A ER Doc's Guide to Crash Chest Radiology

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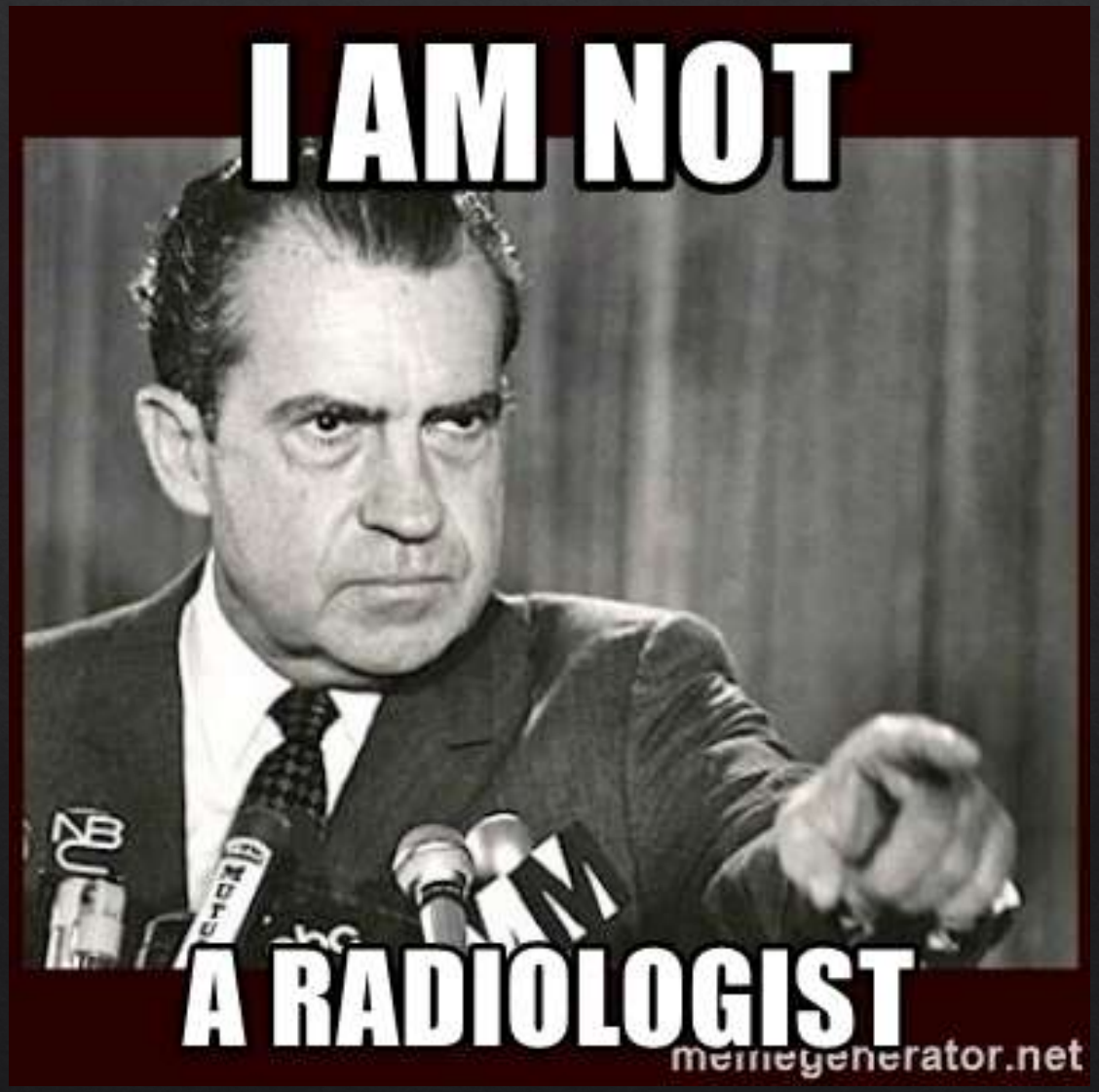
Disclosures

- *I have no relevant relationships with ineligible companies to disclose within the past 24 months. (Note: Ineligible companies are defined as those whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.)*


I AM NOT
A RADIOLOGIST
memegenerator.net

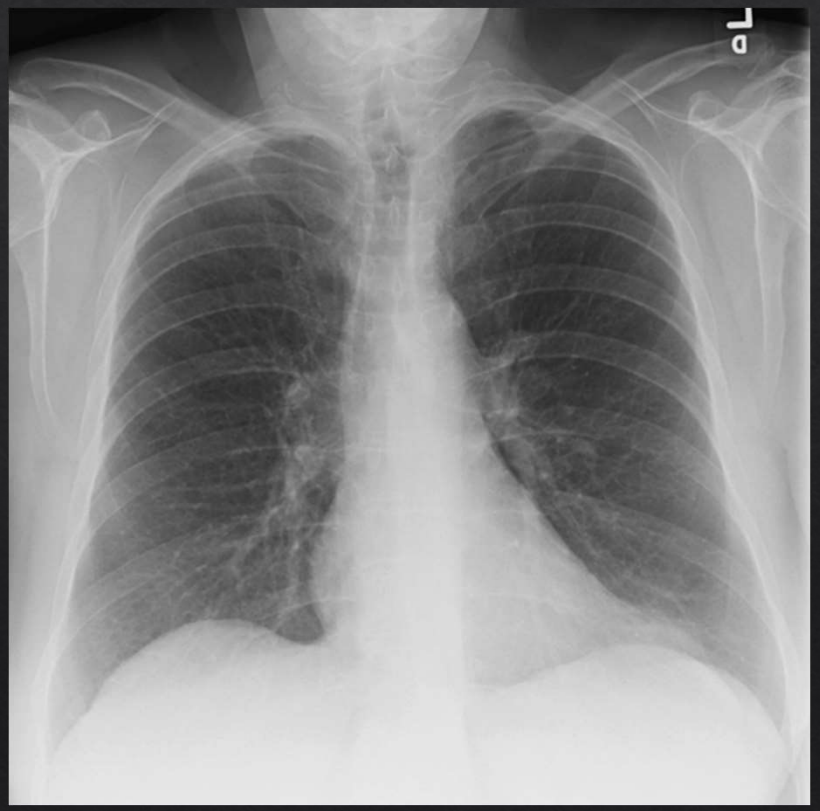
Educational Objectives

- **Description:** The primary objectives are for the participant to become comfortable in basic chest radiography modalities, including chest x-ray and computed tomography. Participants should be able to clearly identify normal anatomy and specific pathology on CXRs and Chest CTs.
- **Learning Objectives:** *At the conclusion of the session participants should be able to:*
  - Recognize critical anatomic structures on a chest x-ray
  - Choose the appropriate imaging modality for certain suspected diagnoses
  - Identify anatomic structures on a chest CT
  - Recognize common pathologic findings such as pneumonia, pulmonary edema, pneumothorax and pleural effusions


ER docs
CT scan
Physical exam
History
Seeing the patient

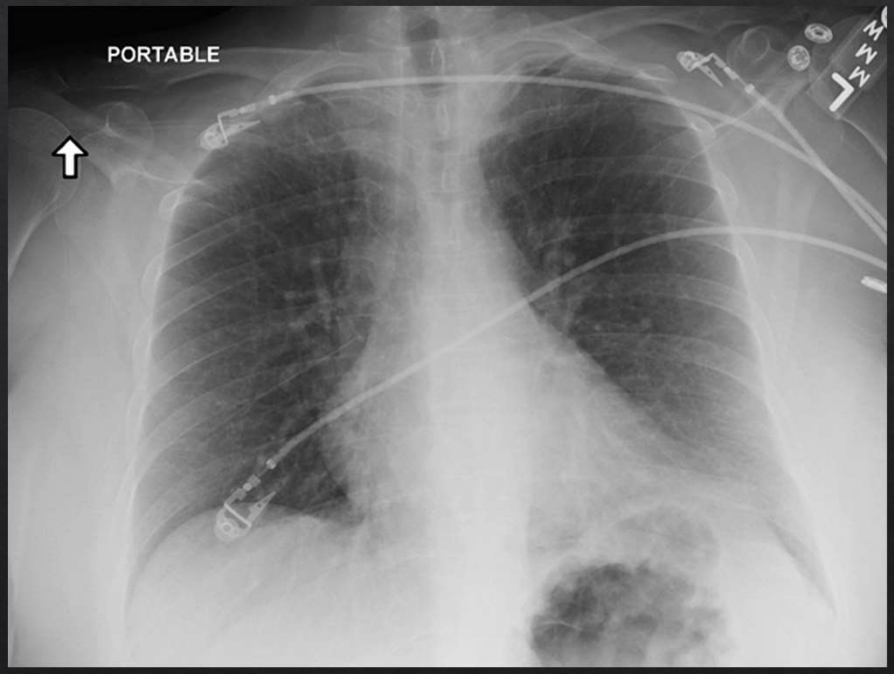
Chest Radiography

- **CXR is the most common radiology study**
- PA View – Patient has to be able to stand
  - Posteroanterior (PA) projection in an upright position is the preferred X-ray
    - prevents congestion of blood in the pulmonary vessels
    - air fluid levels can be demonstrates
    - It naturally depresses the diaphragm and magnifies the heart less
- 15% of the lung is hidden on the PA view, so more info in gained with a lateral view

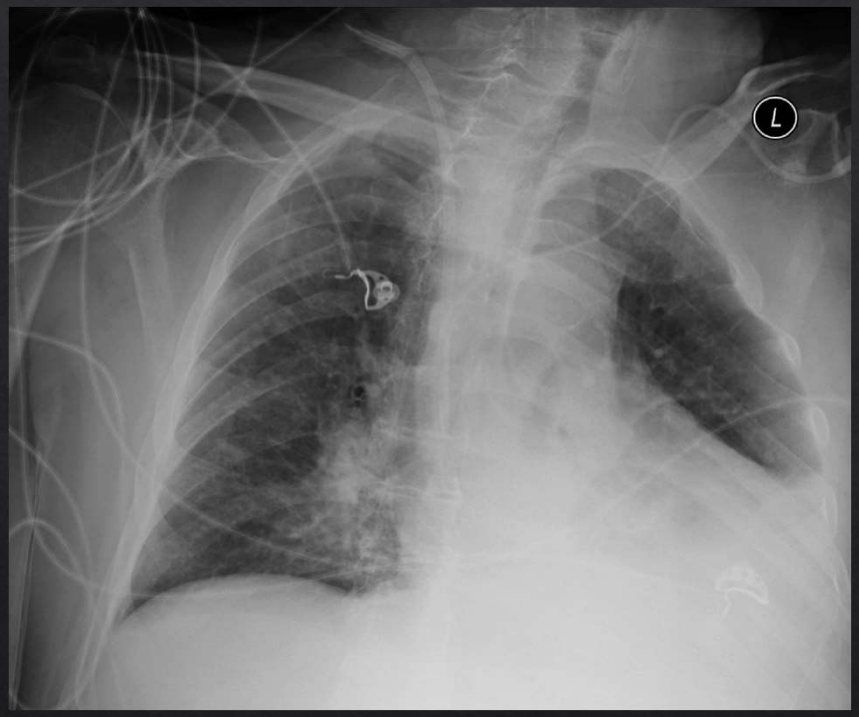


Chest Radiography

- AP View (portable) - patient in bed and lying flat or partly upright
- making the heart and mediastinum appear more prominent
- shallower inspiration which can limit evaluation of the lung bases



Rotation

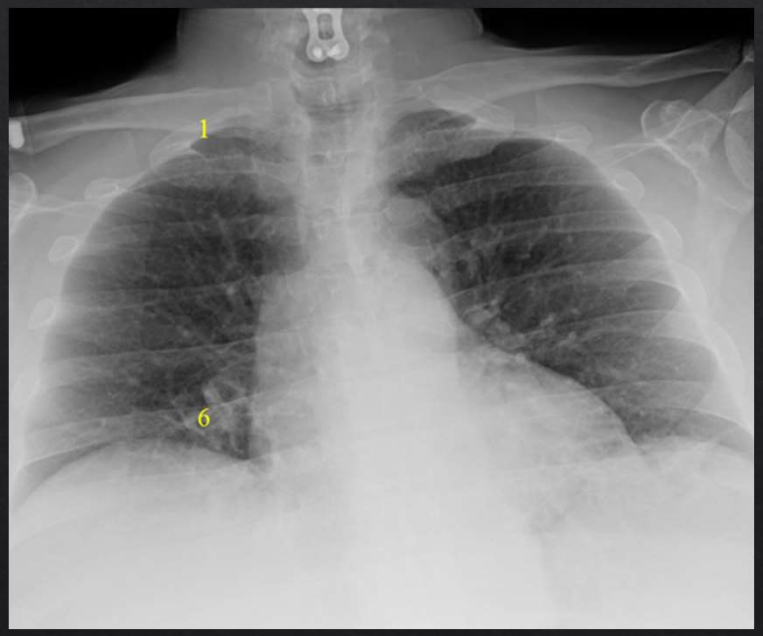


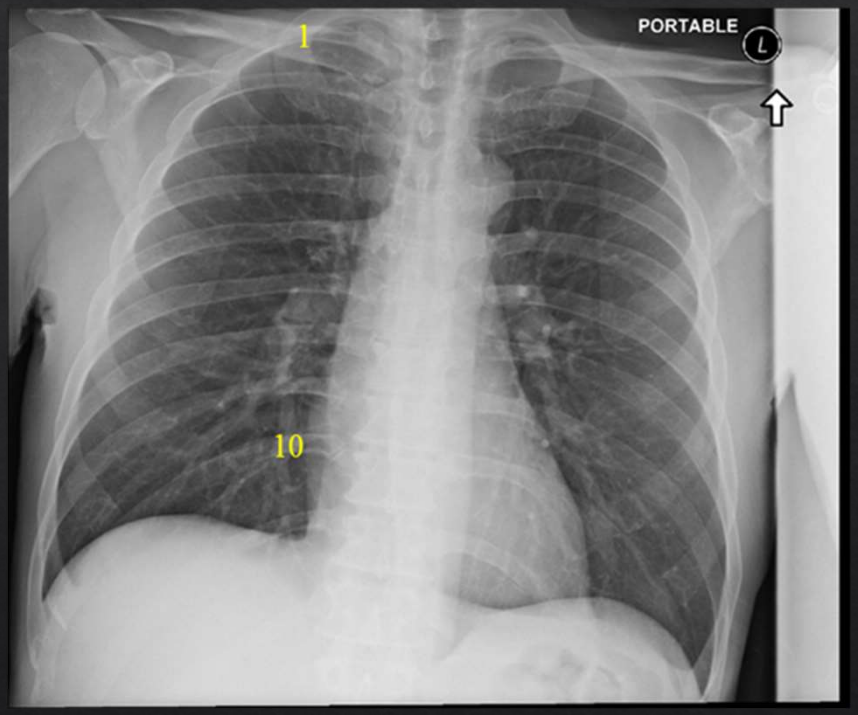
- Measuring the distance between the medial edges of the clavicles to the vertebral spinous processes
- They should be equal or near equal
- Anterior structures move the same direction as rotation so the clavicle/spinous process width is increased on the side to which the patient is rotated.

https://www.saem.org/about-saem/academies-interest-groups-affiliates2/cdem/for-students/online-education/m3-curriculum/group-diagnostic-testing/chest-radiograph

