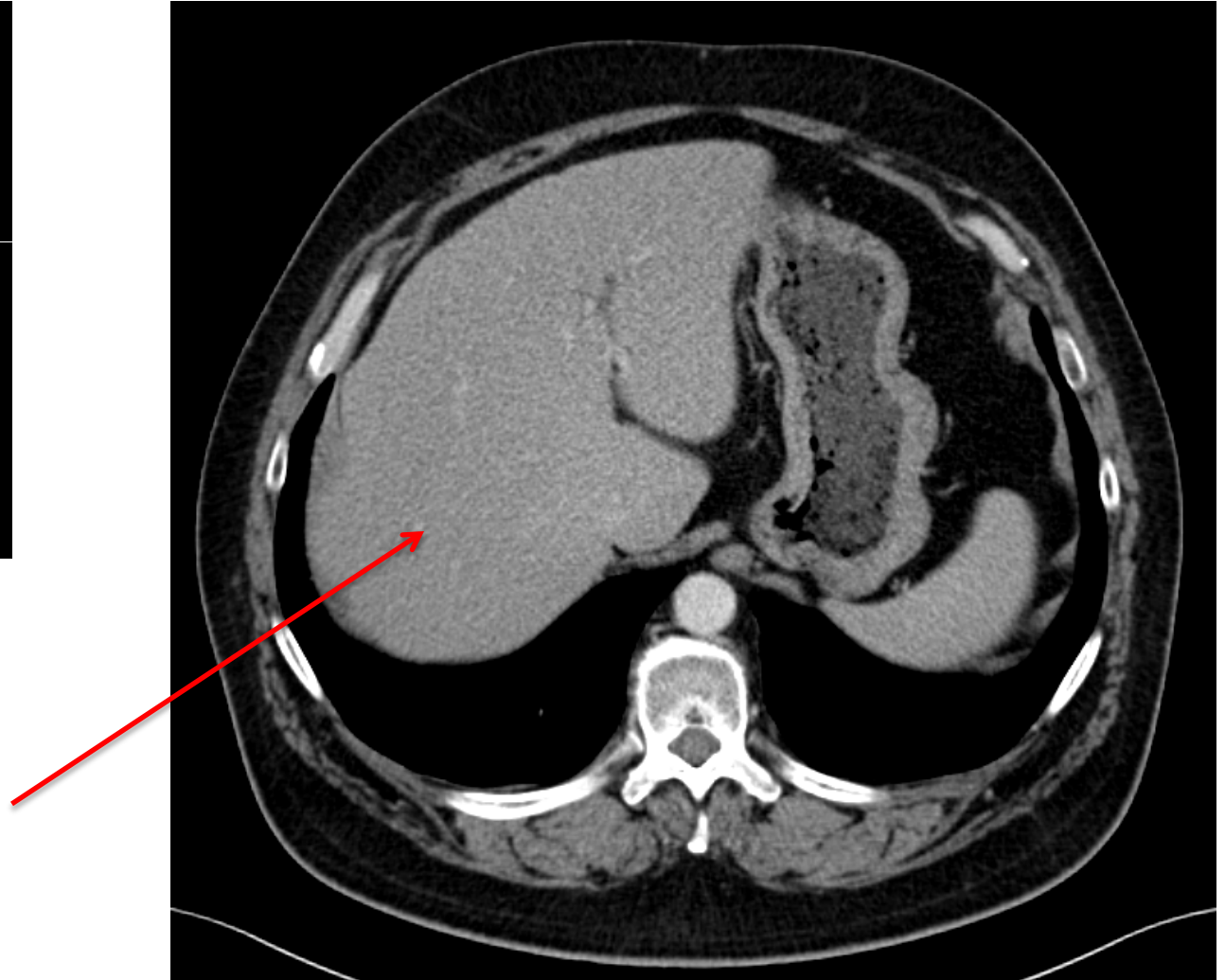
■ **Abb. 4.7a, b** CT-Thorax mit Kontrastmittel. Dunkelrot wurde der linke, rosa der rechte Ventrikel schattiert. Der linke Vorhof ist dunkelblau, der rechte hellblau eingefärbt. Im linken Ventrikel ist sogar ein Papillarmuskel zu erkennen. Die Segelklappen zwischen Vorhöfen und Ventrikeln sind gut sichtbar (lilafarben)

