

Back to Basics 1

- The Chest

Chest radiography

- Most common radiograph worldwide
- One at greatest risk for poor performance
- Poor diagnostic value when:
 - Non-standard position
 - Poorly executed
 - Misunderstood
- Does the doctor understand the technique?

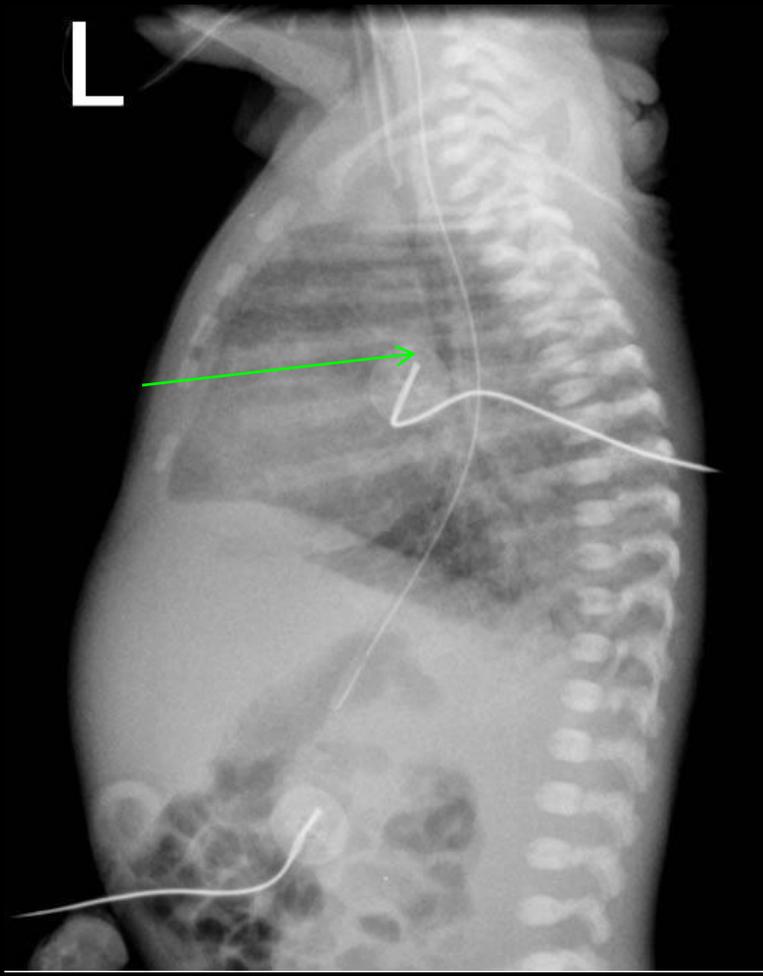
Aim of the session

- Revisit anatomy
 - Child
 - Adult
- Understand the implications of technique on image appearance and diagnosis