Inspiration

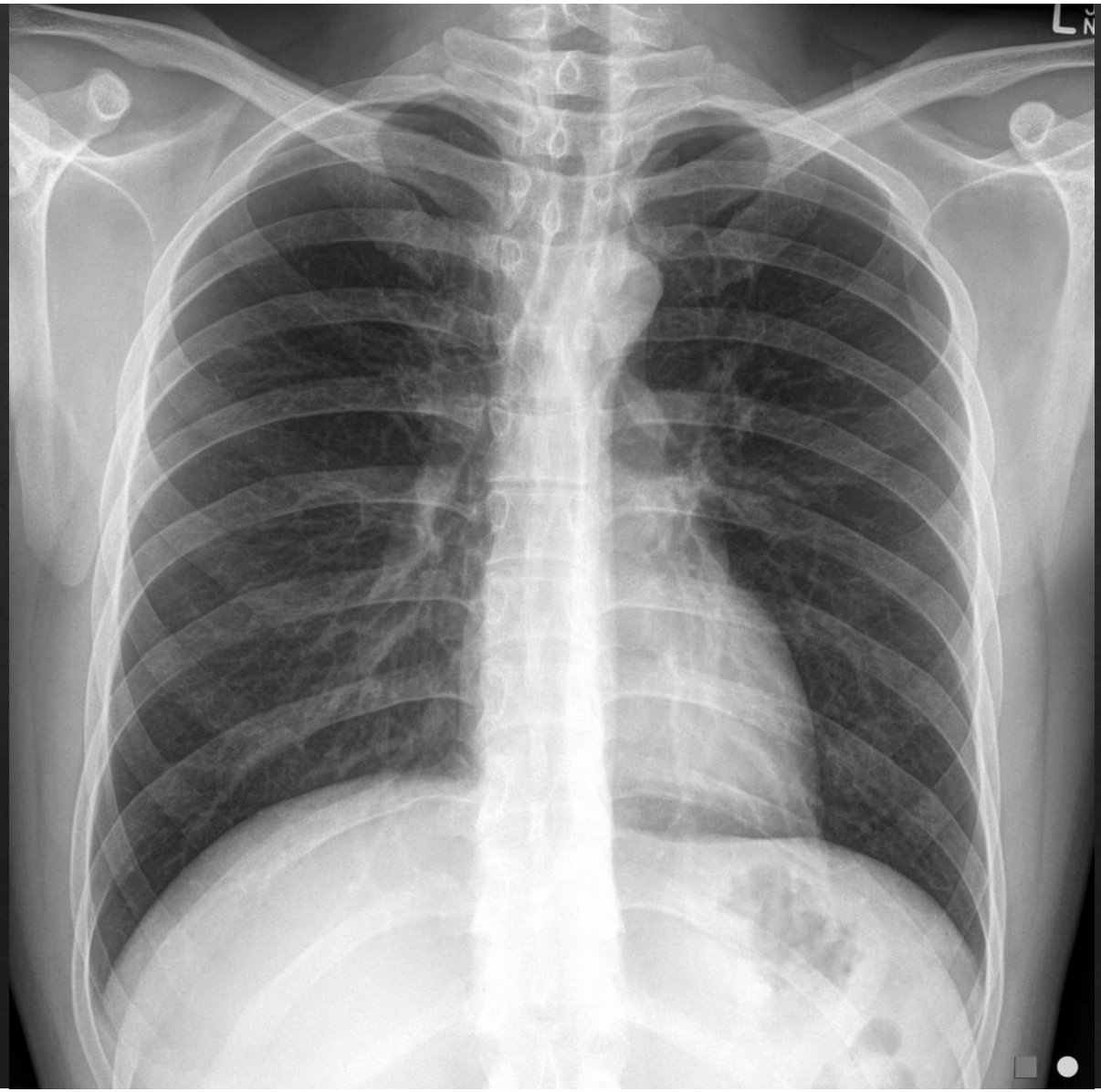
- A good inspiration on a PA CXR shows at least 9 posterior ribs





https://www.saem.org/about-saem/academies-interest-groups-affiliates2/cdem/for-students/online-education/m3-curriculum/group-diagnostic-testing/chest-radiograph

Normal



Take a Systematic Approach - ABCDE

- Airway
  - Trachea
  - Carina
  - Right and Left Mainstem Bronchi
- Bones
  - Clavicles, AC Joints, GH Joints, Humerus x 2, Ribs and Vertebrae
- Cardiac
  - Normal size is <50% of thoracic diameter, cardiac borders, aortic knobs
- Diaphragm
- Everything Else
  - Lungs, Gastric Bubble, Hila, Tubes

https://undergradimaging.pressbooks.com/chapter/normal-labelled-chest-x-ray/

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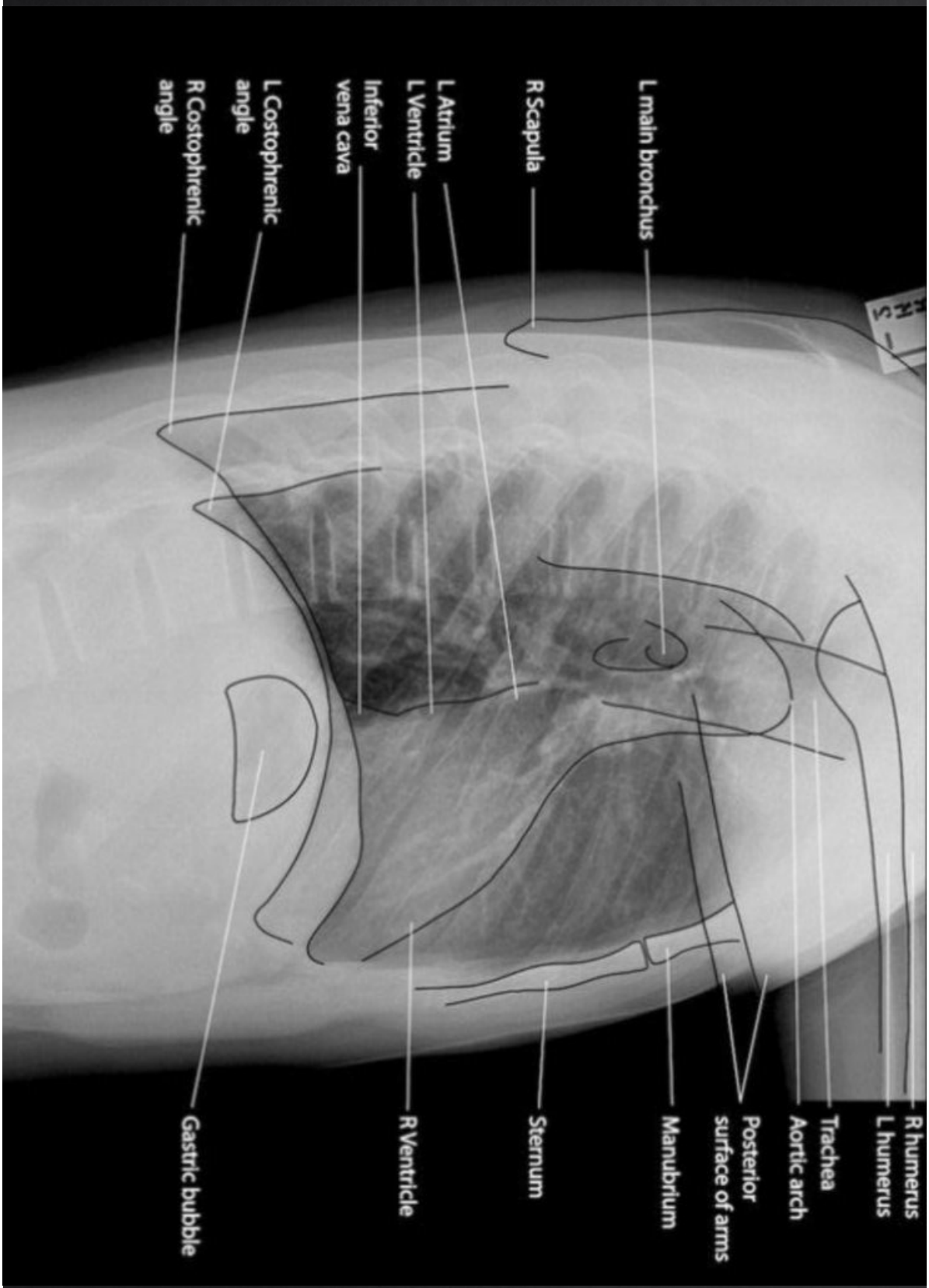


Pitfalls

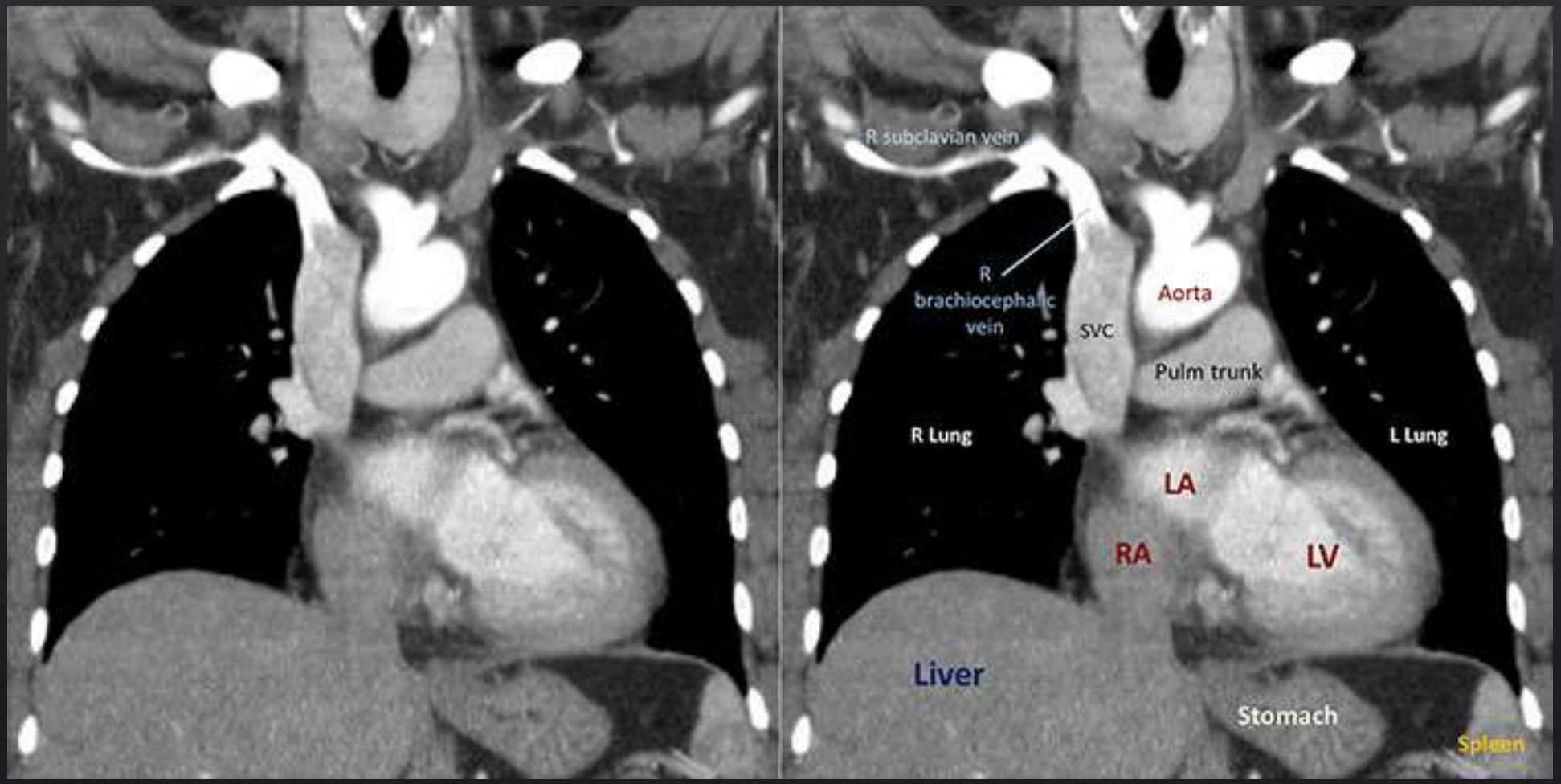
- ***Places that we tend to miss things:***
- ***Lung apices***
  - Clavicles get in the way
  - look for any asymmetry between lung apices
  - Things that hide:
    - small pneumothorax, apical tumors or cavitary lung disease
- ***Lung bases***
  - Diaphragms get in the way
  - Look for the normal increasing darkness from the lung apices to the hemidiaphragms
- *When looking for FREE AIR you need an UPRIGHT film*

CXR vs CT – Radiation Risks

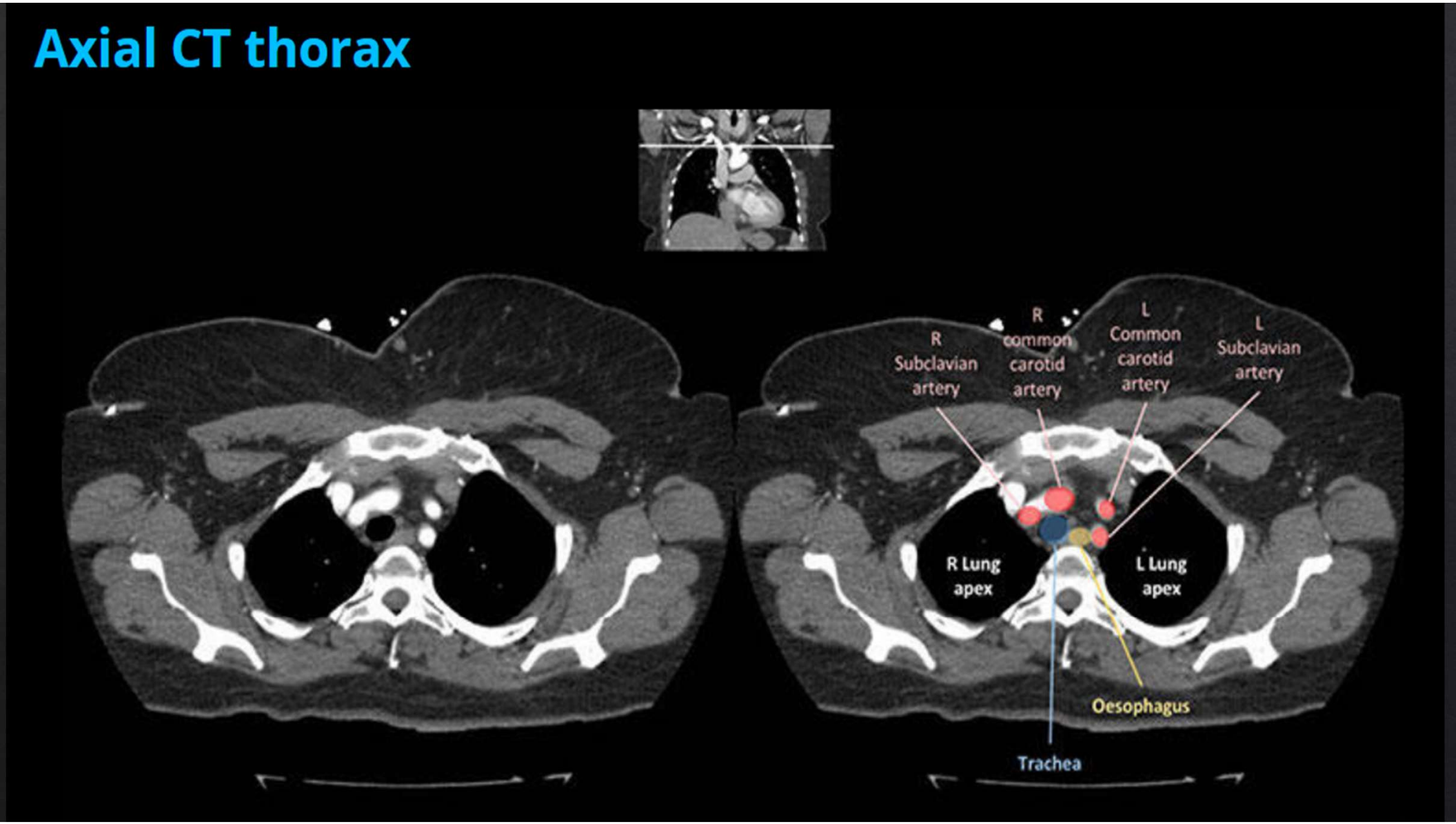
- One CXR delivers 0.1mS of radiation which is equivalent to about 10 days of atmospheric radiation in North America
- One chest delivers the equivalent of about 80-100 CXRs or 4 years of atmospheric radiation, which increases the risk of cancer by about 1 in 1000 in a 40 year old patient (up to 1 in 2000 in a younger patient, less in an older patient)
- Approximately 1/3 of people in North America will develop cancer some time in their lives; therefore the risk of cancer after a CT pulmonary angiogram of the chest increases from about 33% to 33.1%, a minuscule difference