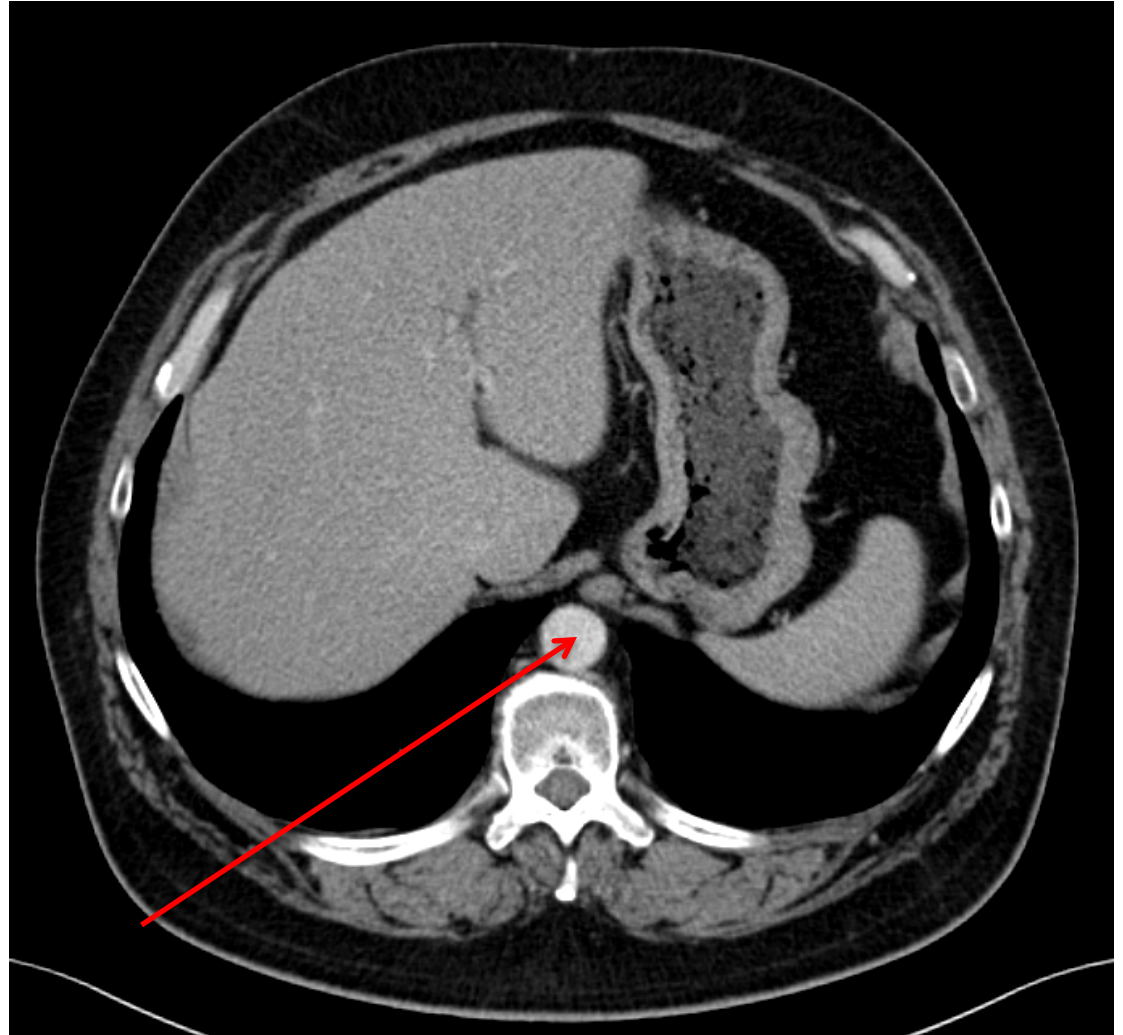


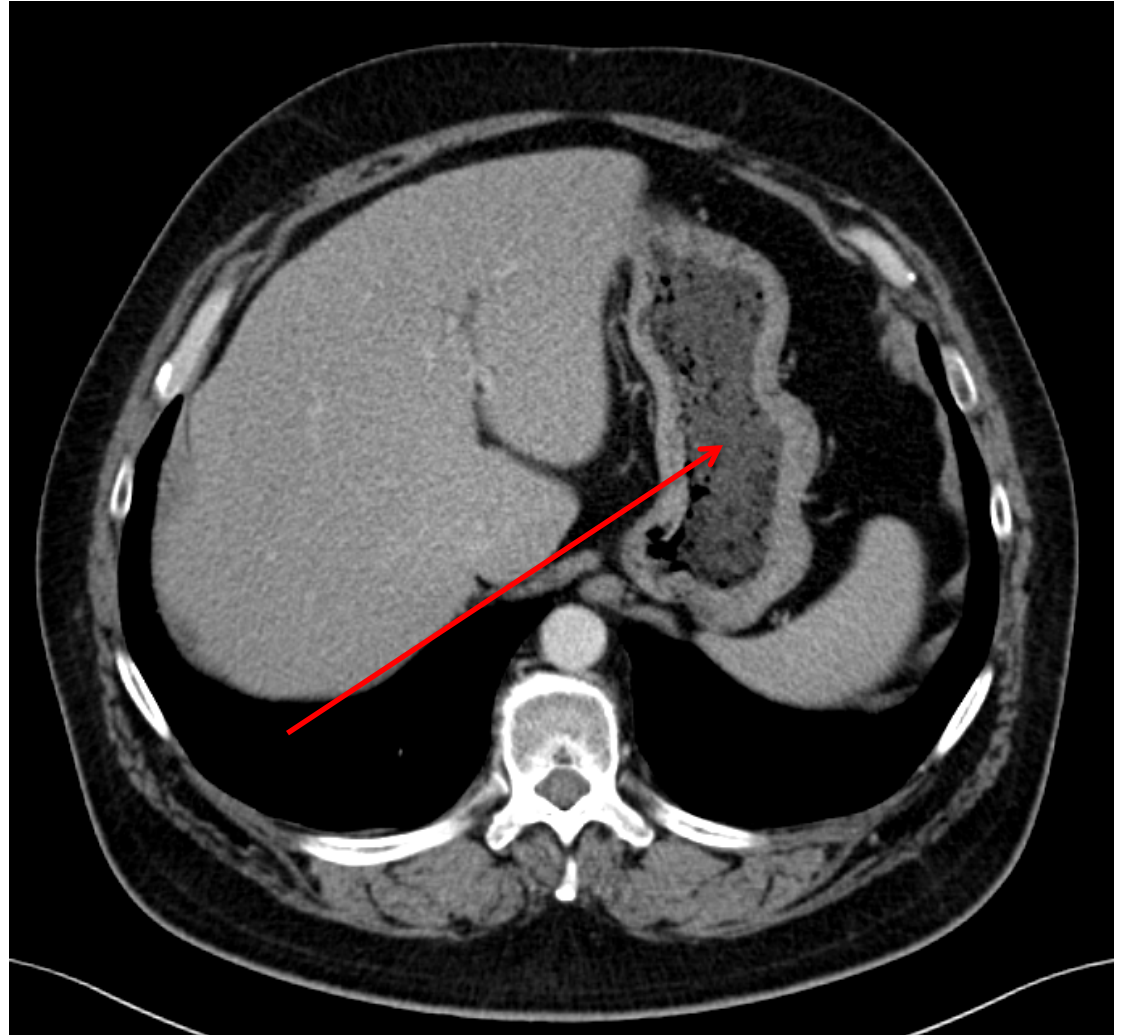
■ **Abb. 4.62a, b** Das CT zeigt die PPVI in regelrechter Lage in Pulmonalklappenposition, ein Teil des tragenden Stents ist noch im Truncus pulmonalis abgrenzbar