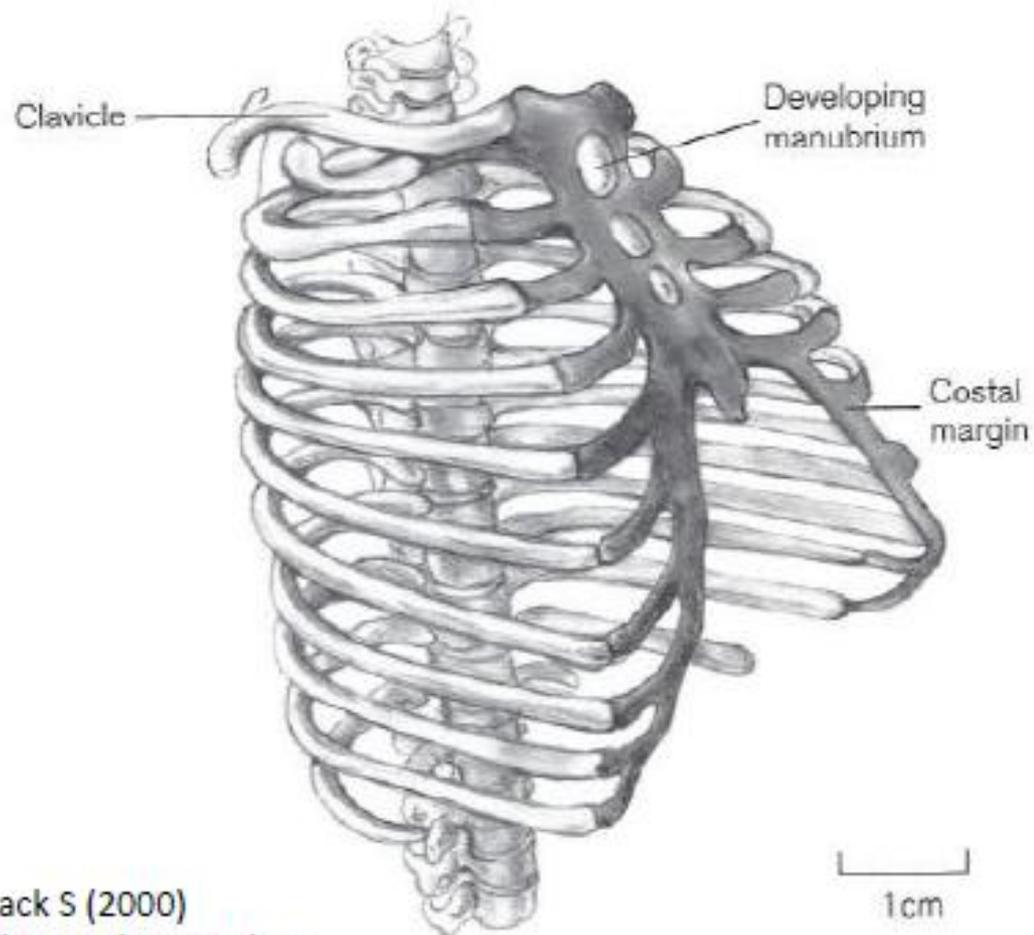
Baby to Adult



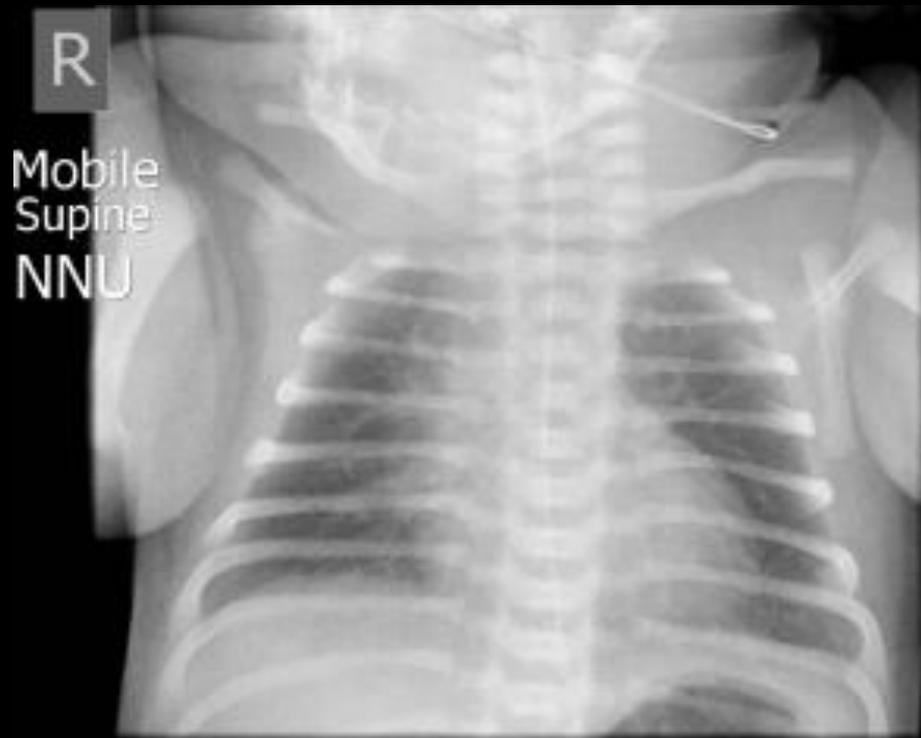




Newborn Thoracic Cage



Scheuer L & Black S (2000)
Developmental Juvenile Osteology



So what?