http://www.emdocs.net/em-cases-emergency-radiology-controversies/

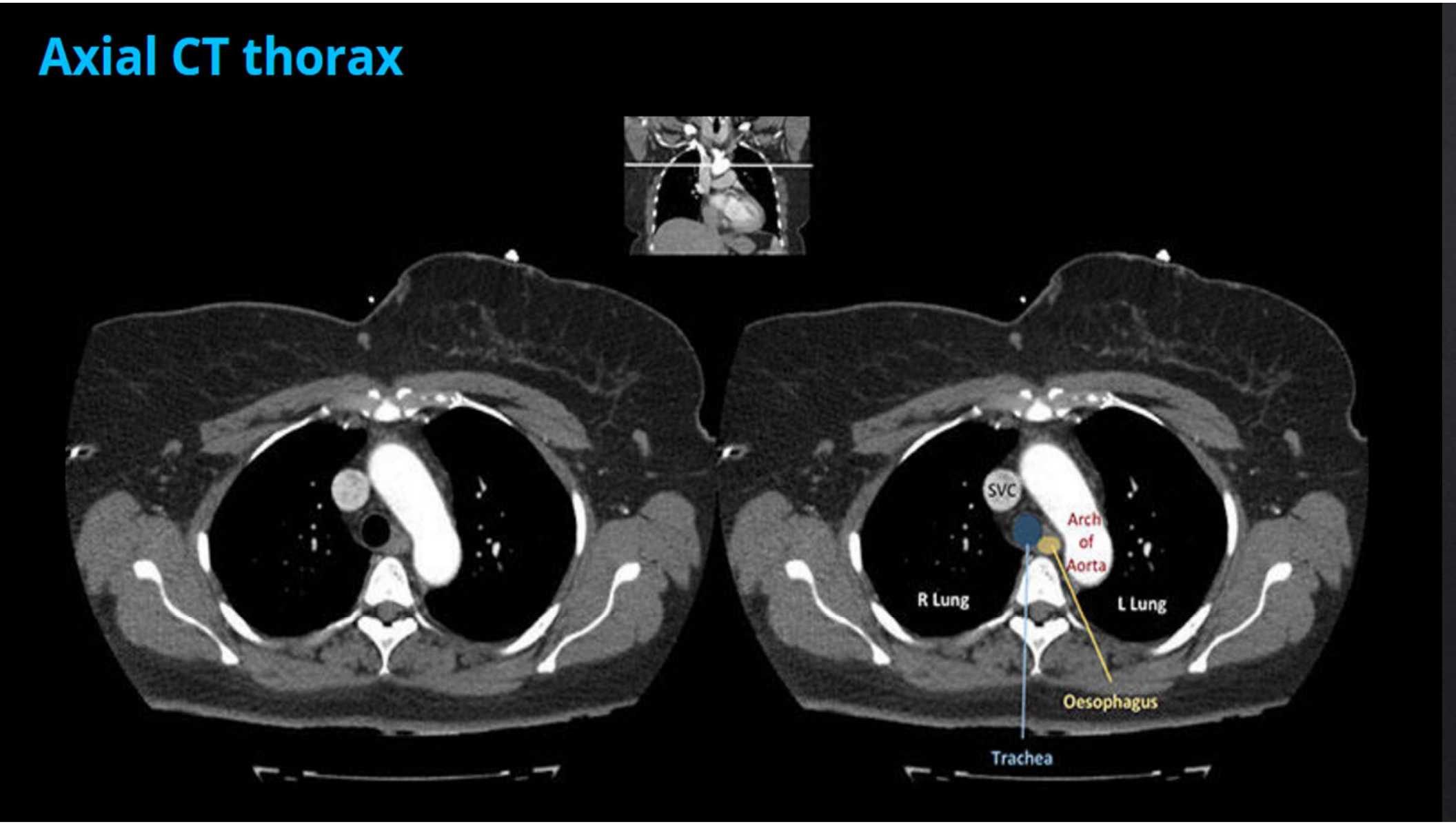
Coronal View



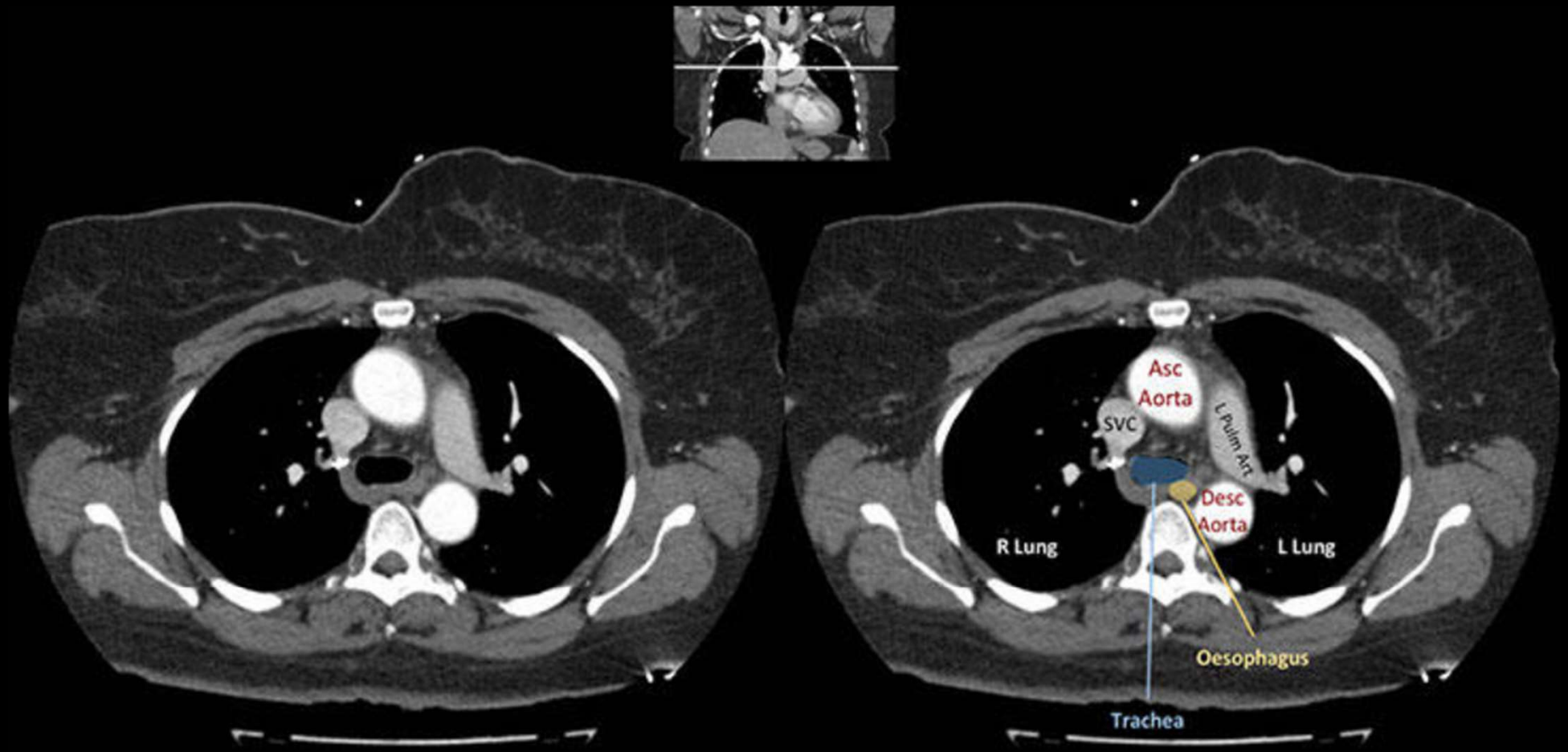
Axial CT thorax



Axial CT thorax



Axial CT thorax



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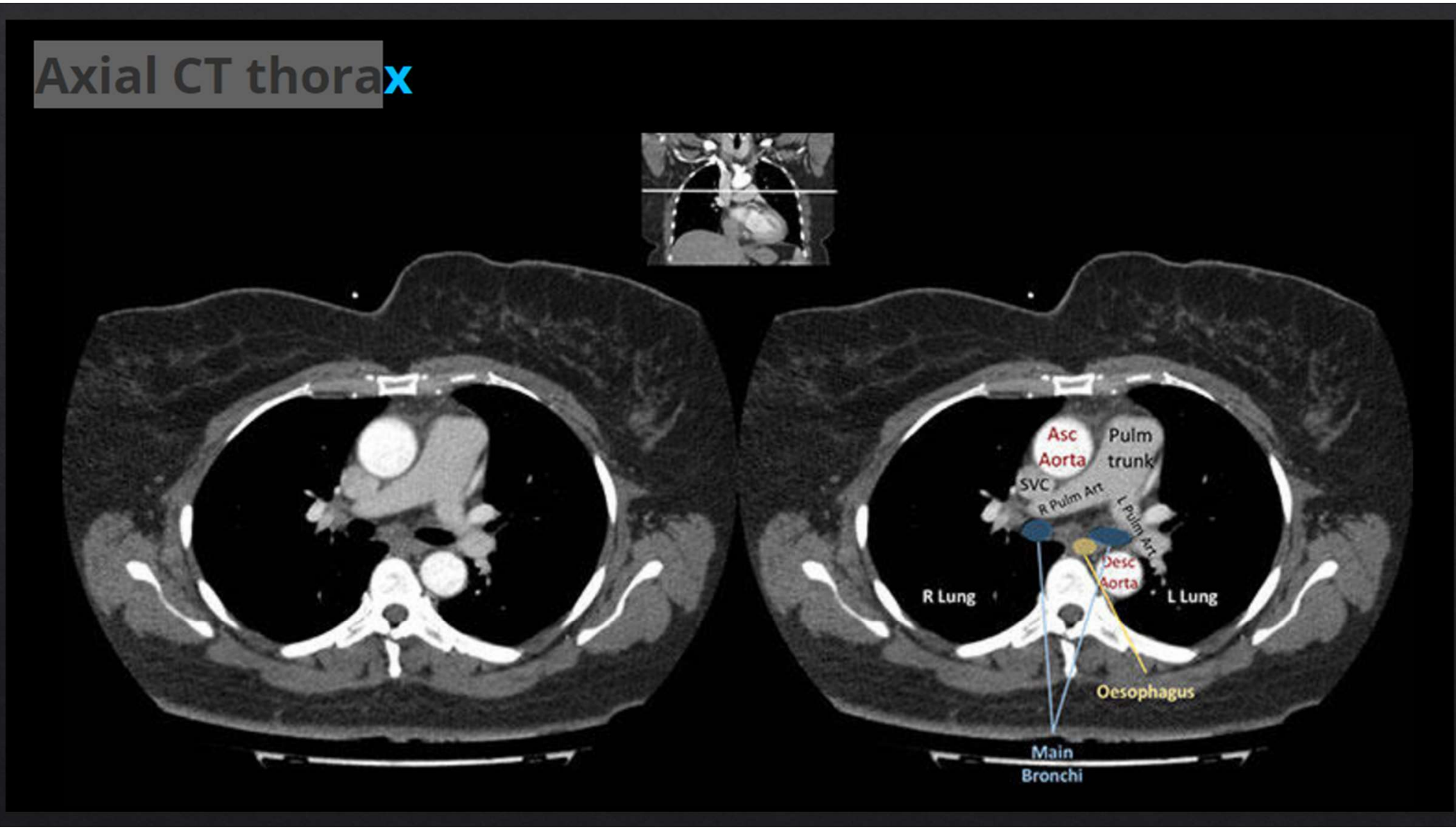

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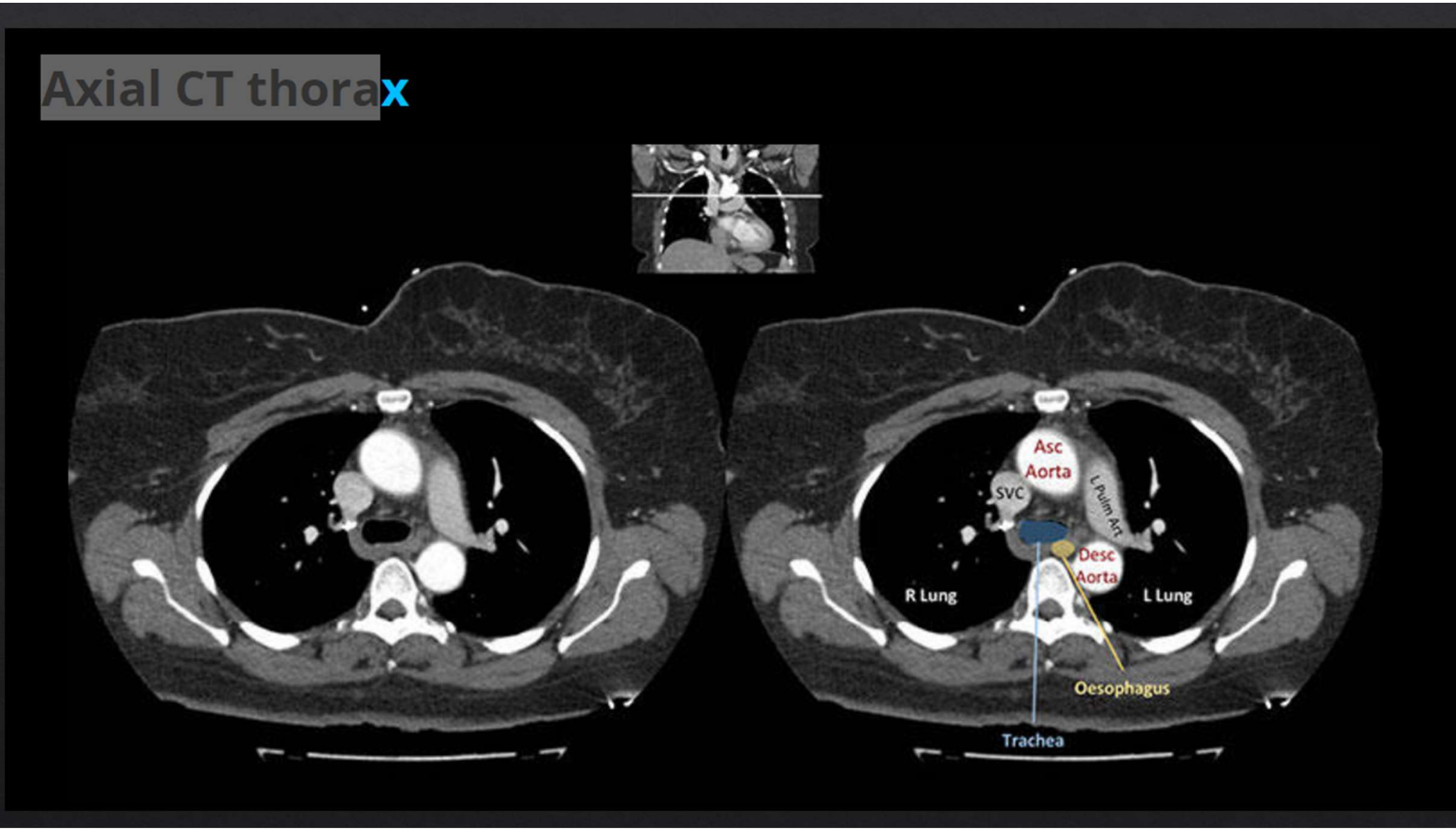

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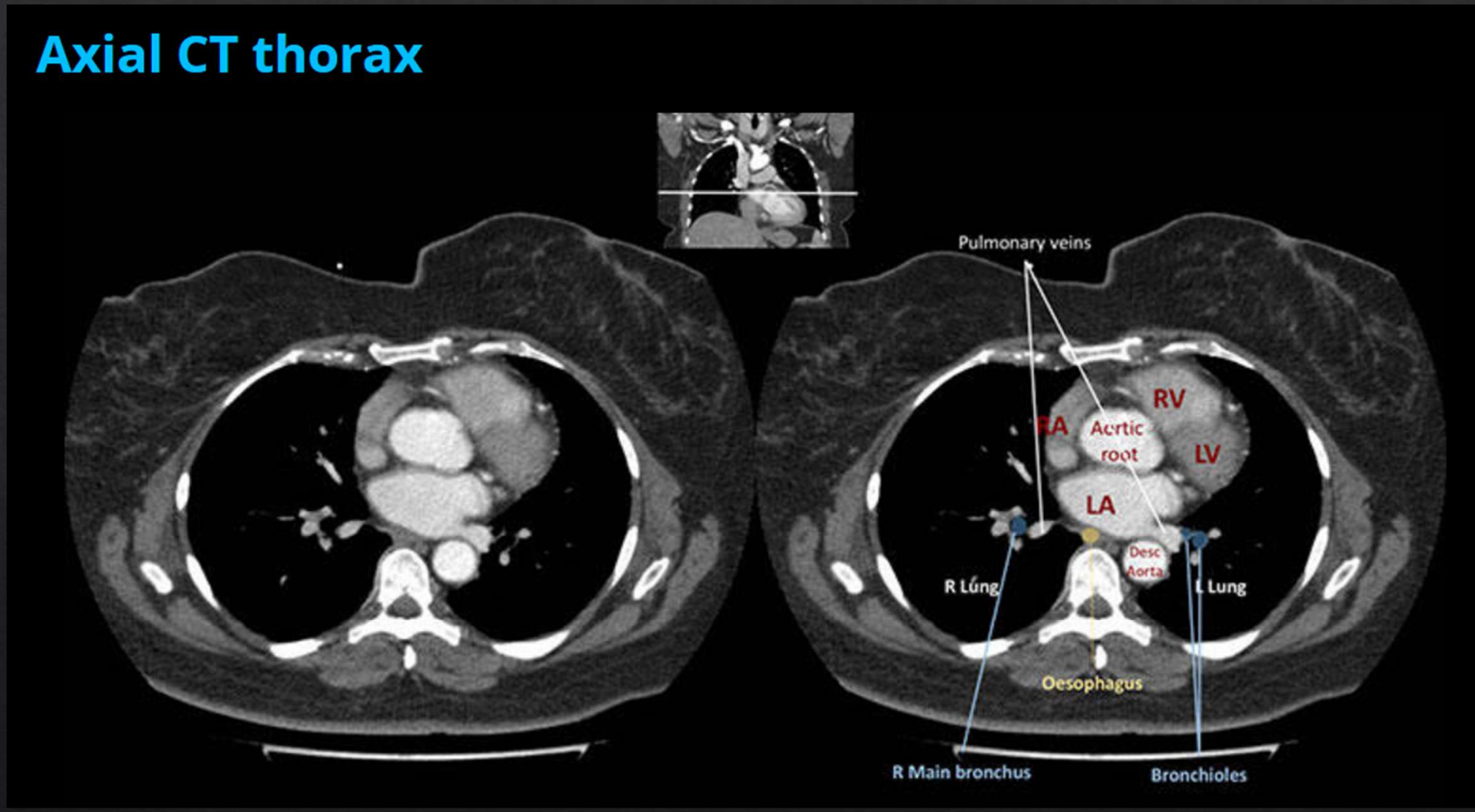