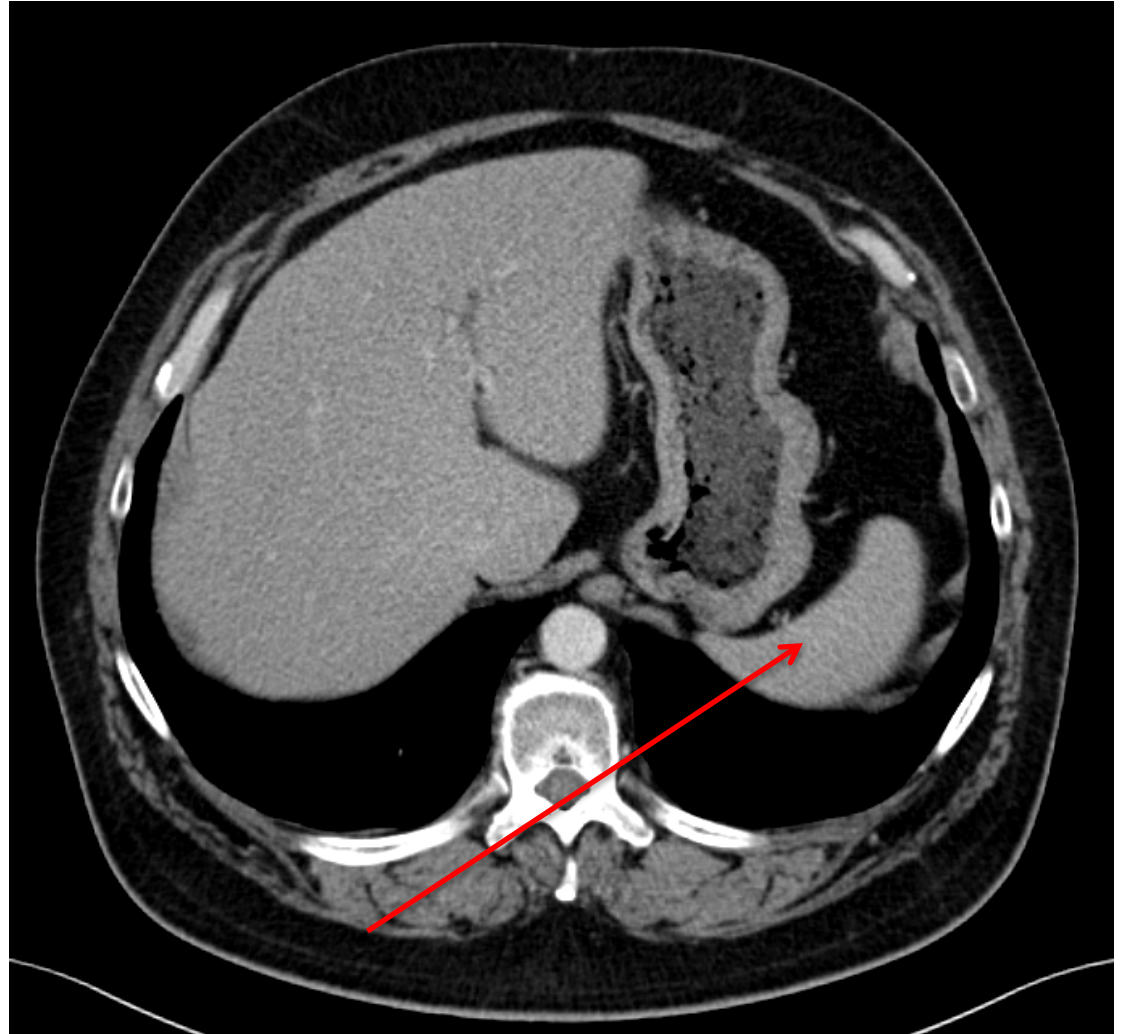


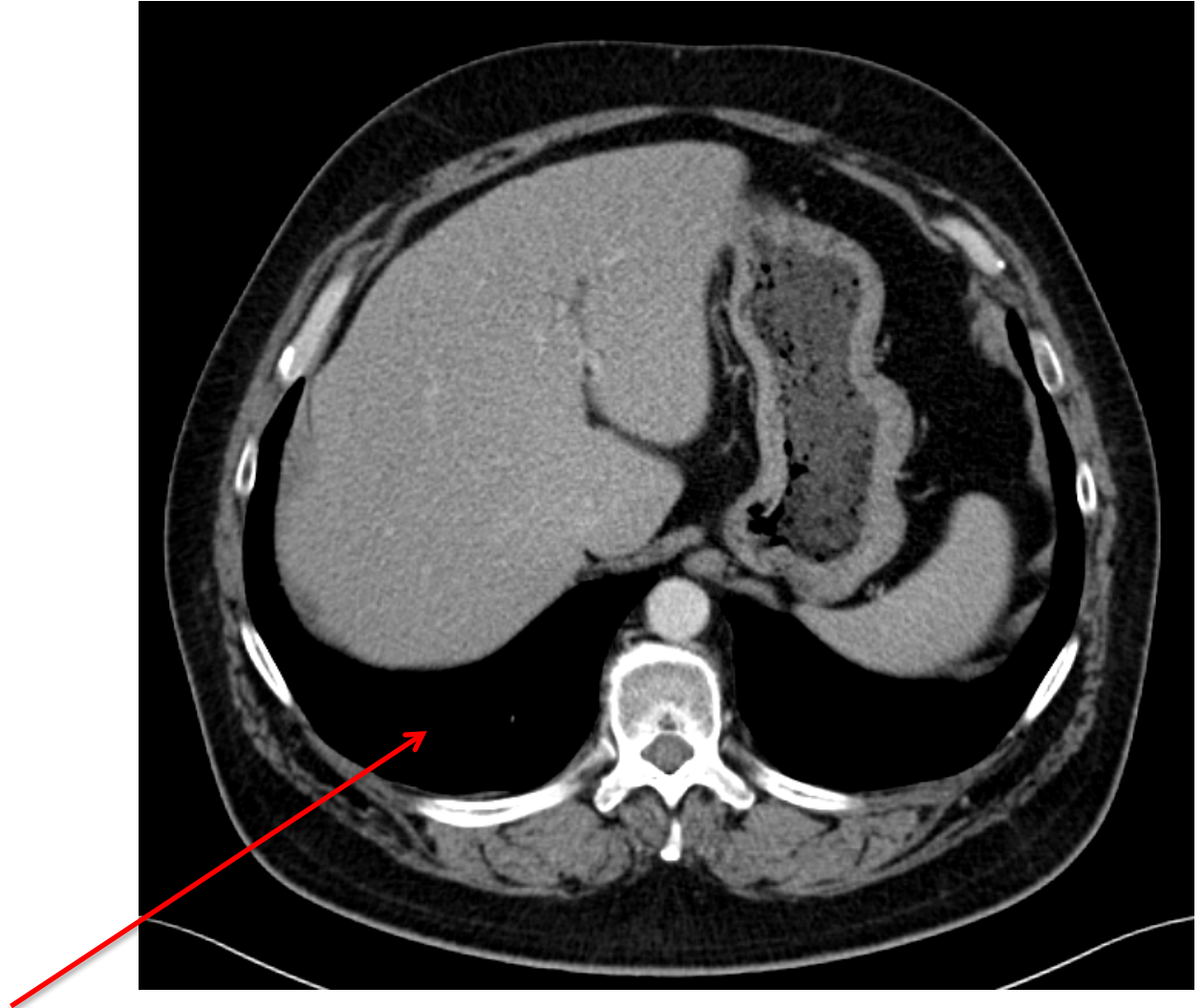
Anatomy of the Abdomen

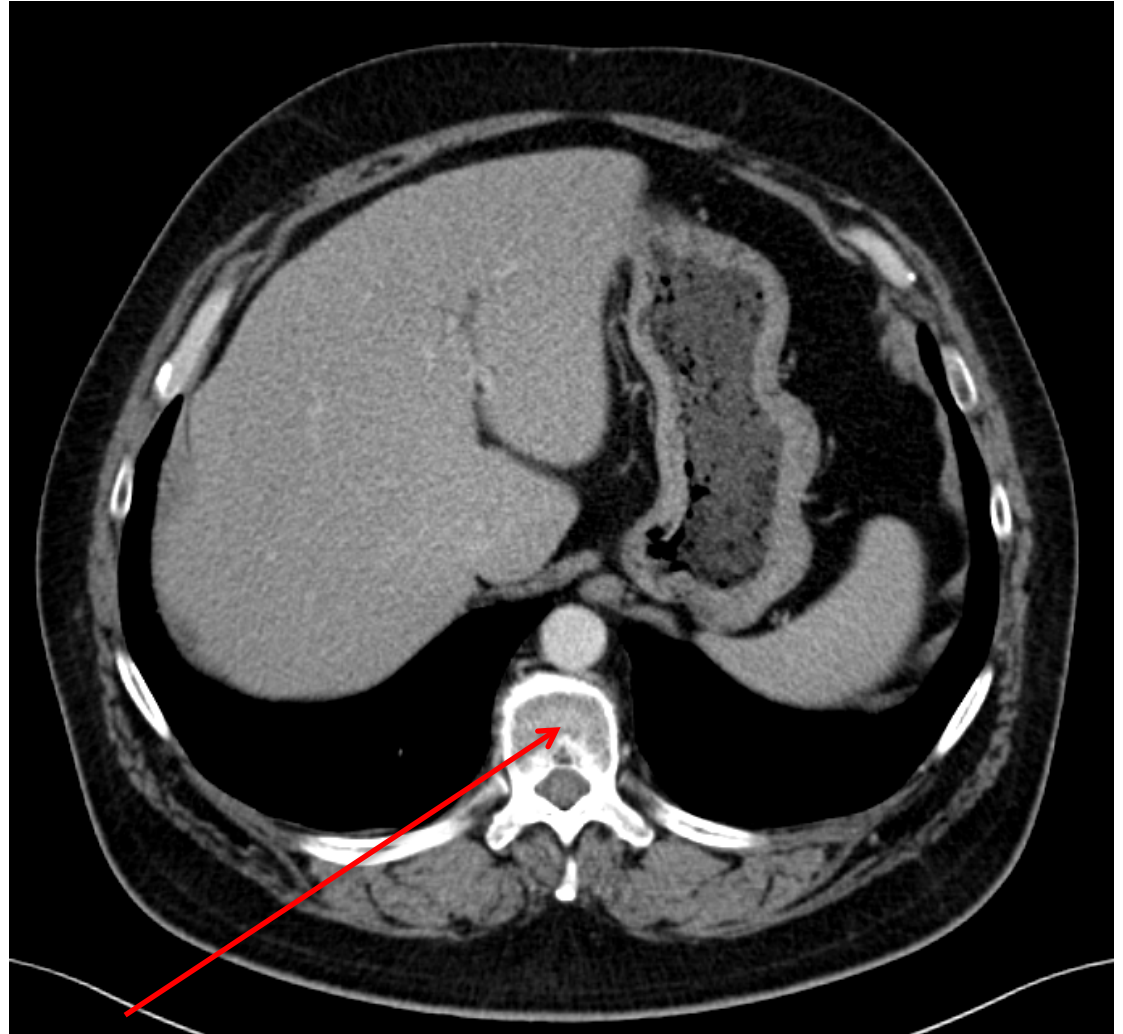


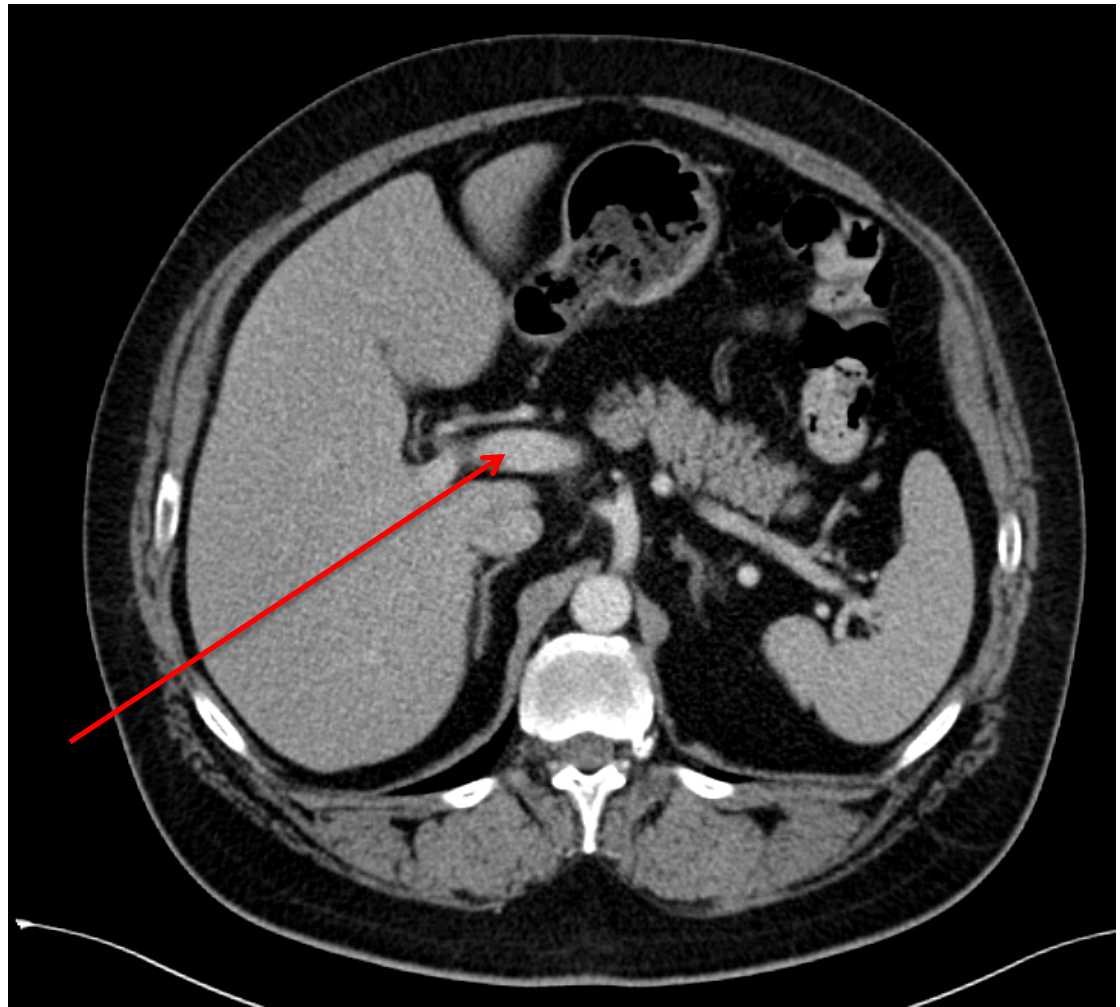