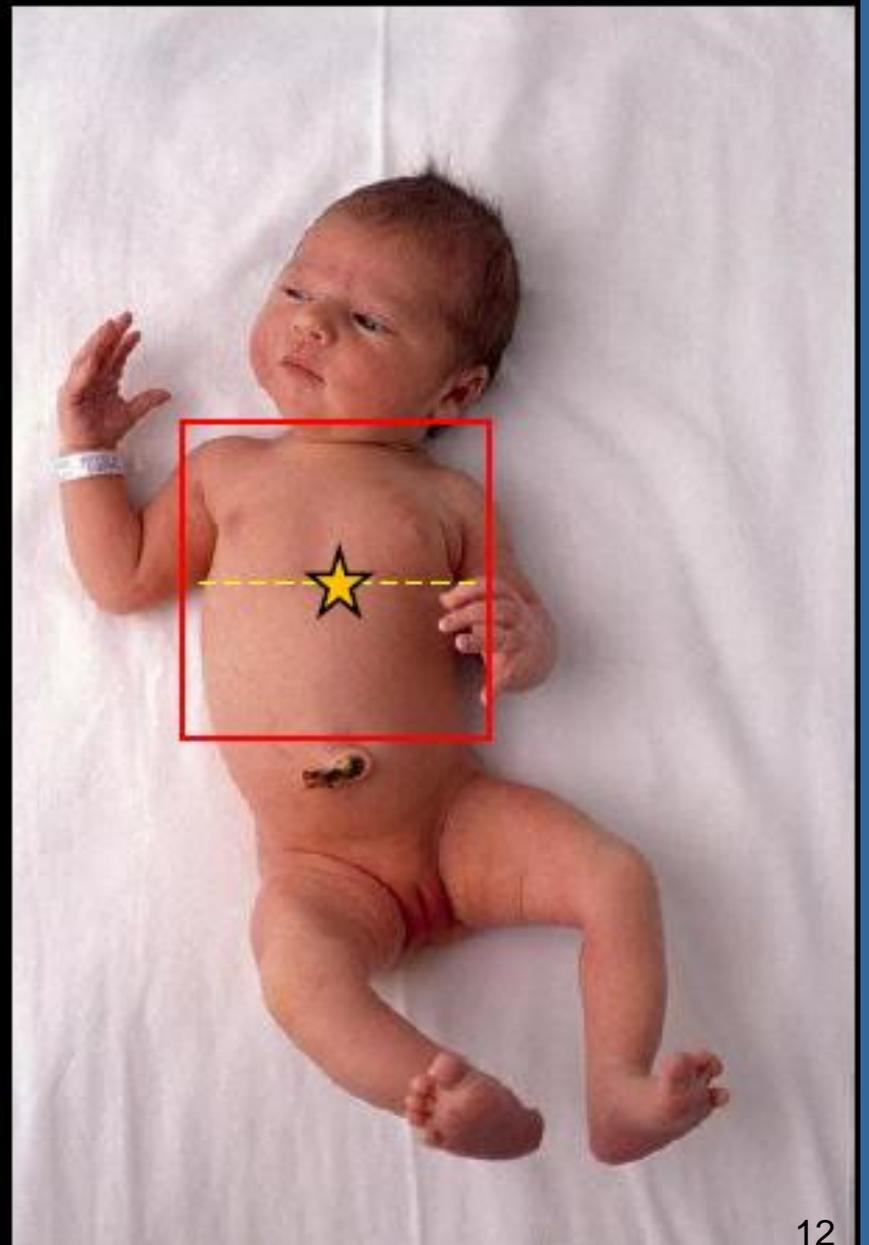
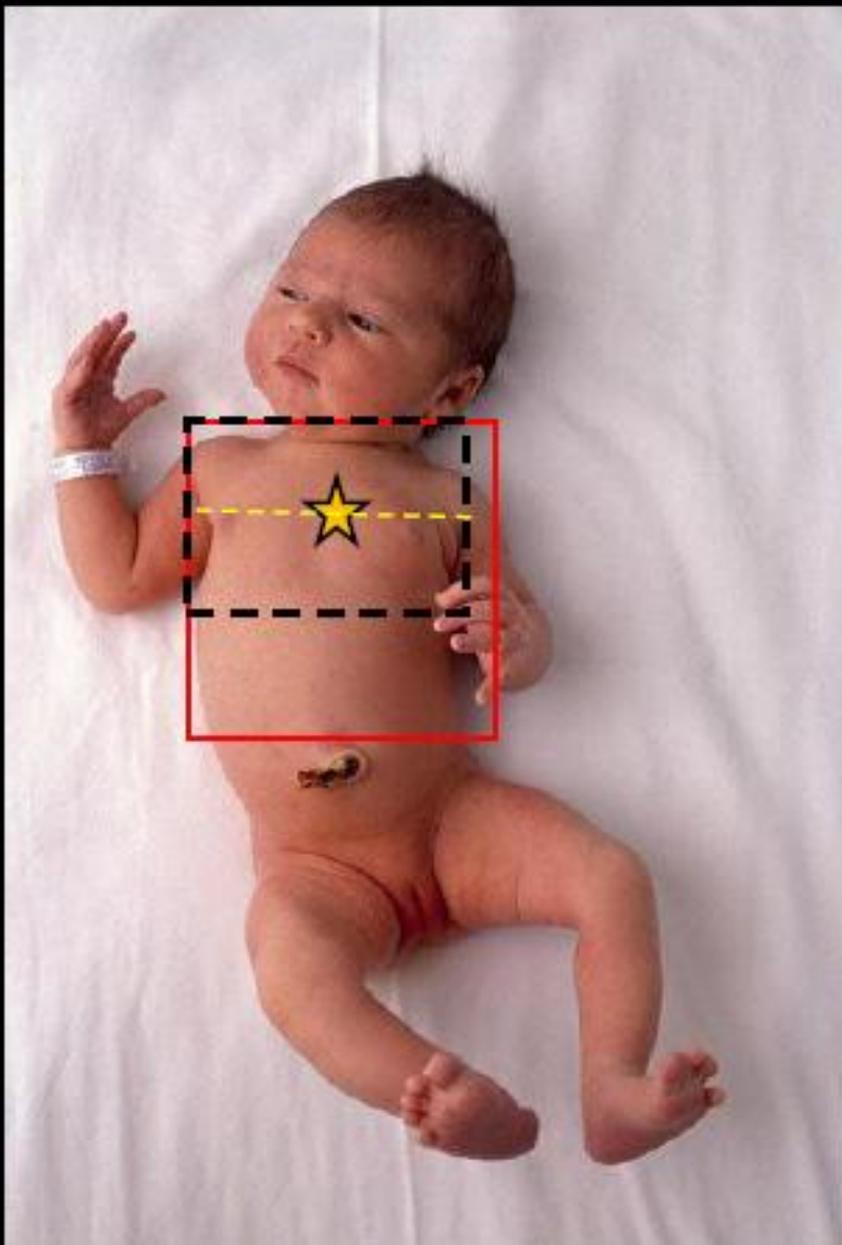
- If we acknowledge anatomy is different:
- What about technique?
- What is the evidence base?