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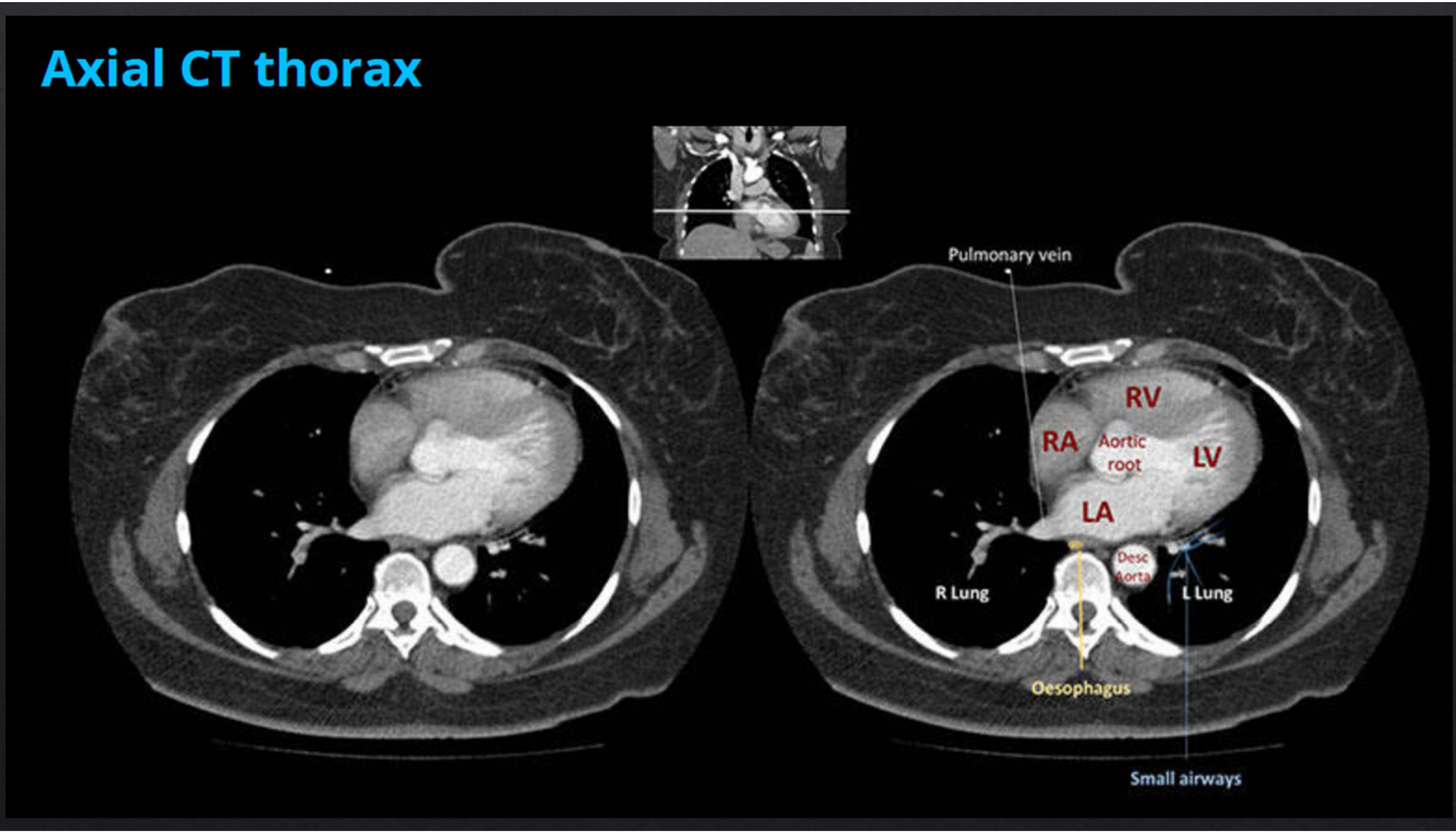
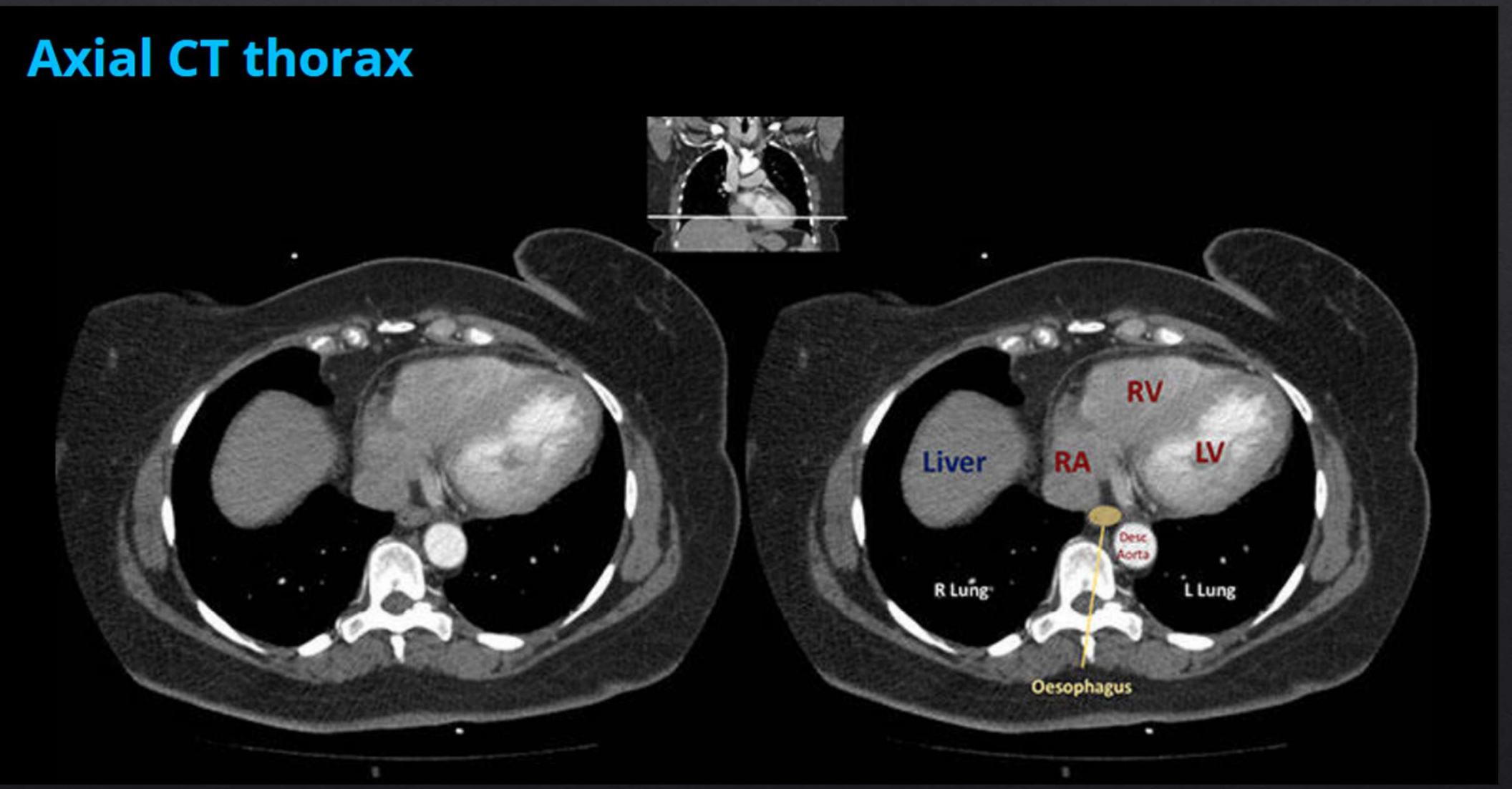


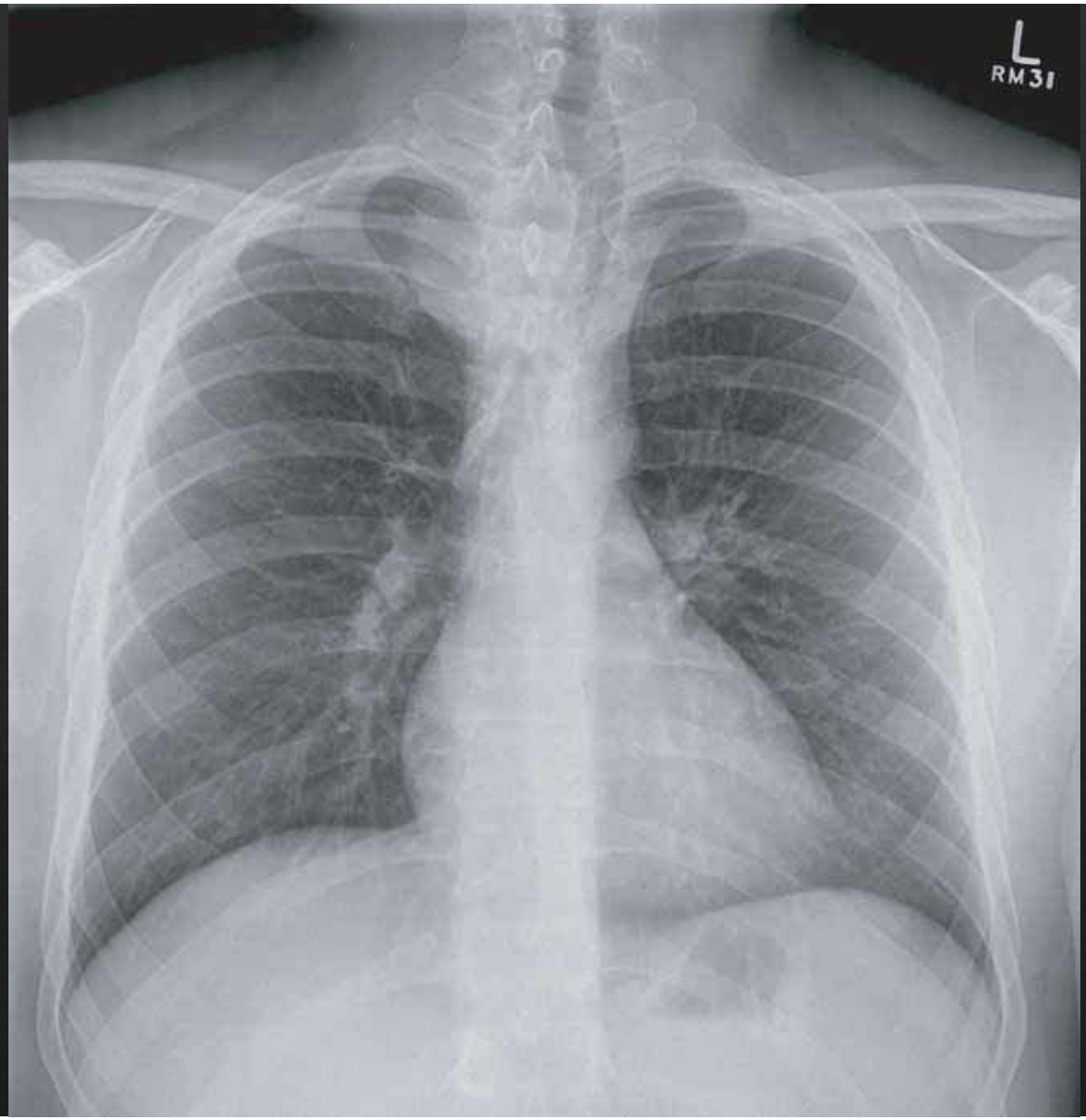
Axial CT thorax



Who Needs IV Contrast

- Best used for:
  - assessment of mediastinal structures
  - vascular structures (PE, Aorta)
  - chronic pleural disease
  - lung masses
  - differentiation of parenchyma from the pleura or pleural collections.