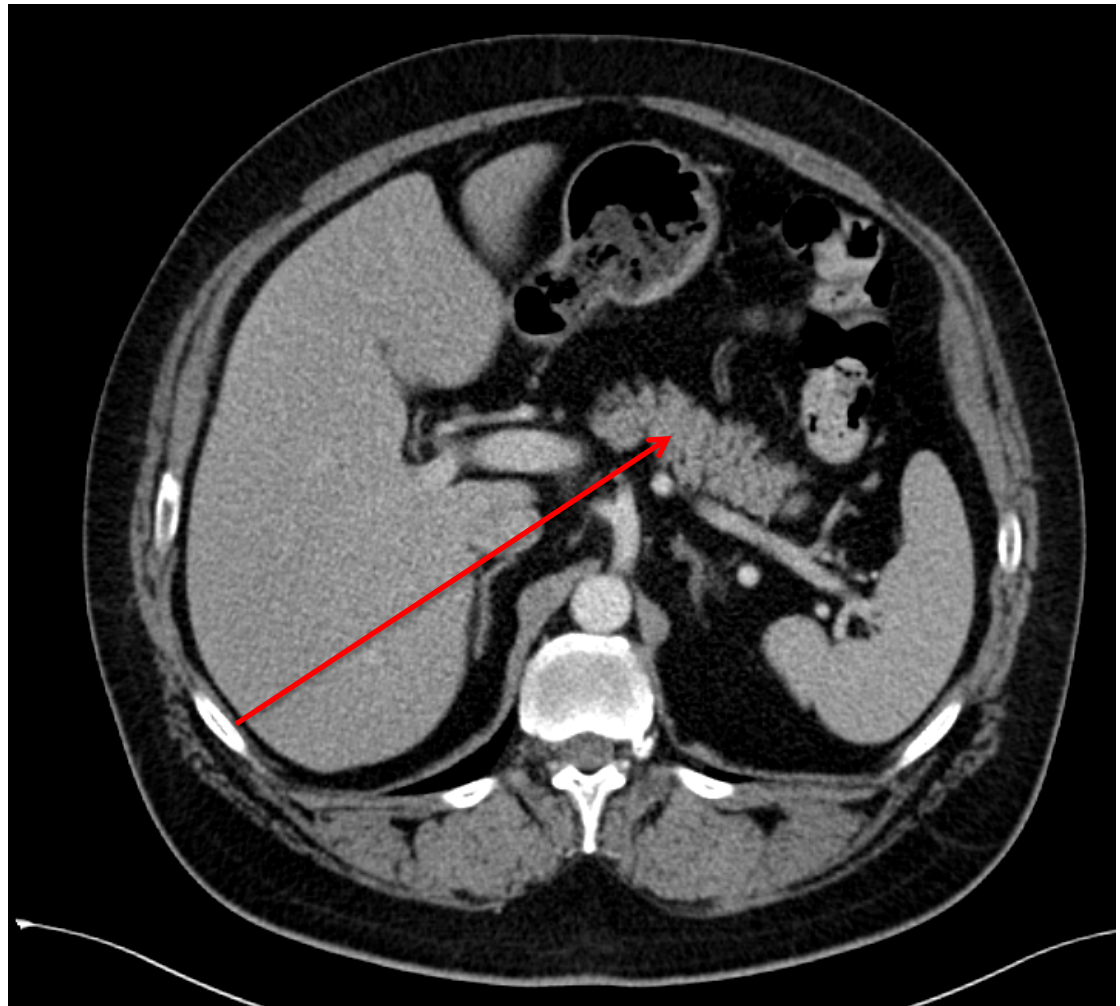


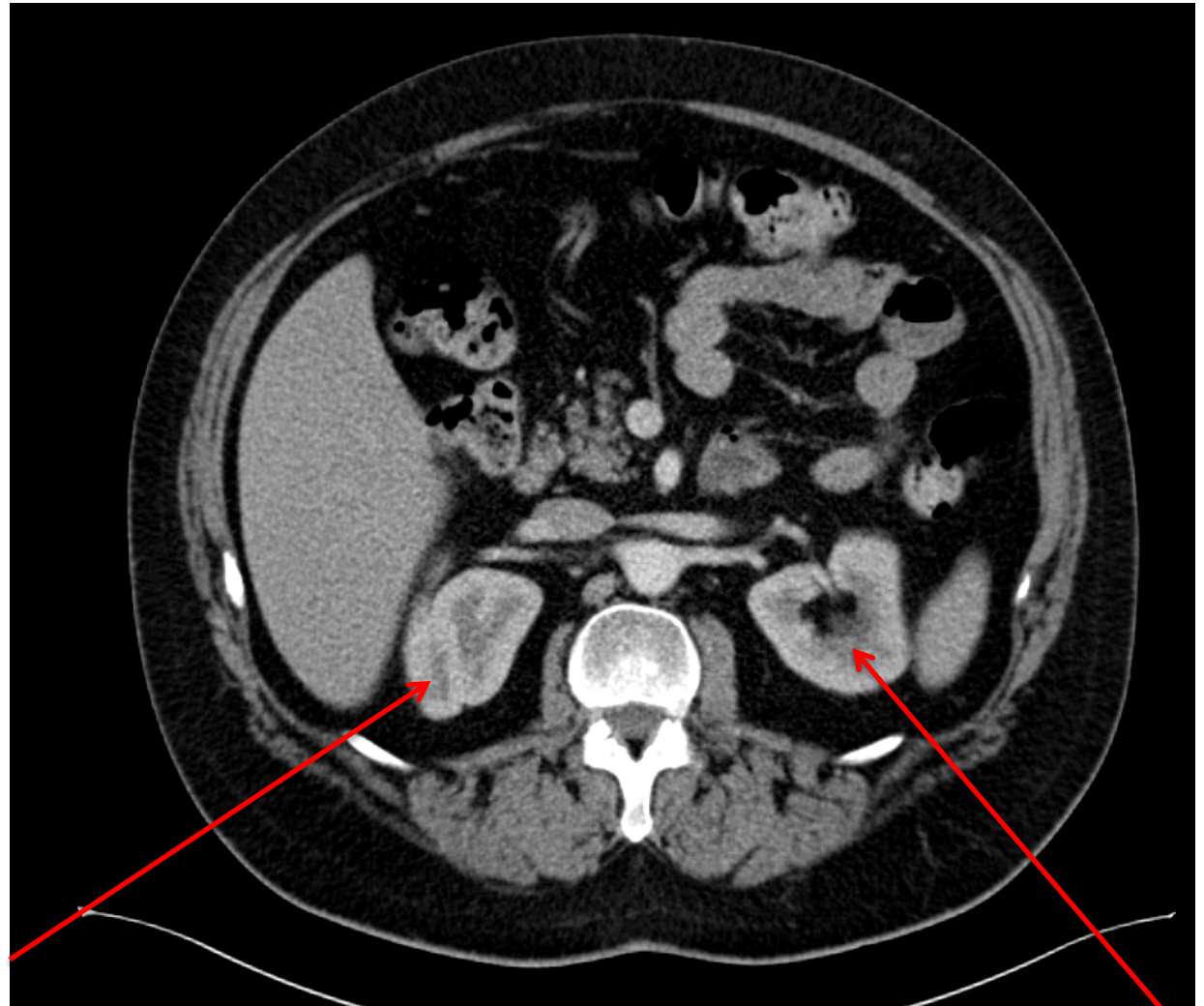


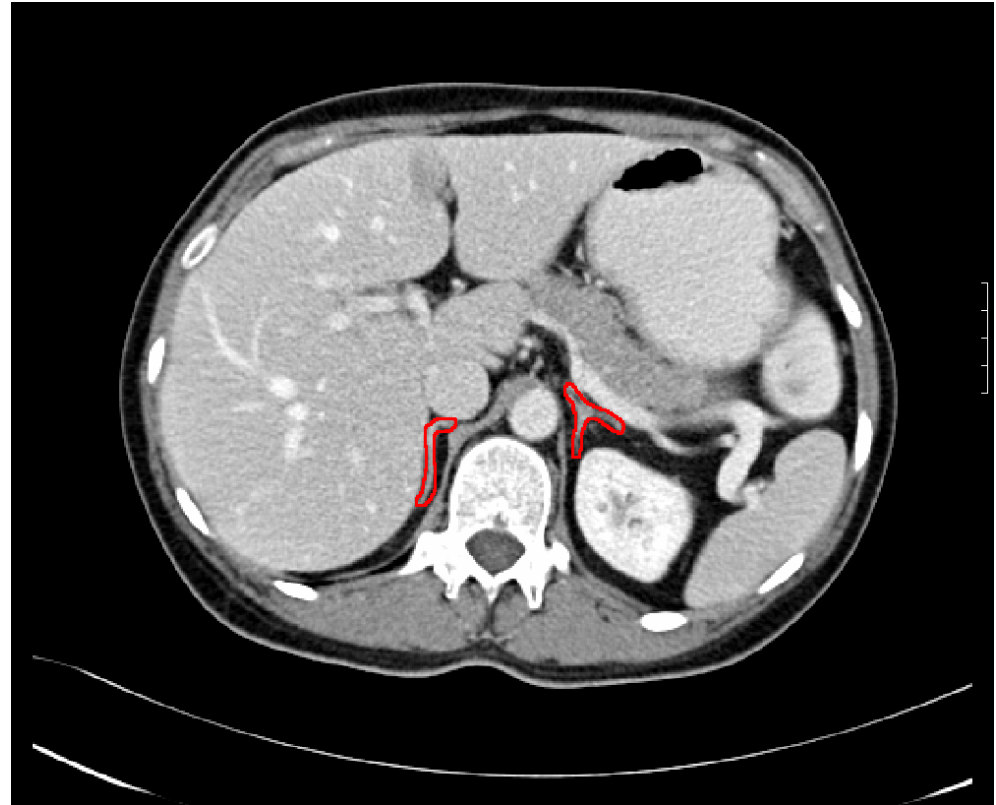


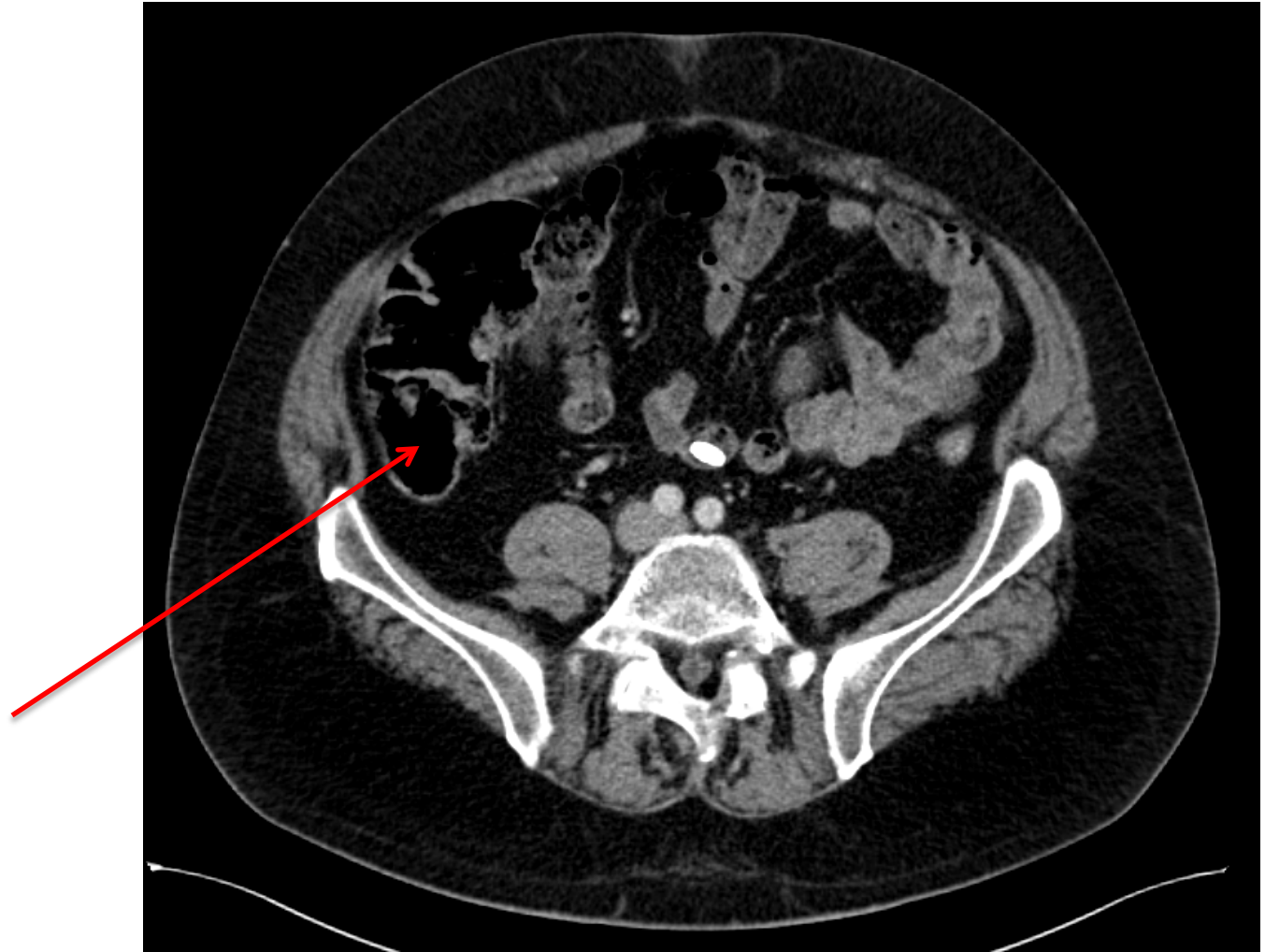