- **Carver E & Carver B (2006)**
Medical Imaging Techniques,
Reflection and Evaluation
- **Whitley et al (2005)**
Clark's Positioning in Radiography
(12th ed)
- **Bontrager KL (2005)**
Textbook of radiographic
positioning and related anatomy
(6th ed)
- **Ballinger P & Frank E (1999)**
Merrill's atlas of radiographic
positions and radiologic
procedures (9th Edition)
- **Centre to over midline of sternal angle.** Lower border of collimation should be approximately 2-3cm below the nipples
- No single centring point is advised.
- Centred to the midsagittal plane at the **level of the mammillary (nipple) line**
- **Centre to T6/7** but the collimated field should extend from mastoid air cells (to demonstrate upper airway) to iliac crests to include inferior costal margins.



Resize and move the square to centre and collimate for a CXR





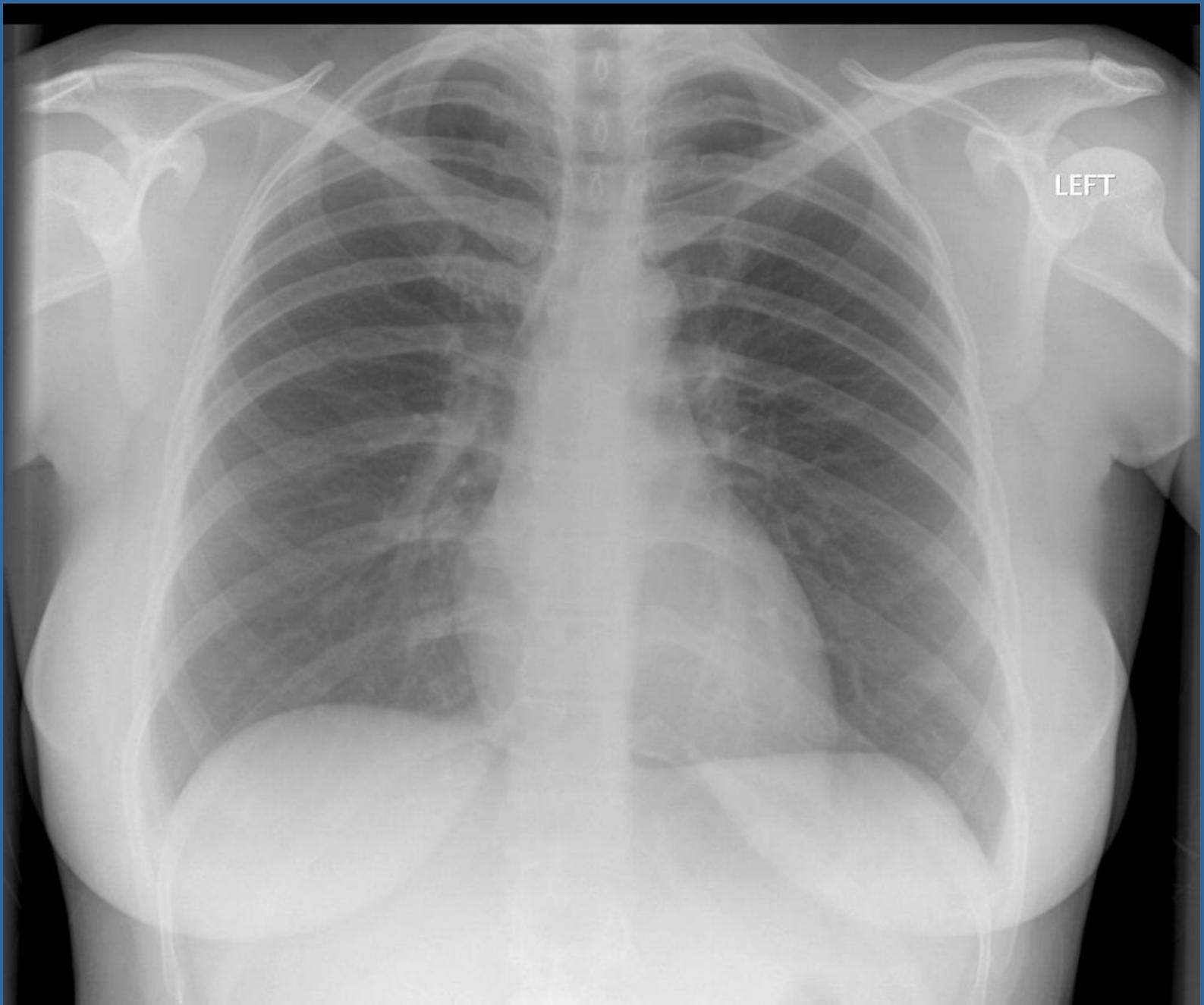
Knowledge base

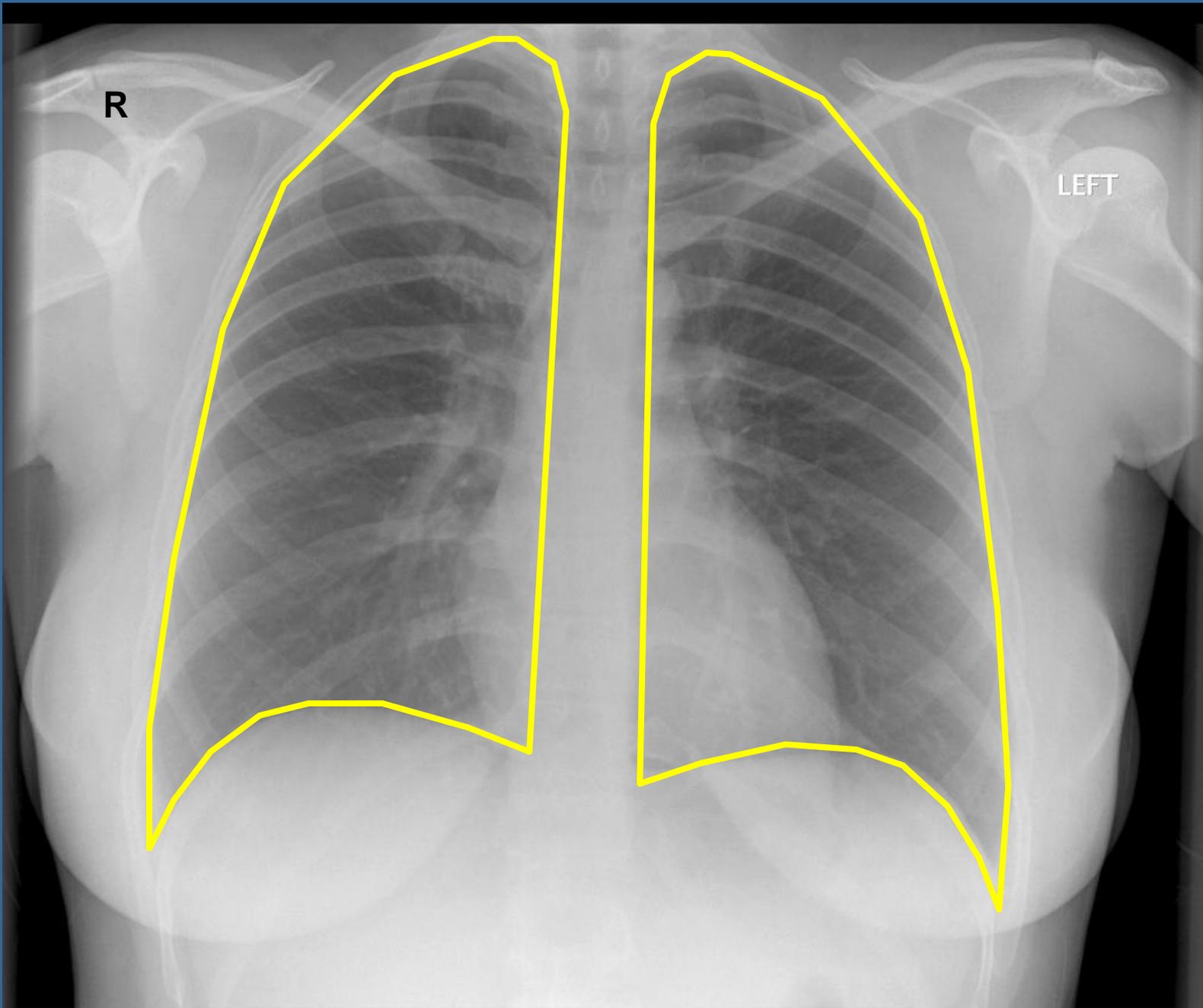
- Needs input from radiographers
- Must be reviewed
- Provides an opportunity for further research

So what about adults?