Let's Look at Some Common Pathology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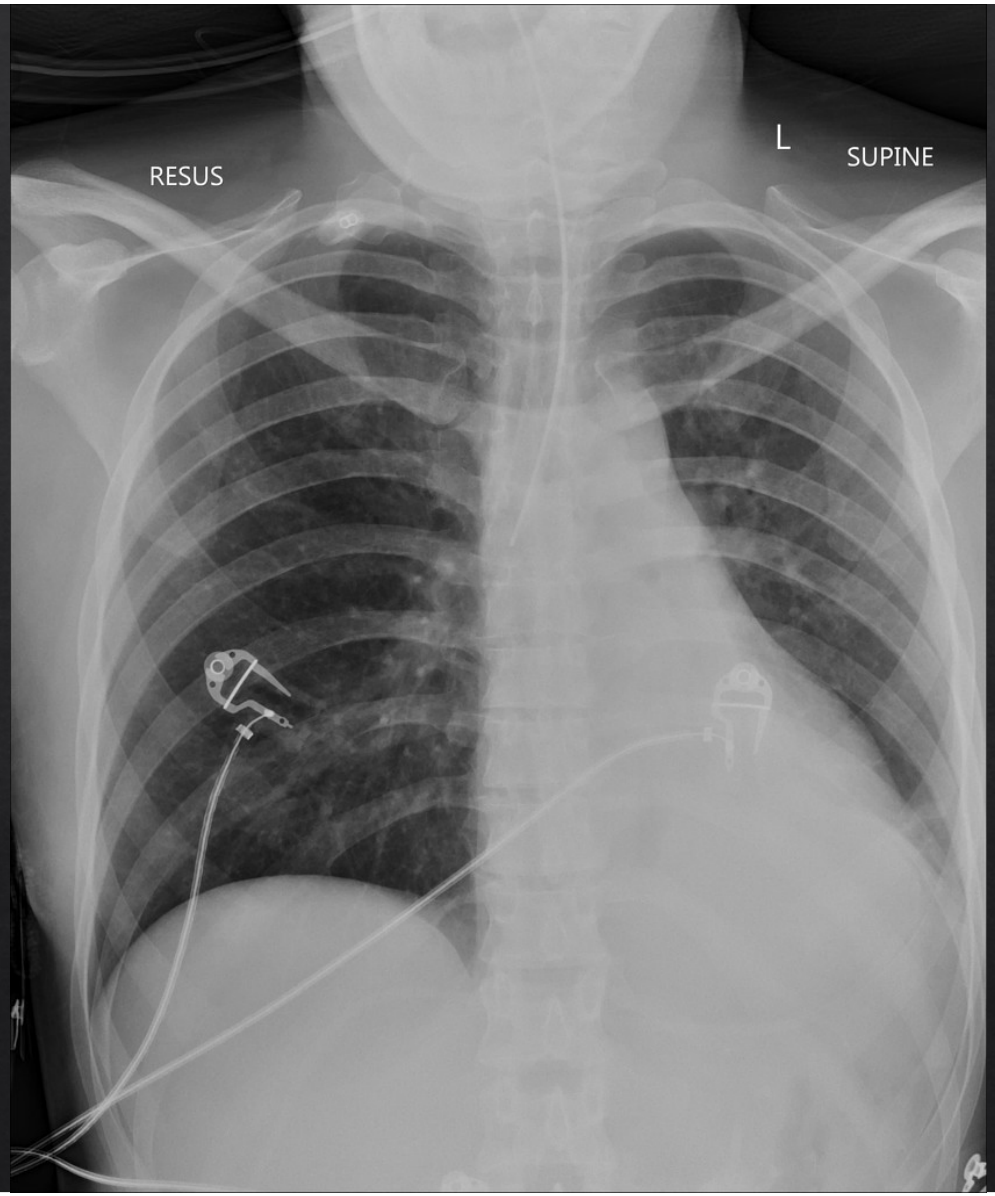
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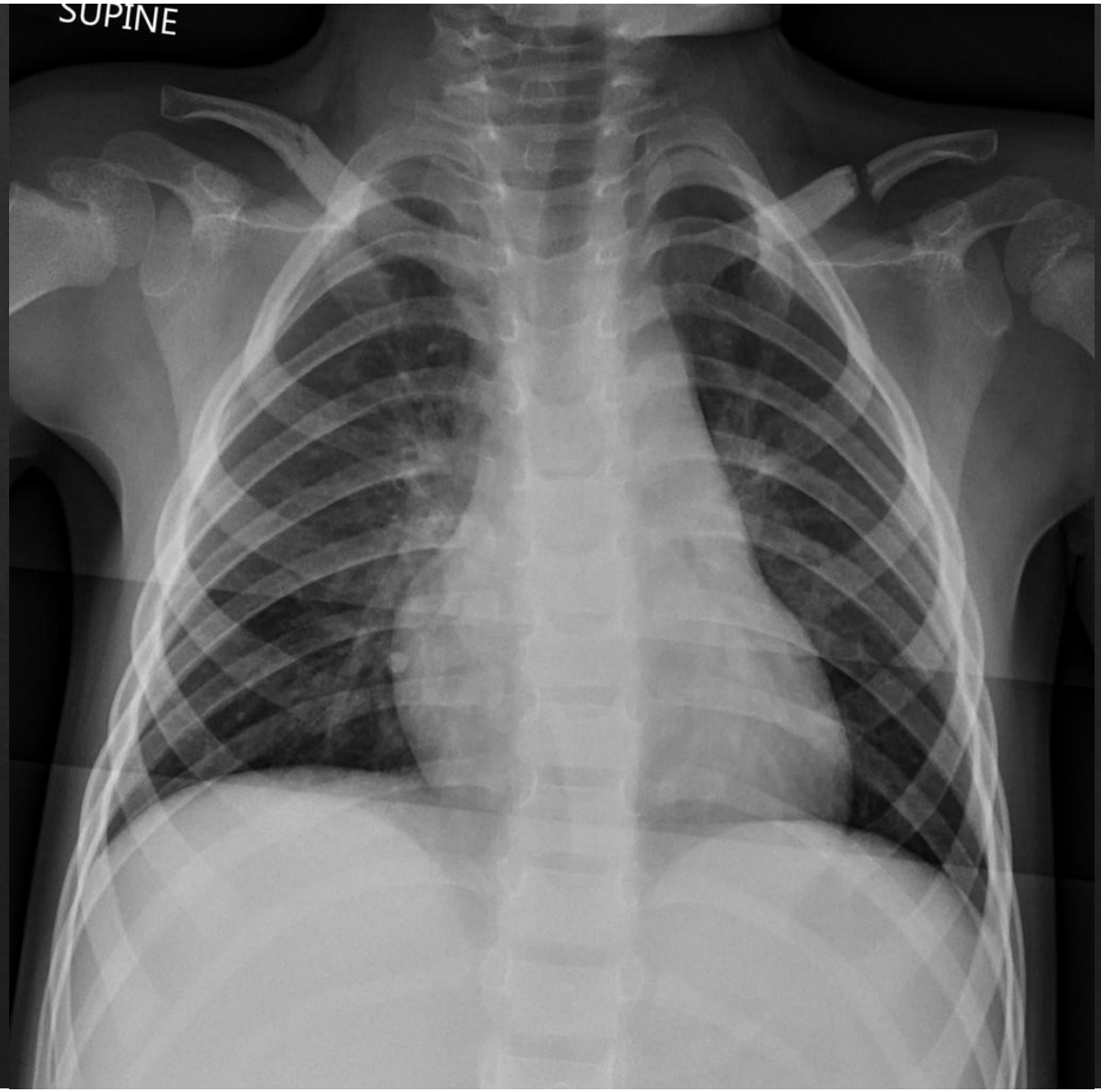
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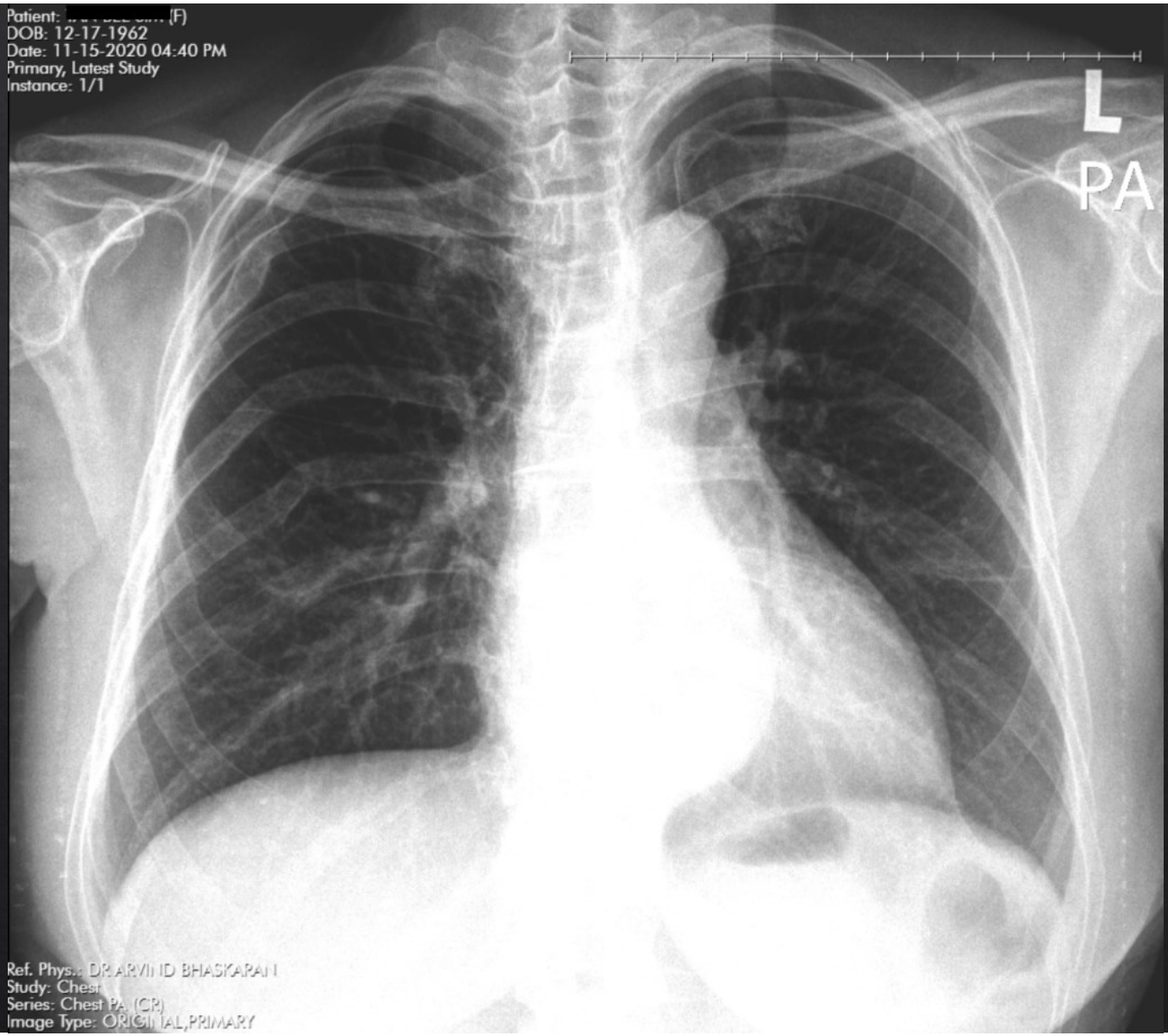
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Study: Chest
Series: Chest PA (CR)
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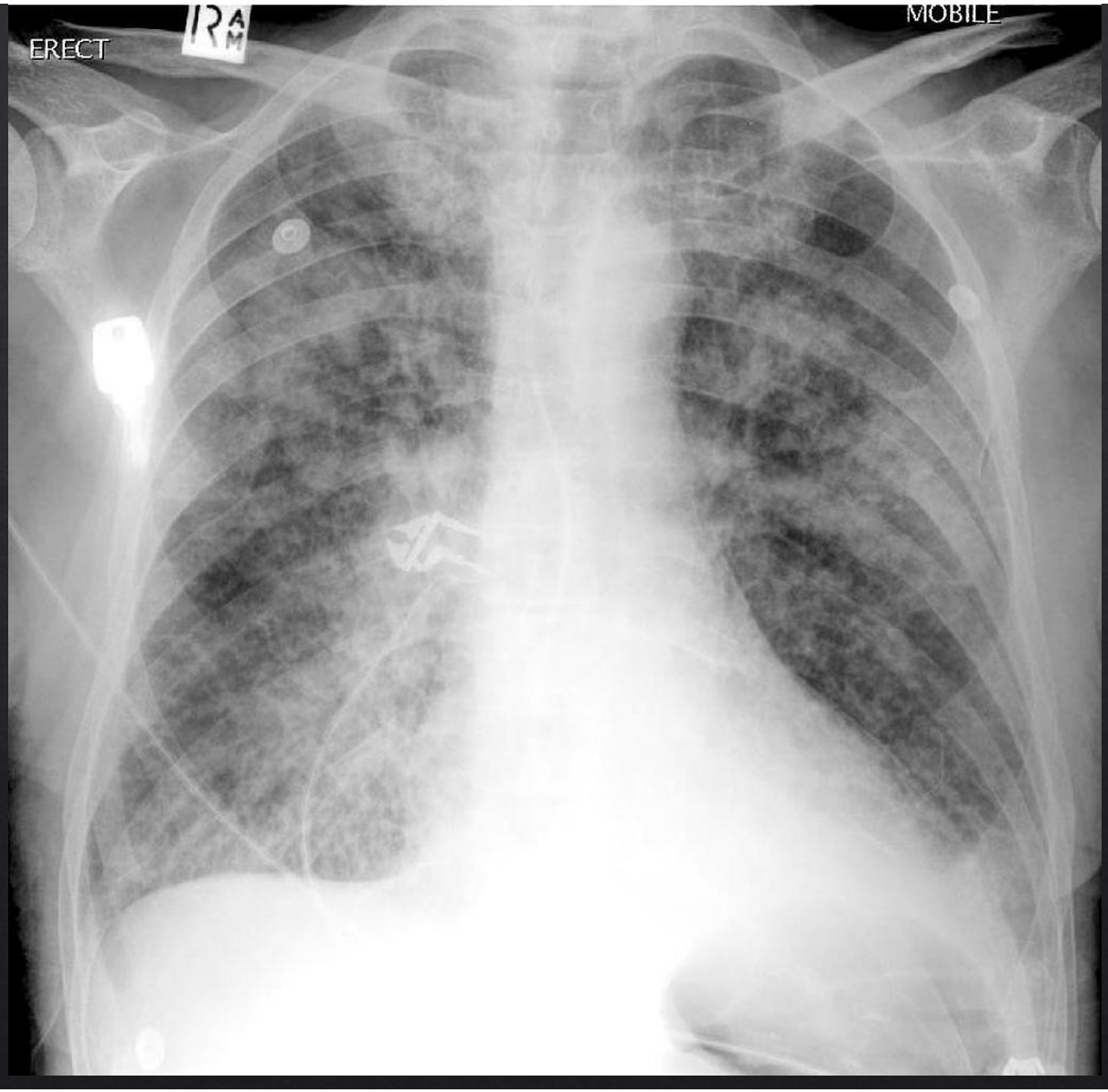
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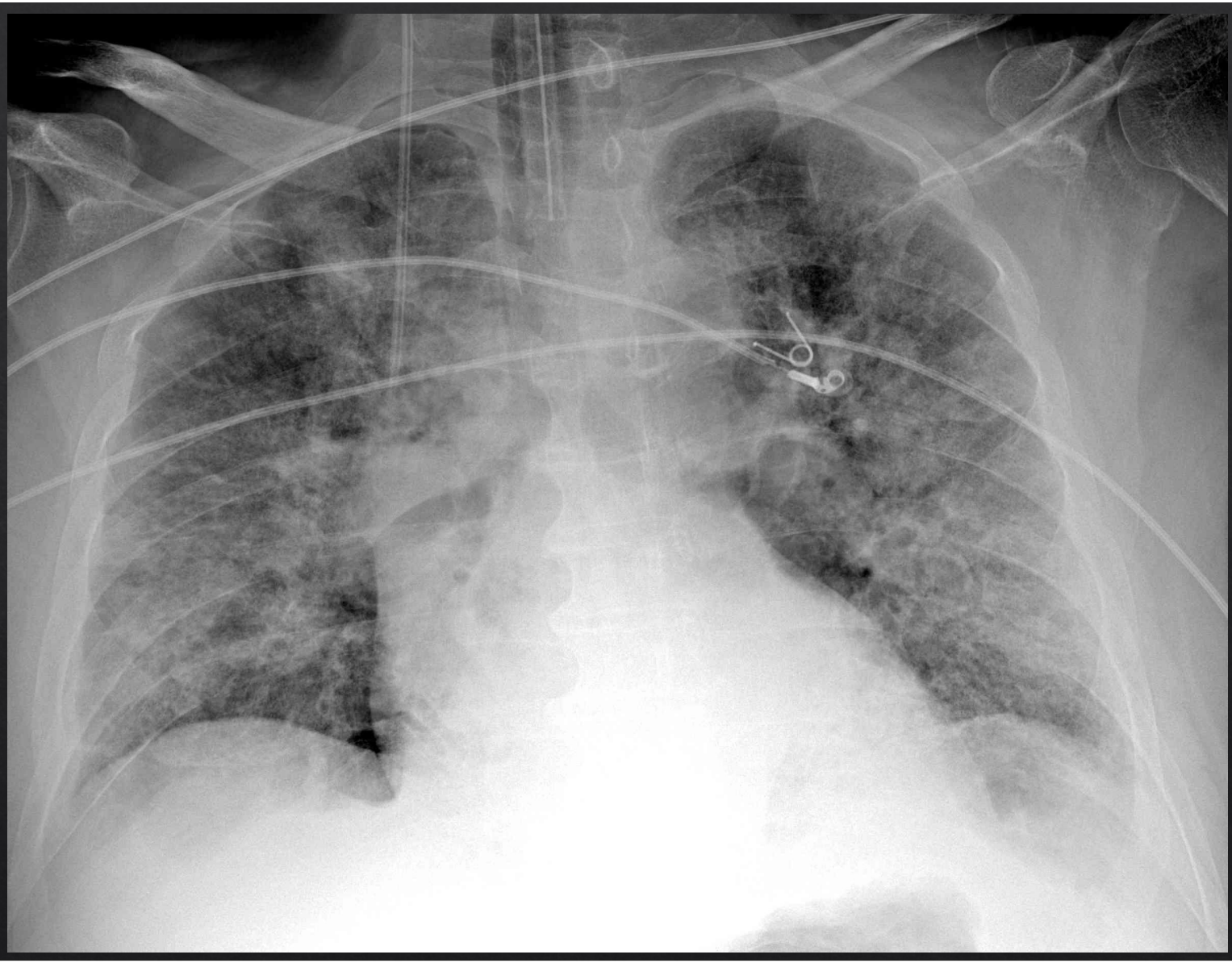