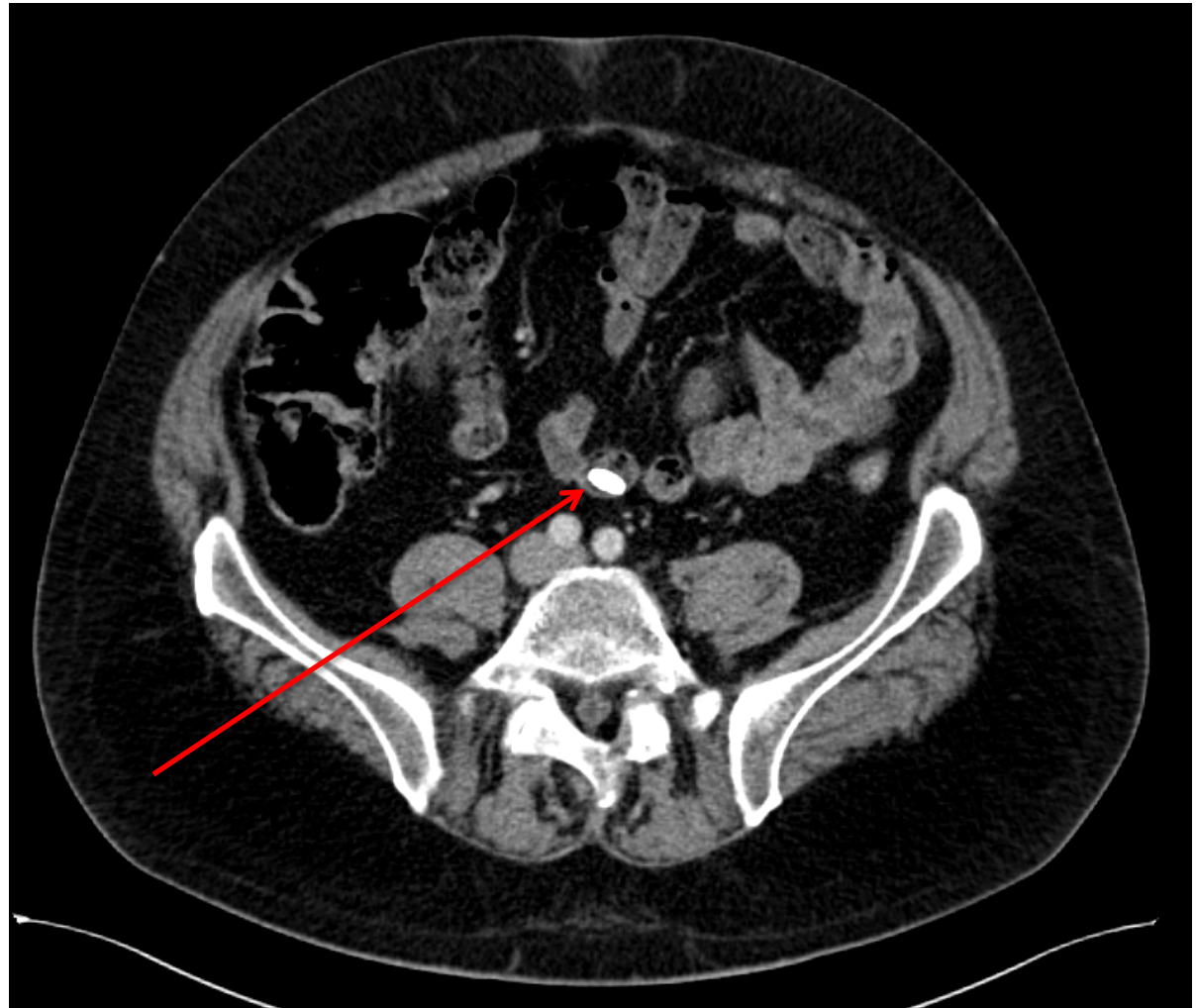


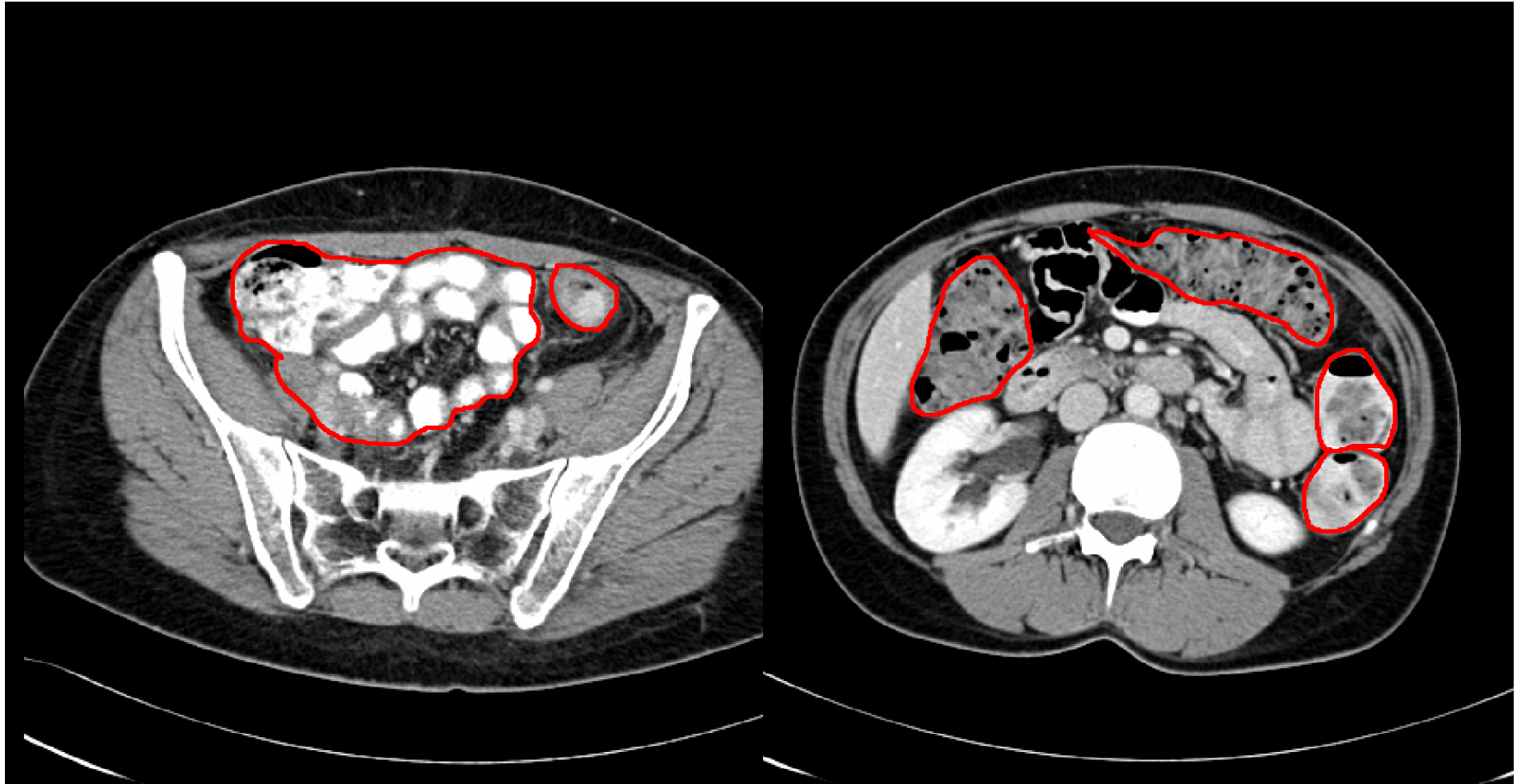






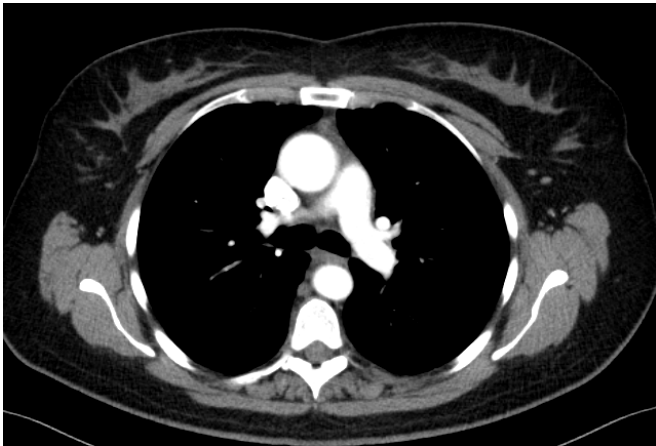




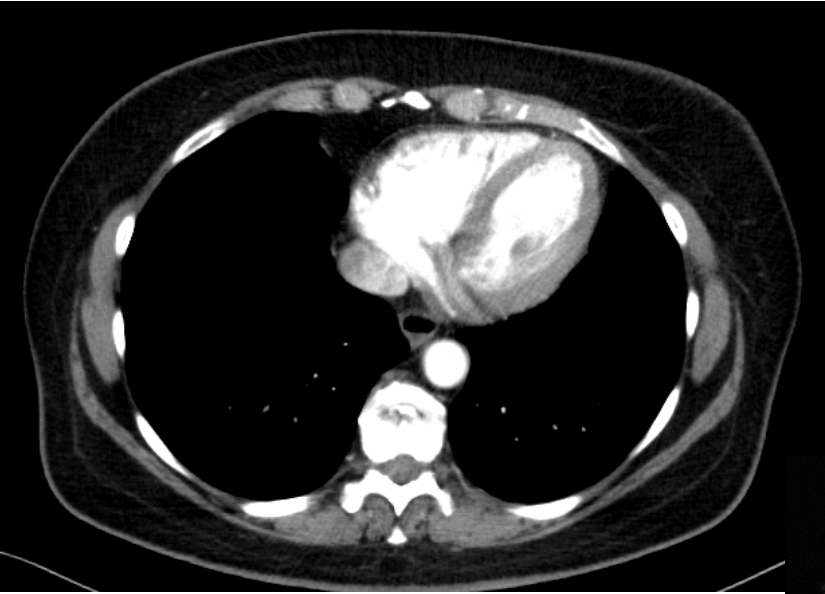