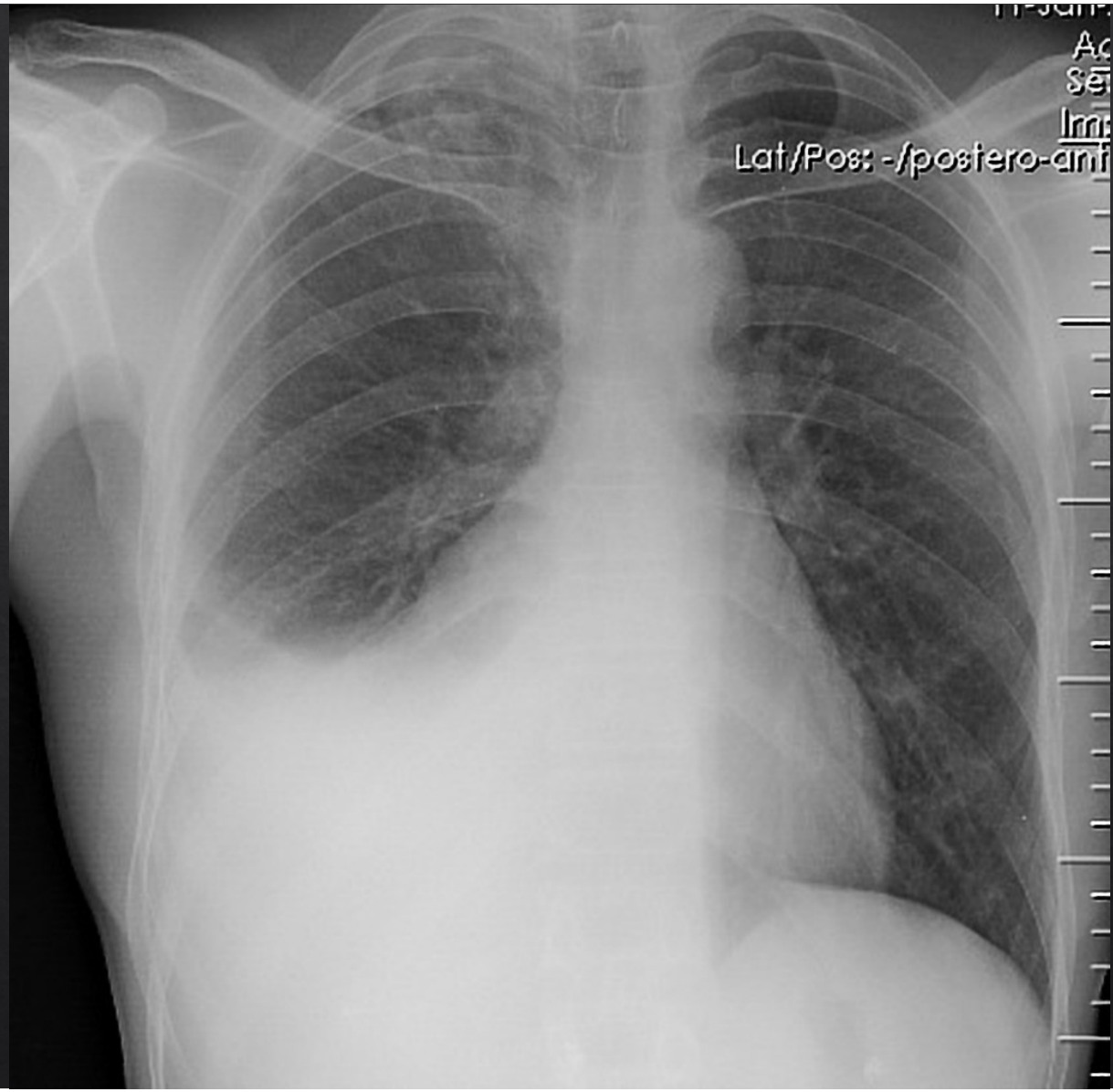
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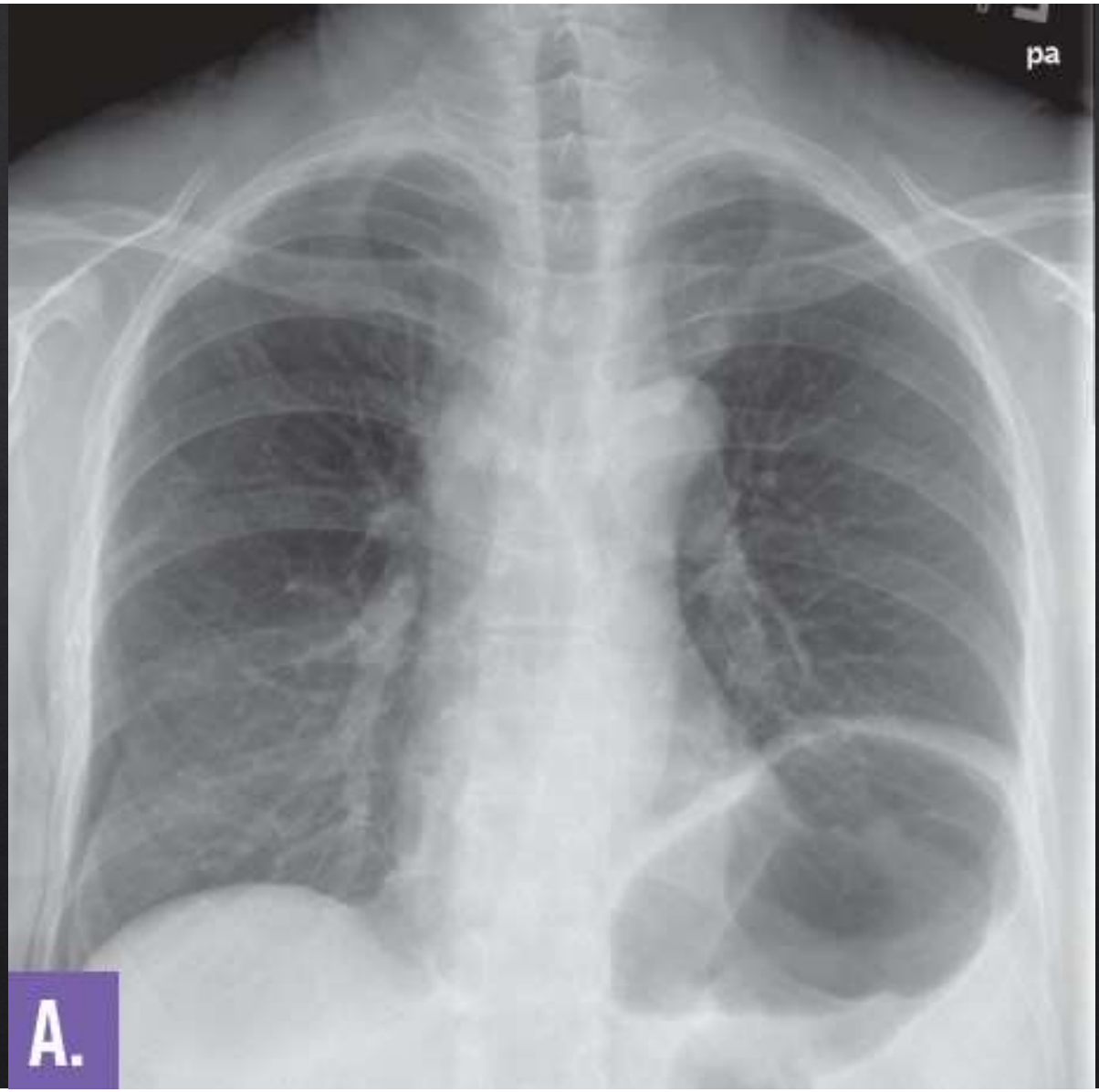
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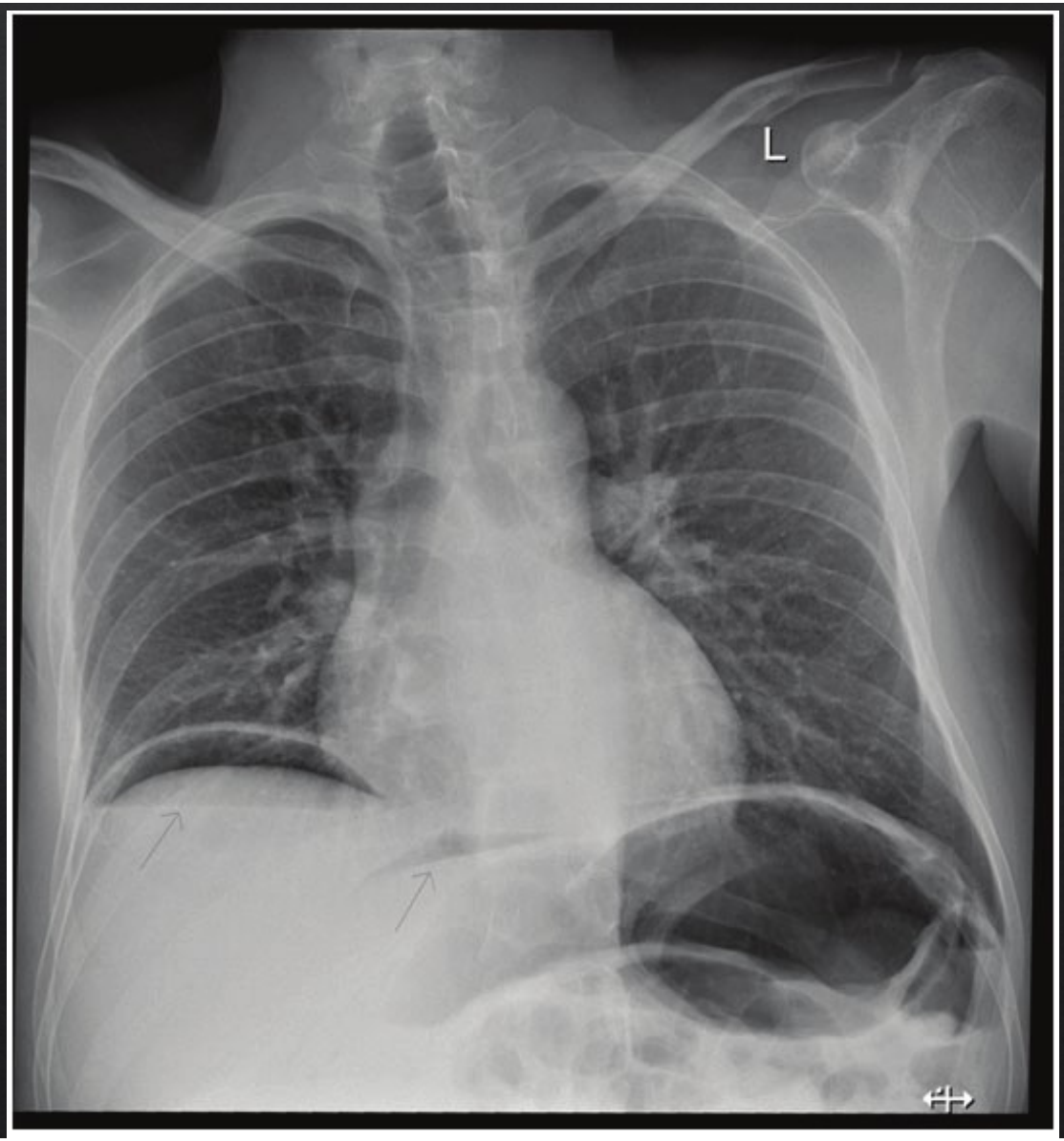
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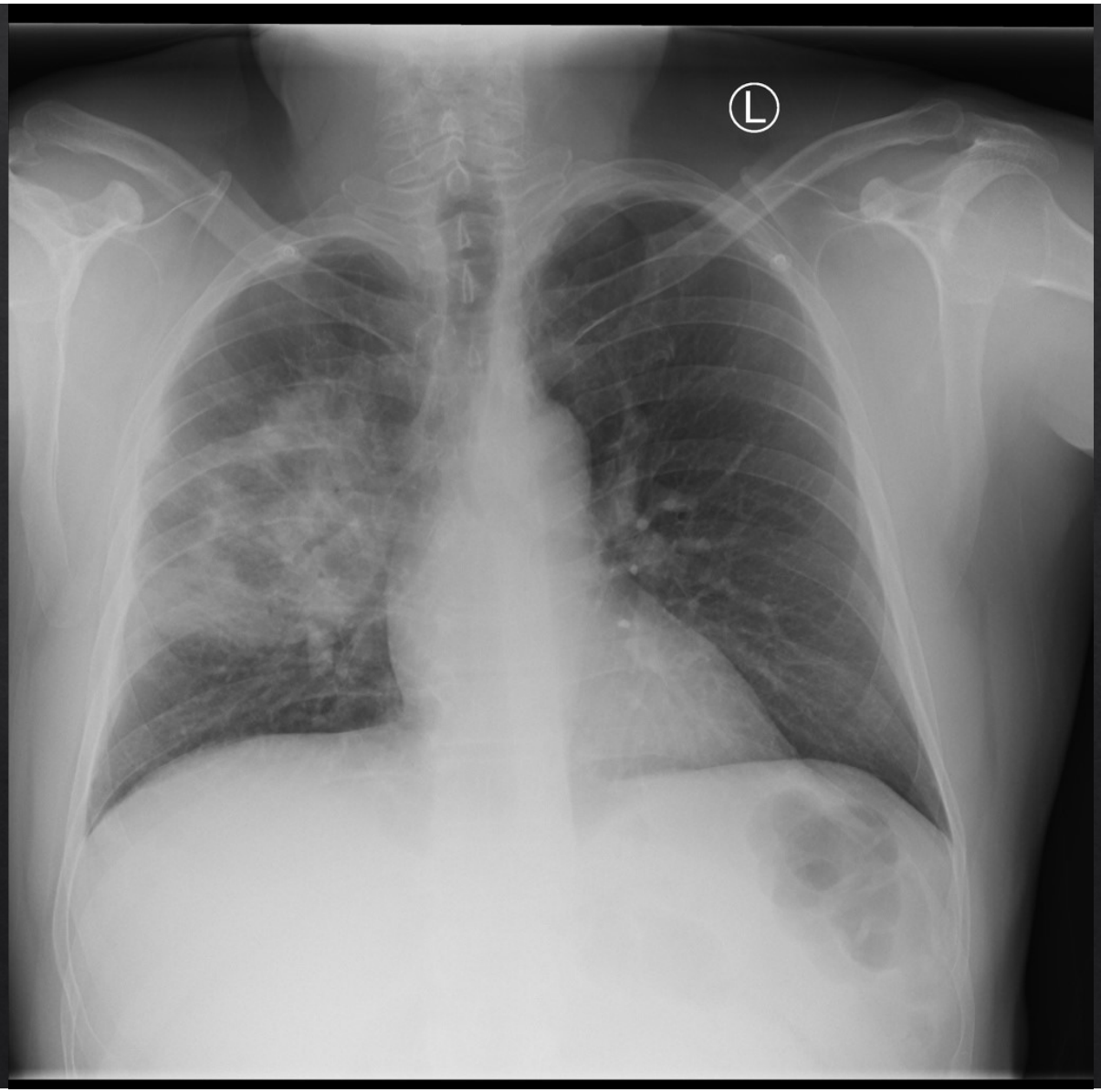