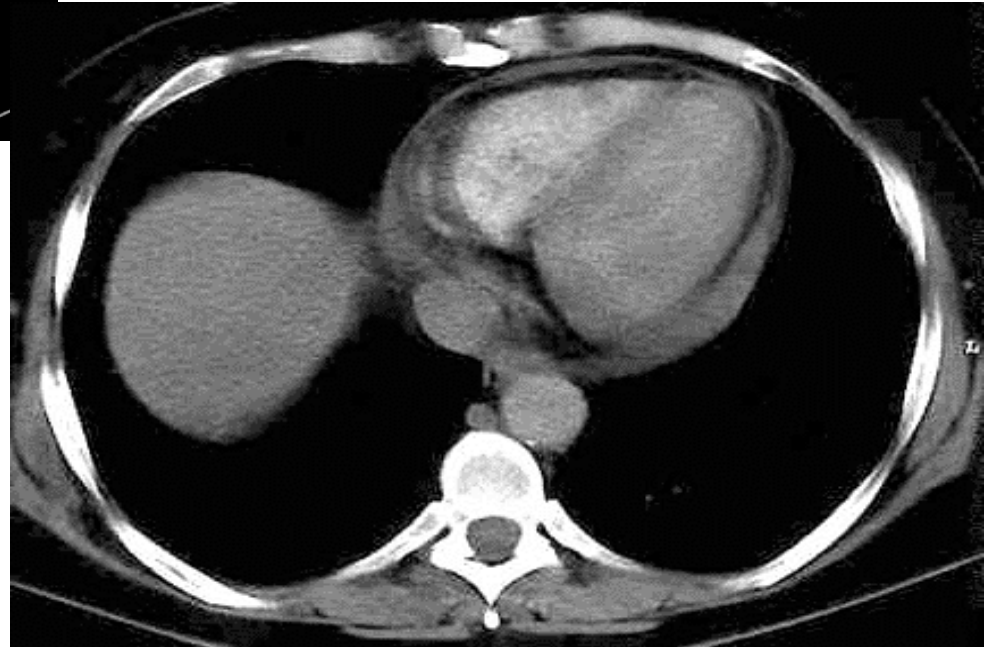
Pathologies of the thorax /abdomen

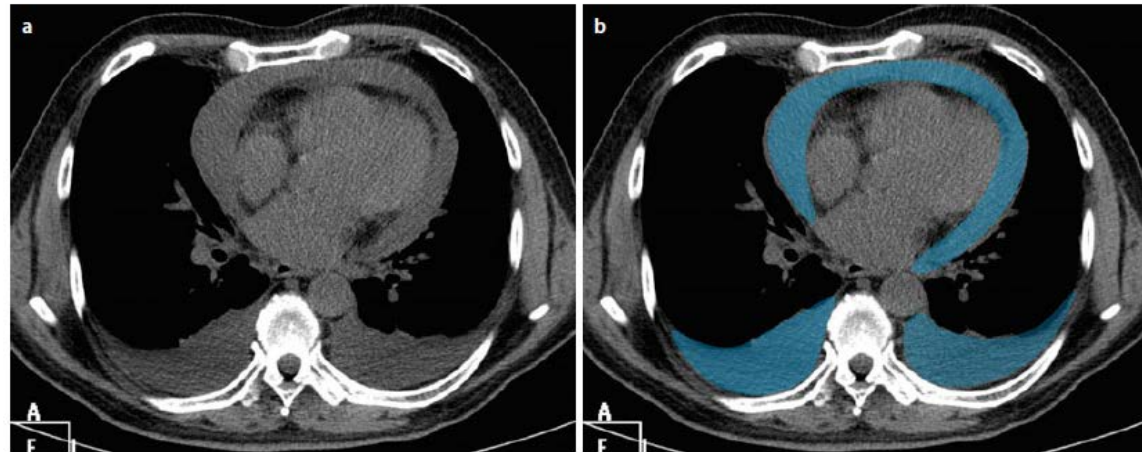


Aortic Aneurysm



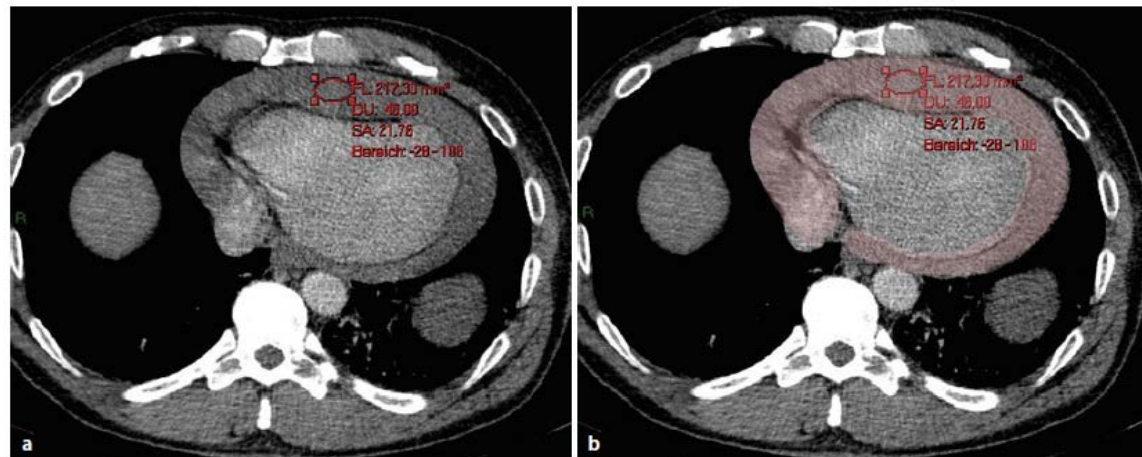
Perikardial Effusion