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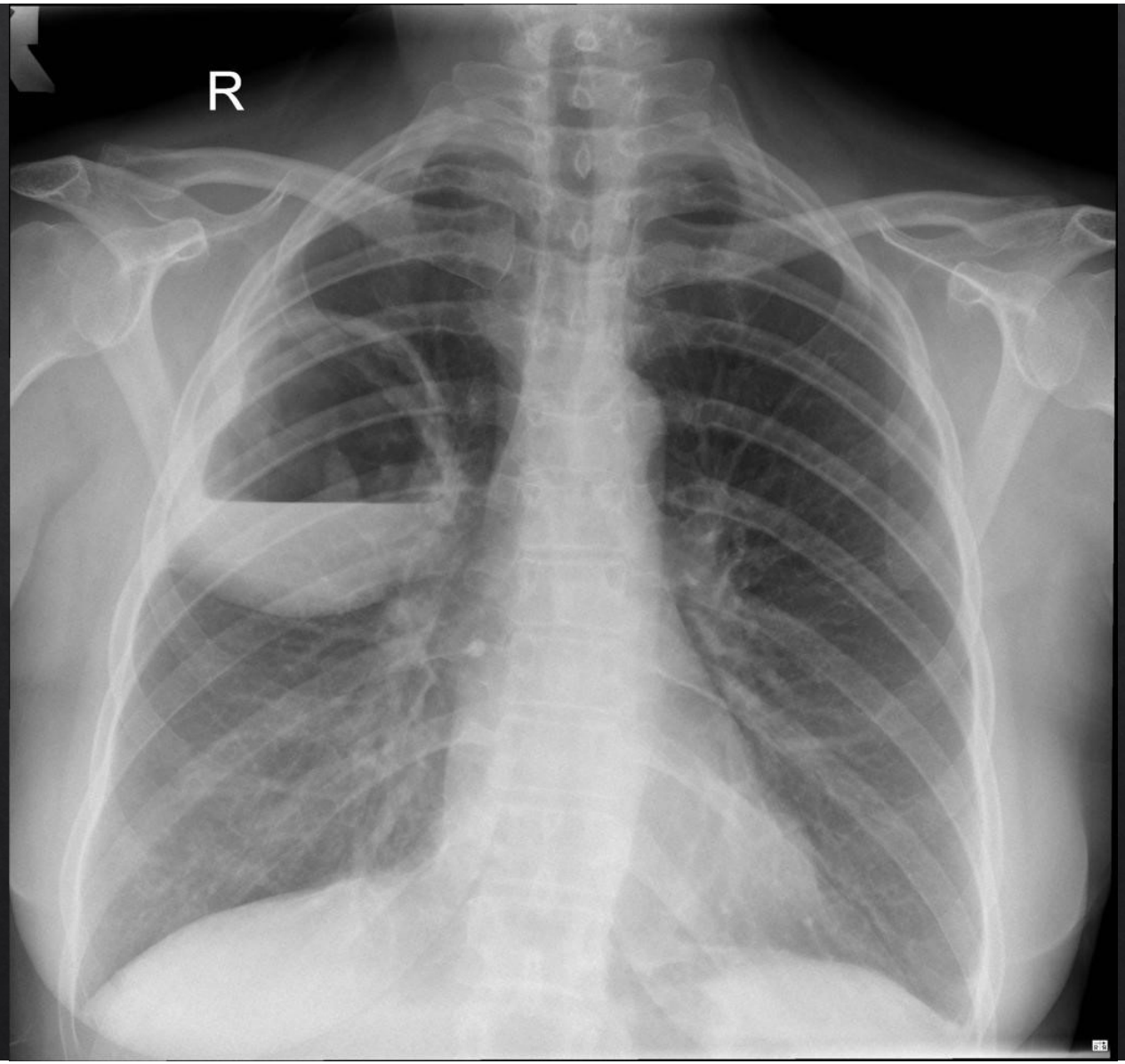
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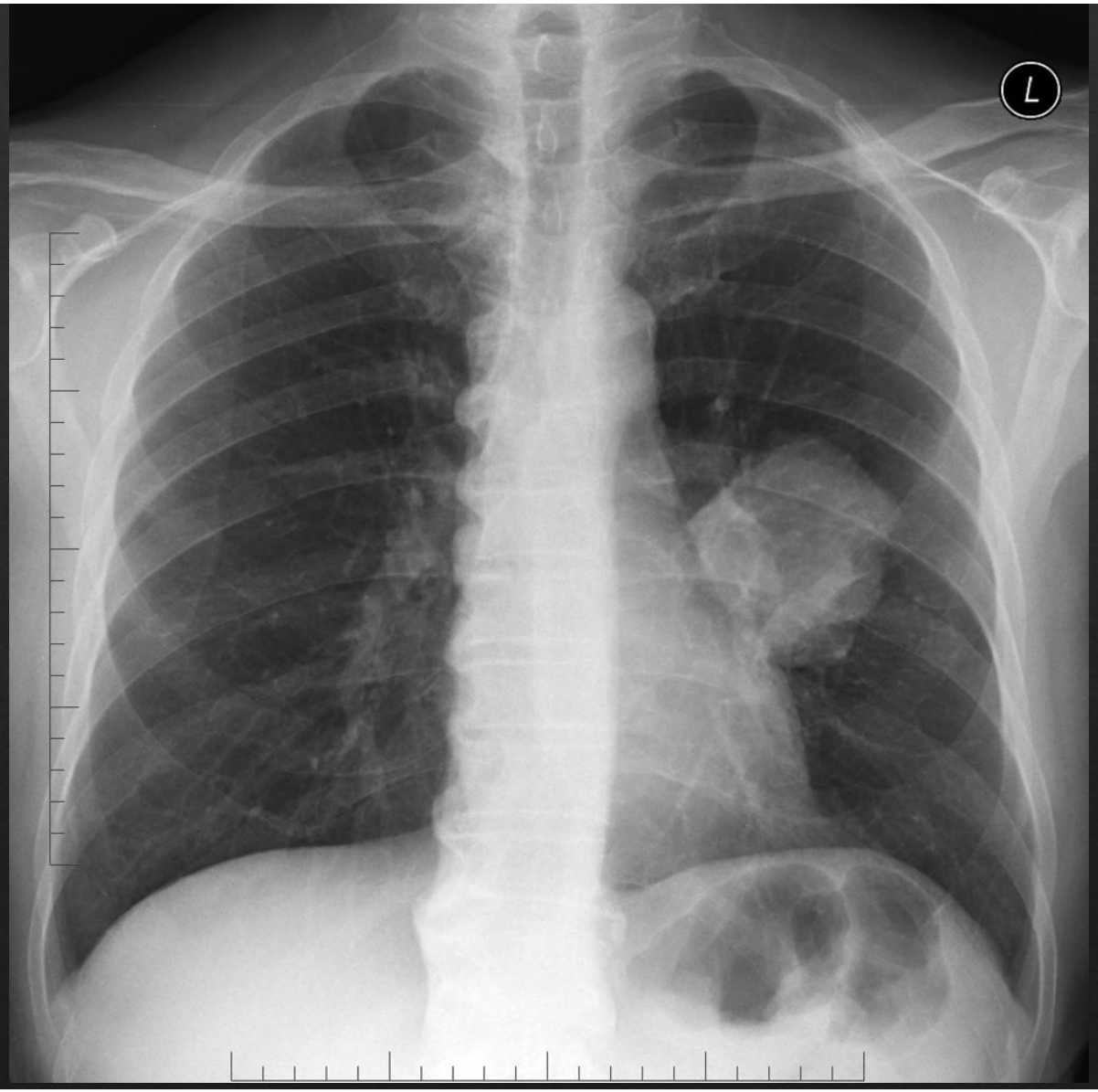
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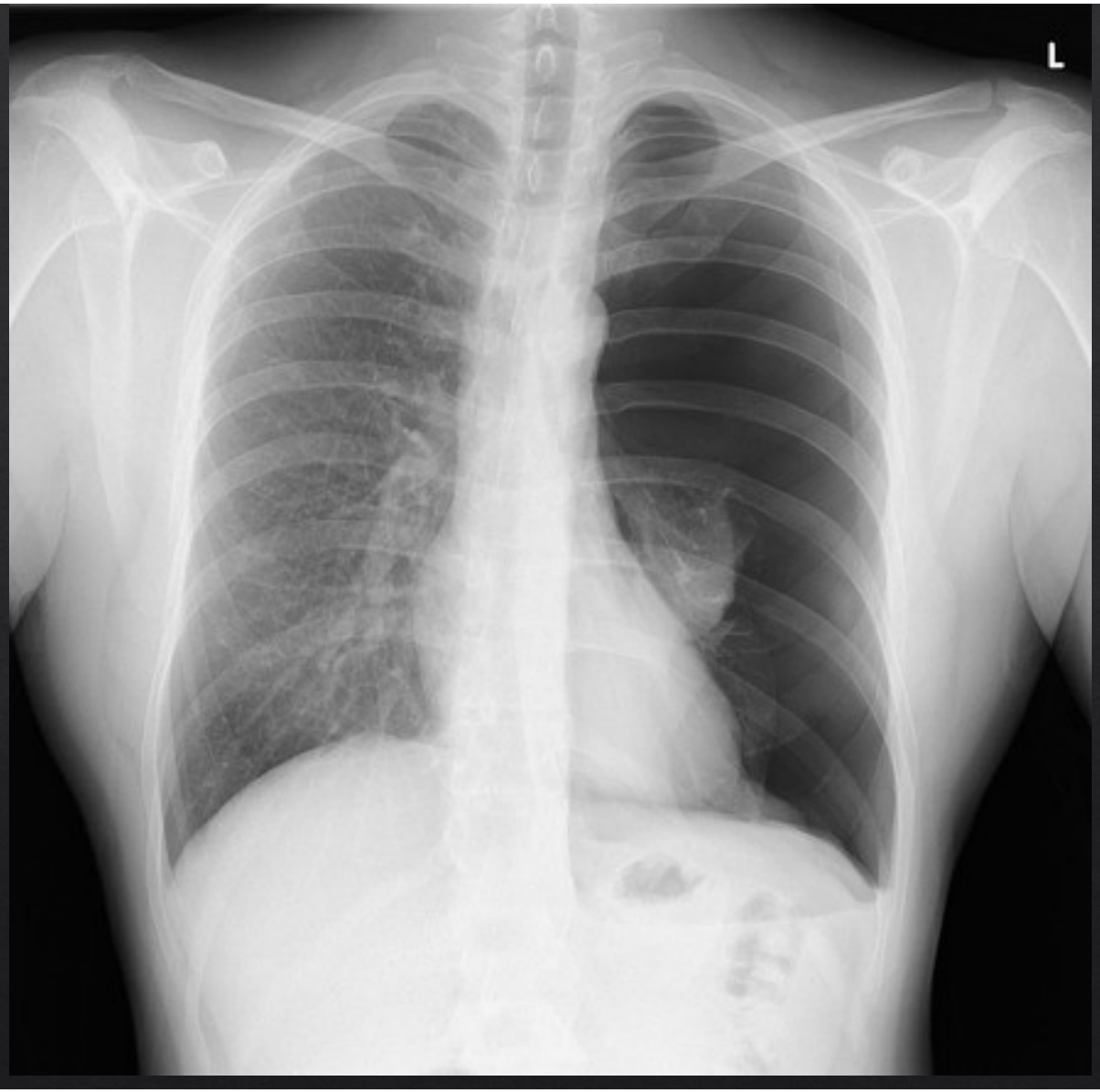
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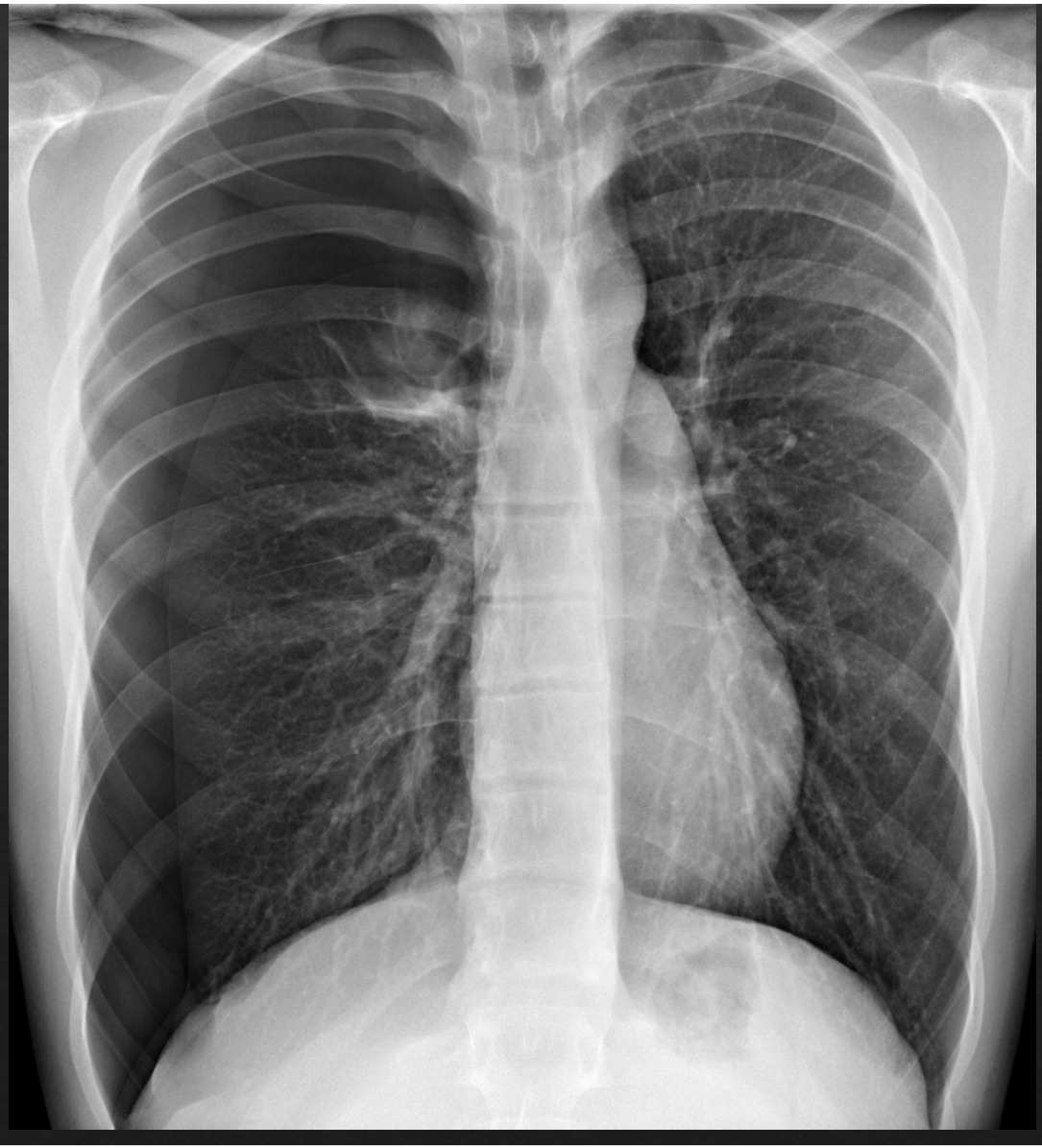