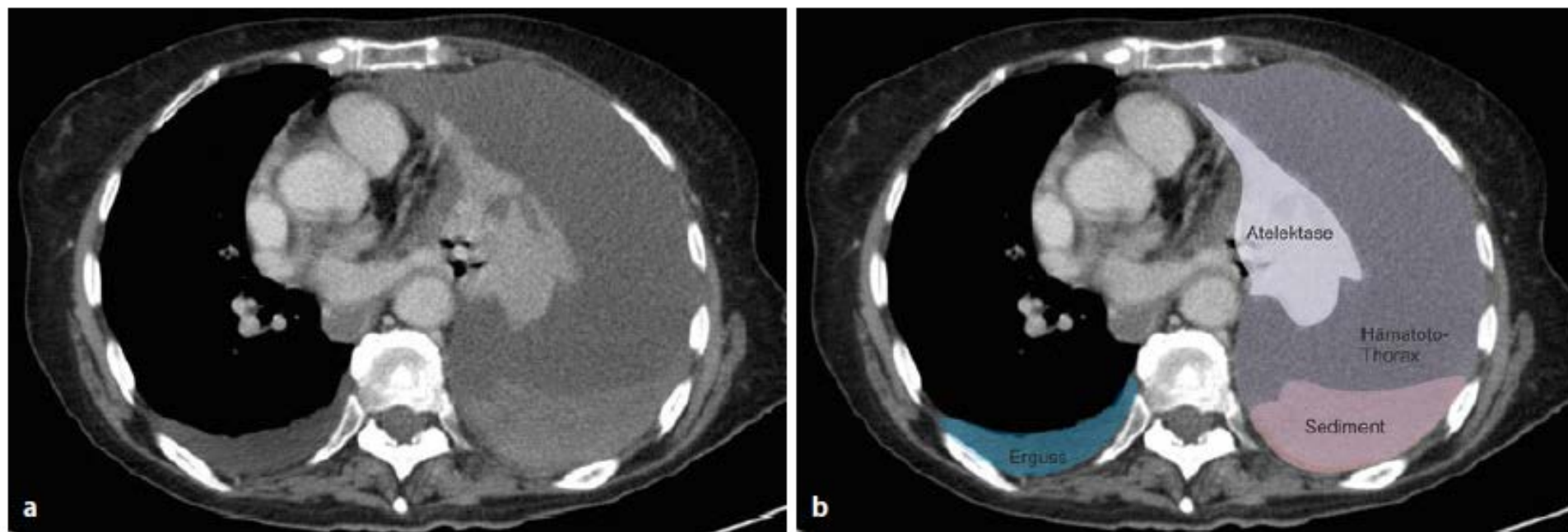


■ Abb. 4.151a, b Pleuraergüsse und Perikarderguss im axialen CT. Die Ergüsse sind homogen hypodens mit Wasseräquivalenten Dichtewerten (0–20 HU)

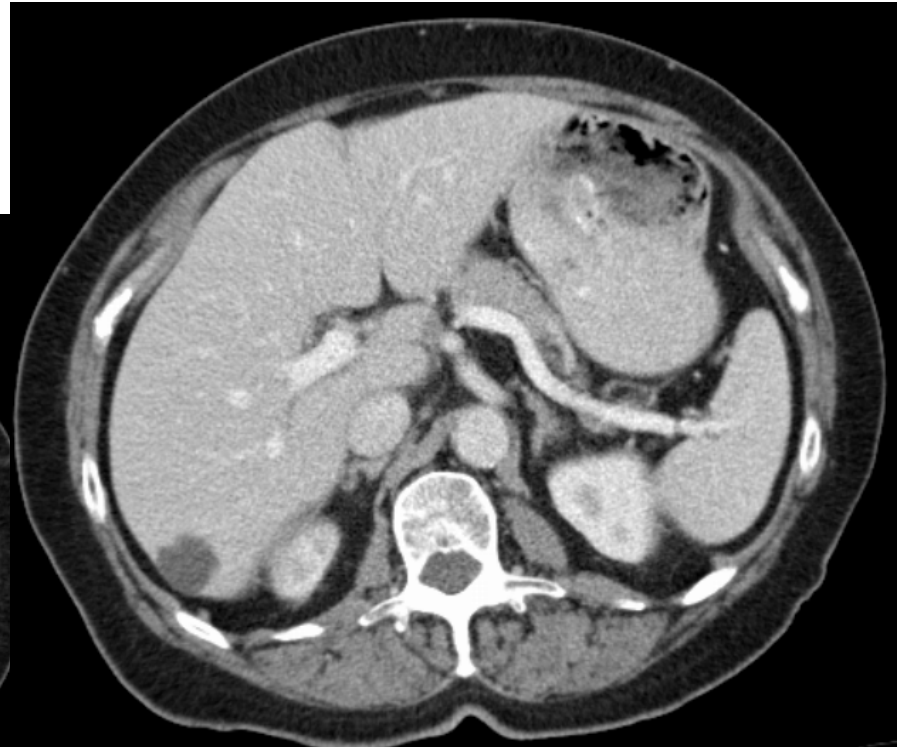
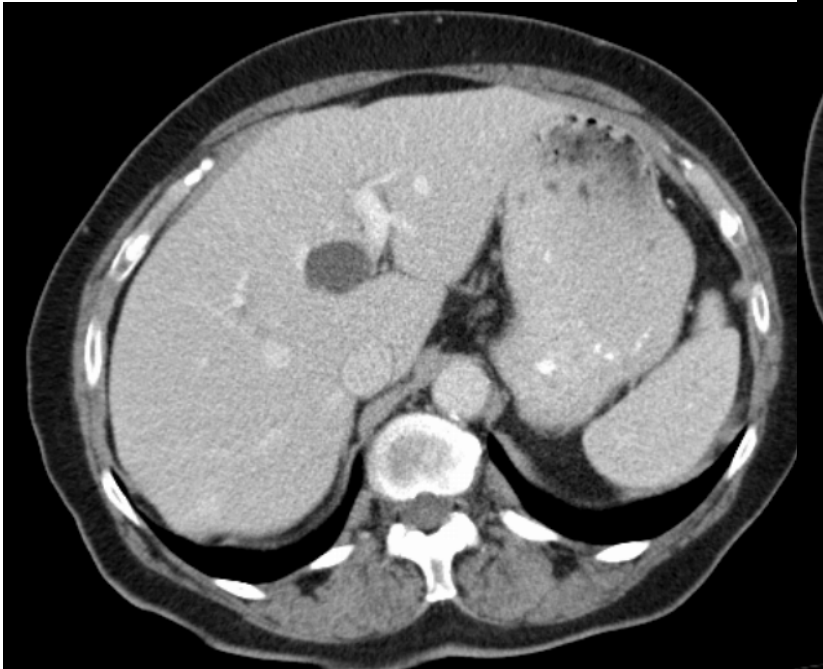
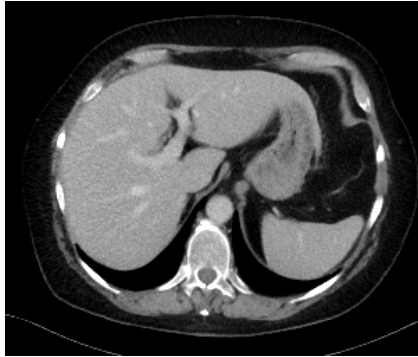
Perikardial Effusion

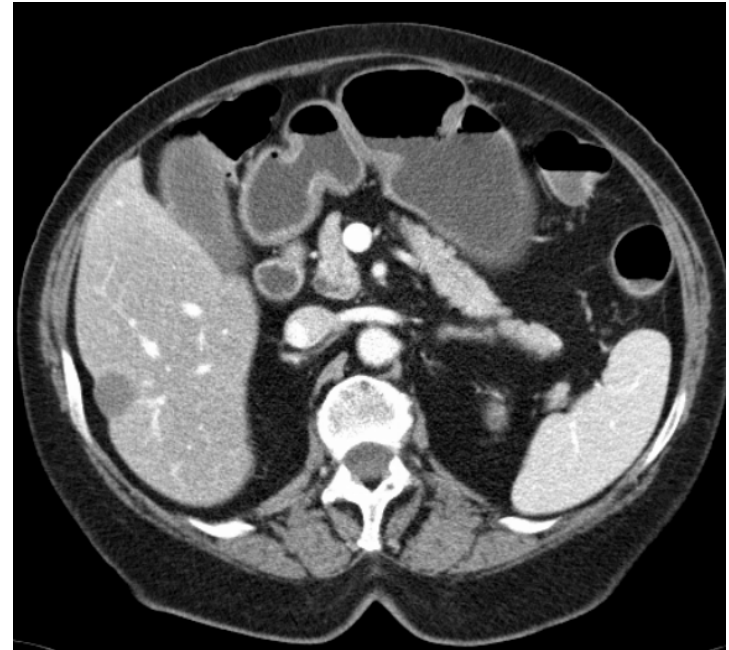
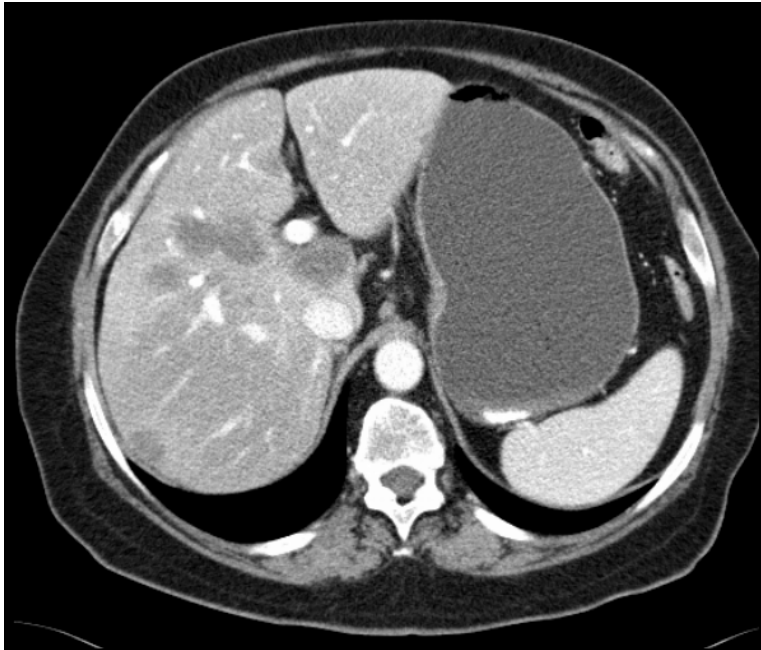


■ Abb. 4.152a, b Hier der direkte Vergleich: ein Hämoperikard. Der Flüssigkeitssaum um das Herz ist deutlich dichter als der in ■ Abb. 4.151 mit Dichtewerten um 48 HU



■ **Abb. 4.153a, b** Hier ein Beispiel eines ausgedehnten Hämatothorax mit hohem Blutanteil und Sedimentation der korpuskulären Blutanteile (rosafarben). Atelektase der linken Lunge (weiß) durch die Kompression. Kleiner seröser Pleuraerguss rechts (blau)







Recommended systematic imaging analysis :

- Knowledge of the crucial **anatomy**
- **Imaging techniques** (which contrast media? Oral/rectal contrast?)
- **Which imaging modality is most useful and when?**



Thank you for your attention!