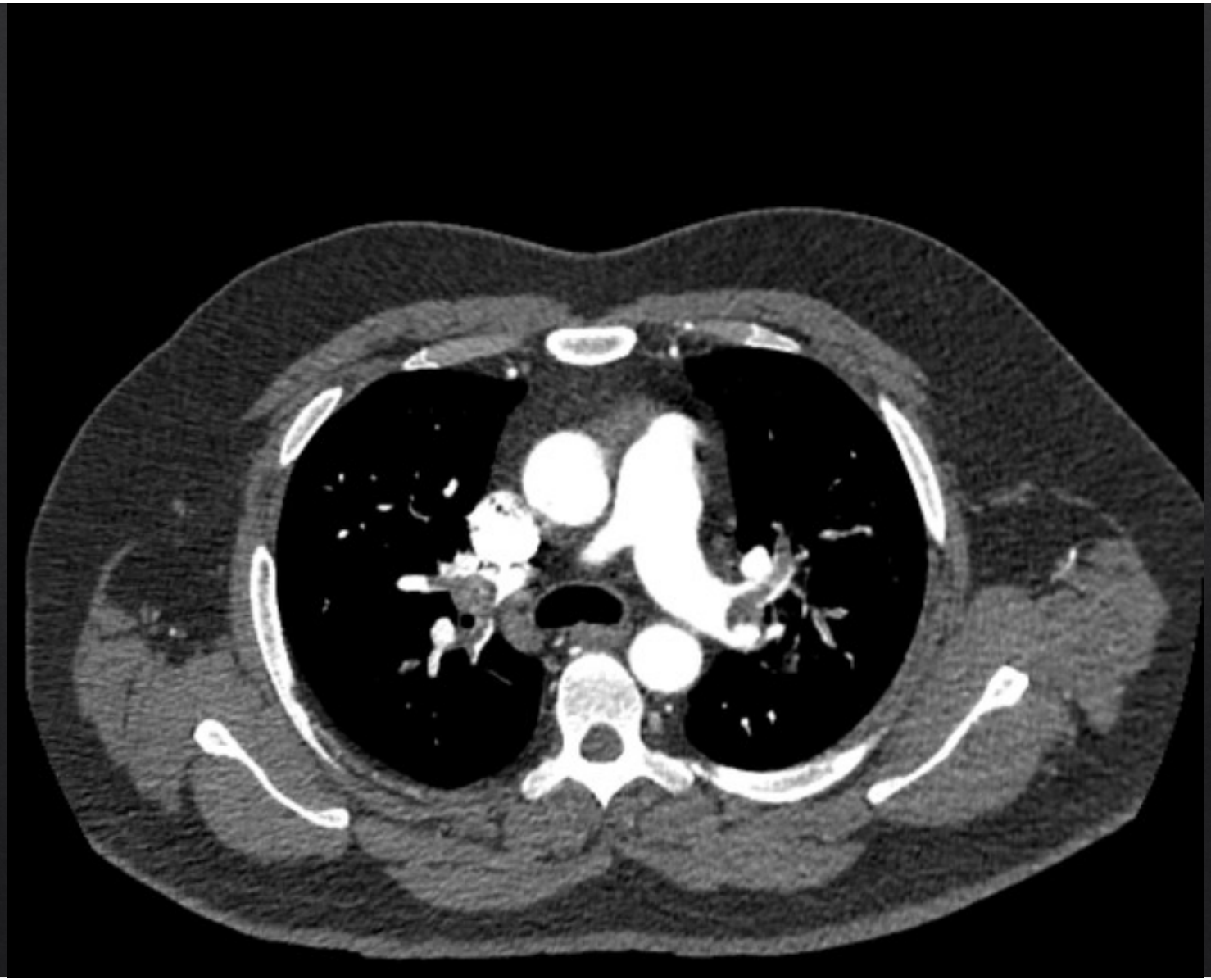

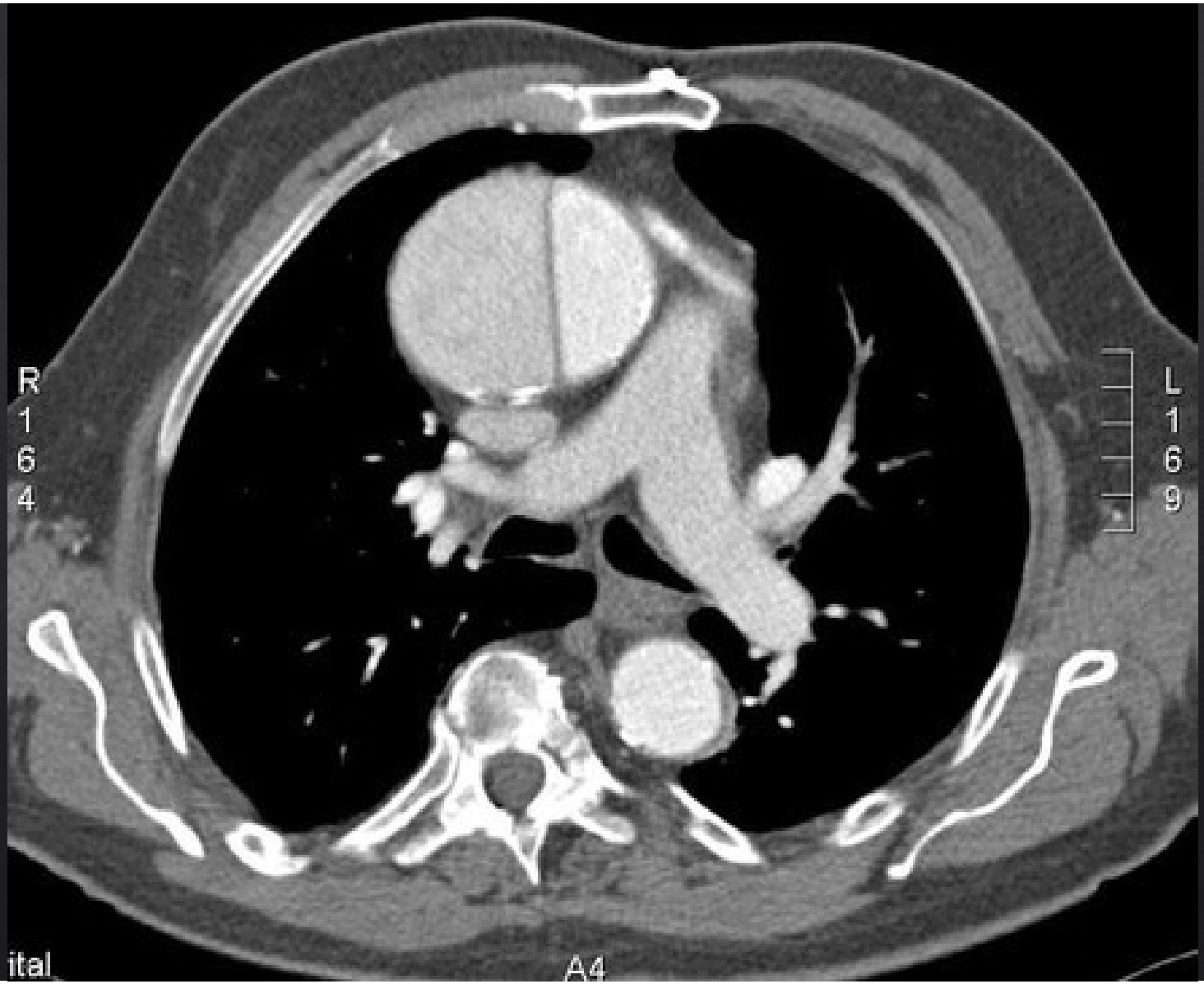
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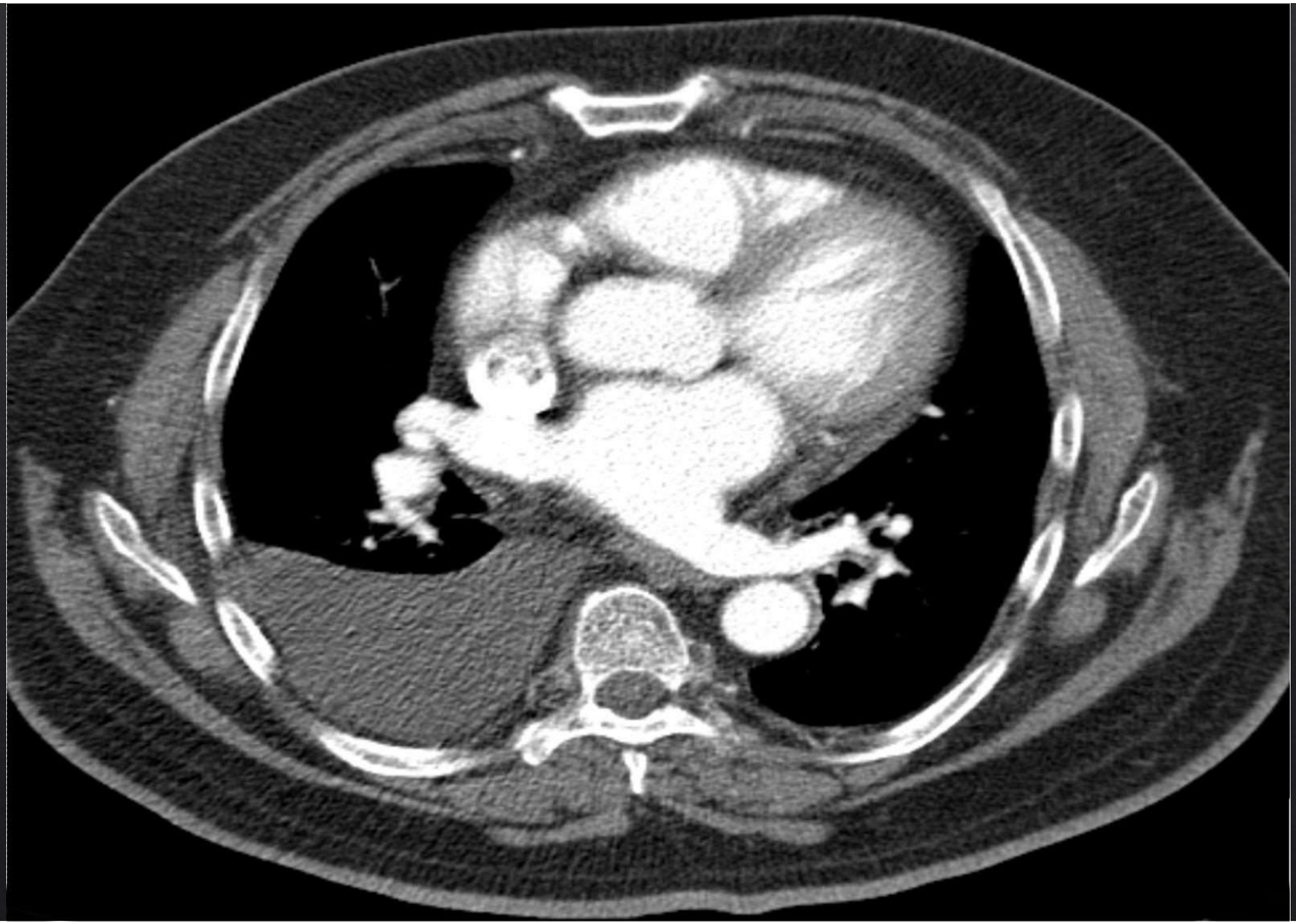

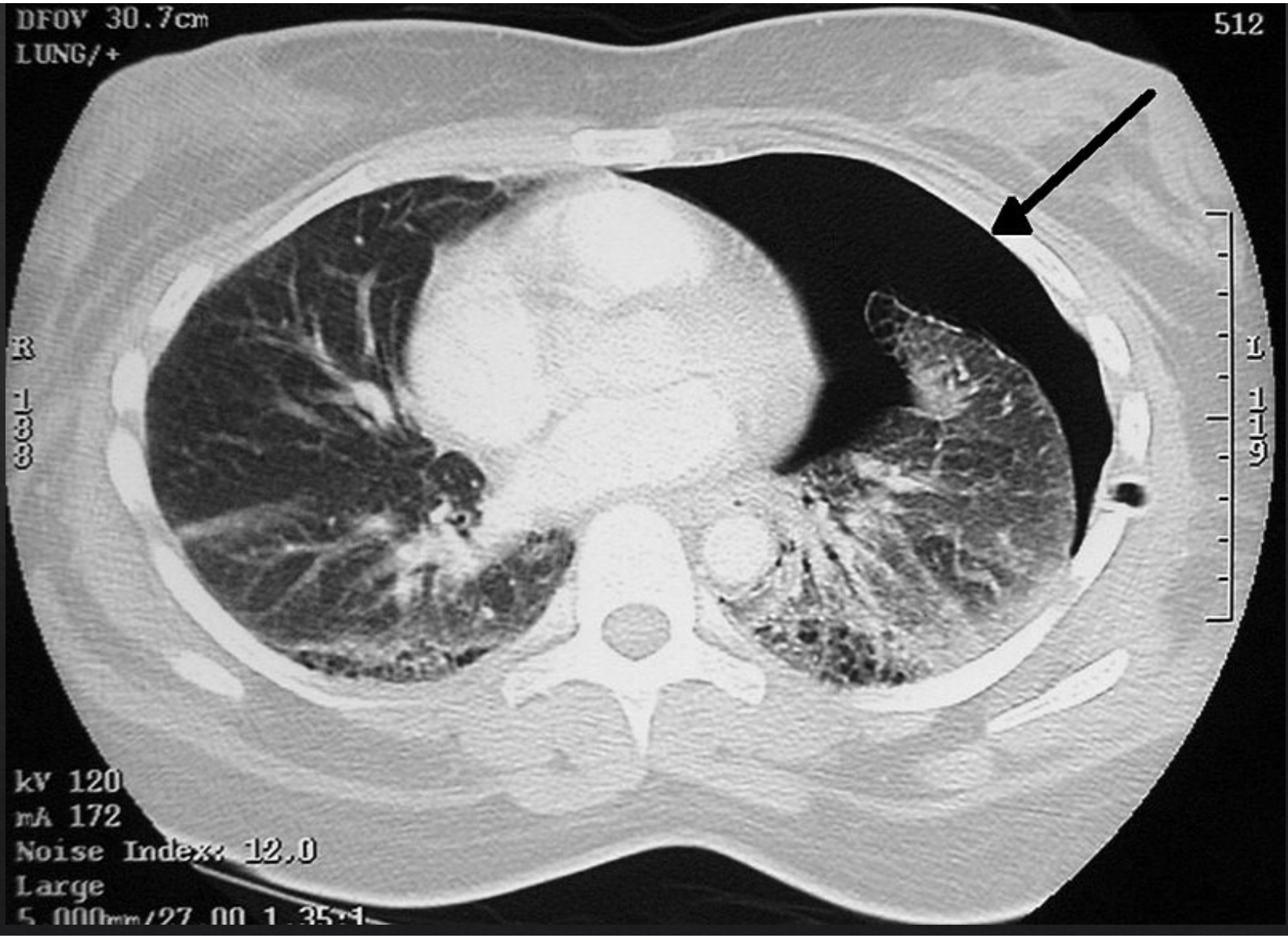
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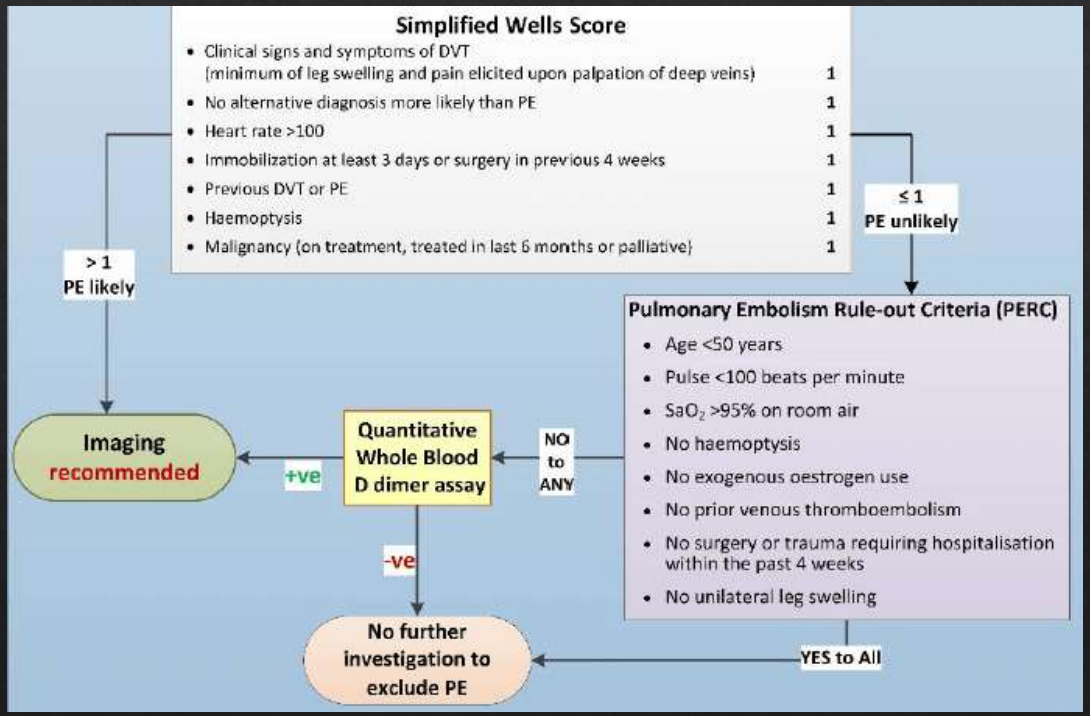
Does everyone with suspected ACS need a CXR?

- *The Canadian ACS Guidelines* suggest that patients can forgo CXR if they have:
  - No history of CHF
  - No history of smoking
  - No abnormalities on auscultation
  - However the study that this was based on could not be validated in subsequent studies.
- Another study suggests that it is reasonable to consider forgoing routine chest radiography in adult patients with non-traumatic chest pain that do not demonstrate any of the variables of the ***modified Rothrock criteria.***
  - age over 65
  - history of alcohol use
  - history of CHF
  - fever
  - hypoxia
  - tachypnea
  - decreased breath sounds
- ULTIMATELY CLINICAL JUDGMENT PREVAILS

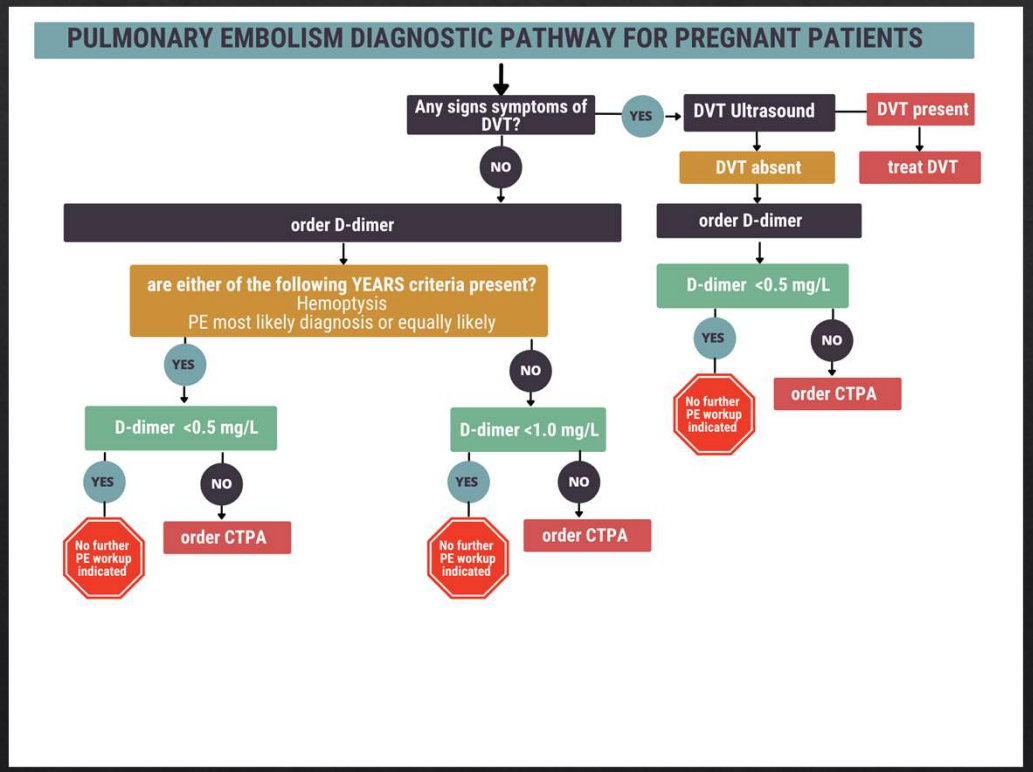
Should we jump right to chest CT to evaluate for PE?

- We have all these tools:
  - Wells Score
  - PE Rule Out Criteria (PERC)
  - D-Dimer Use



What if I suspect PE in pregnancy?

- Pulmonary embolism (PE) in pregnancy is quite uncommon, estimated to occur in 0.02–0.1 percent of pregnancies
- Pregnancy adapted YEARS algorithm



Take Home Points

- Use a systematic approach to radiology
- Use the same approach every time
- Don’t stop at the first abnormal finding!!!
- Always look at your own films!!
- Don’t order a study just to order a study

References

- http://www.emdocs.net/em-cases-emergency-radiology-controversies/
- https://www.saem.org/about-saem/academies-interest-groups-affiliates2/cdem/for-students/online-education/m3-curriculum/group-diagnostic-testing/chest-radiograph
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Questions?