- How many CXR are performed in your centre?
- Have you ever undertaken a quality assessment?
- We have – not pretty!

Let's understand the anatomy



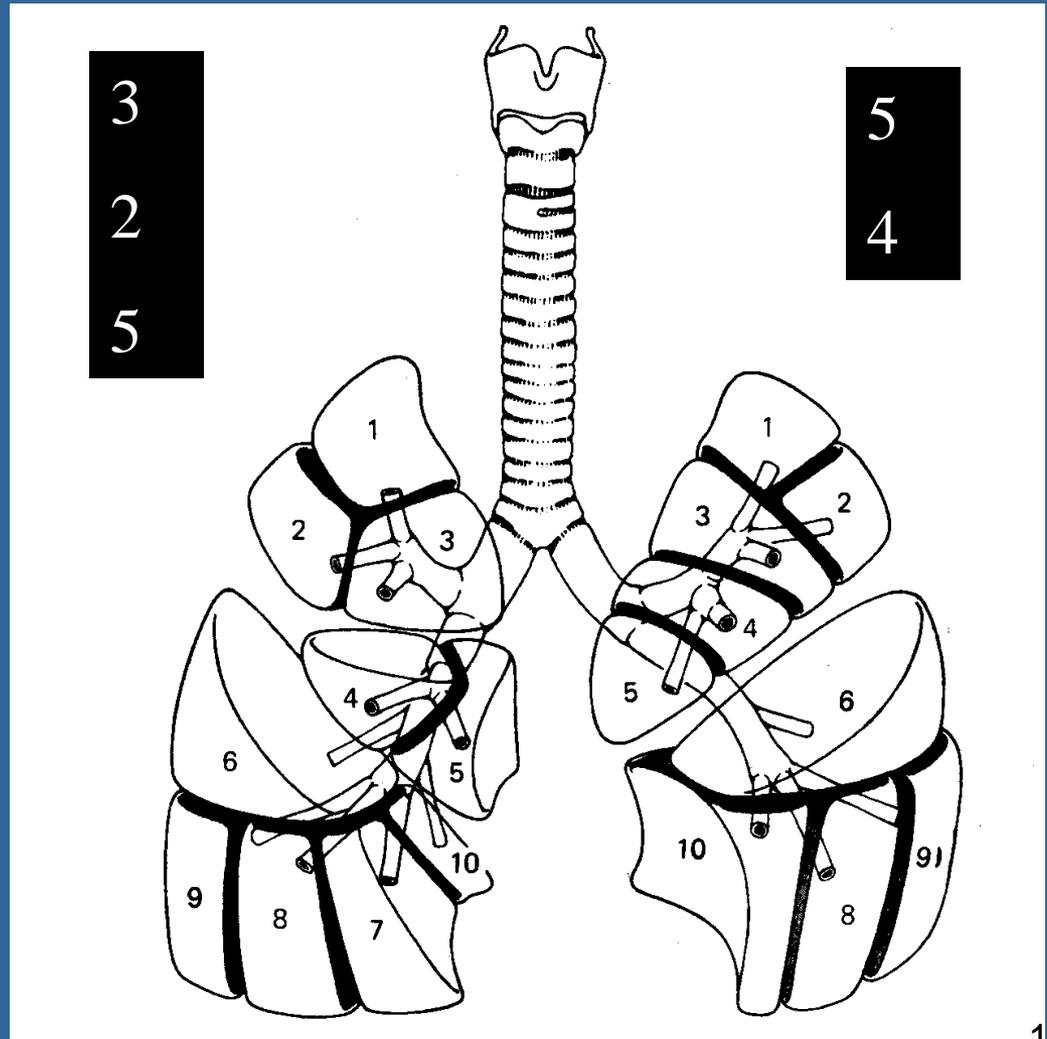


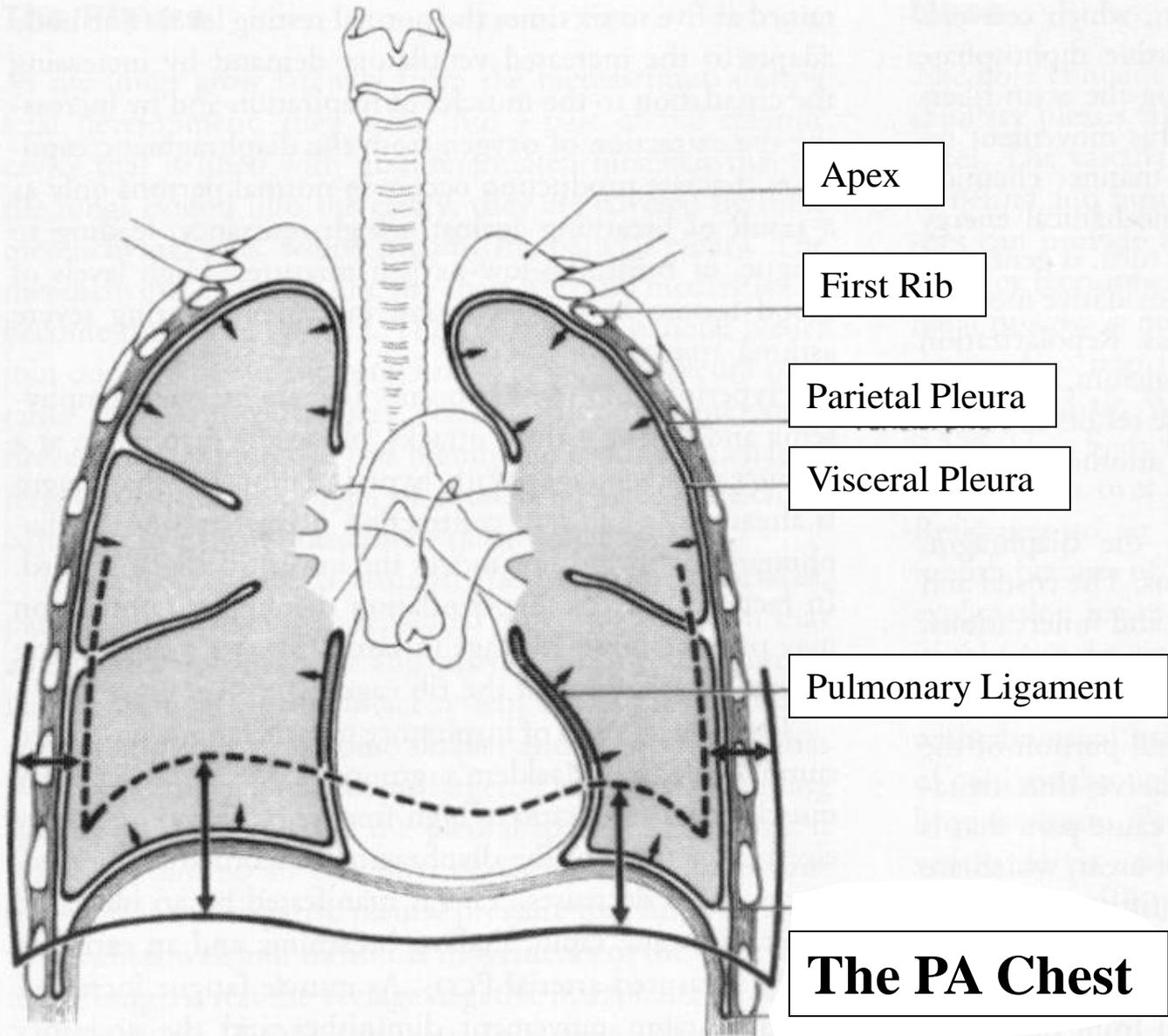


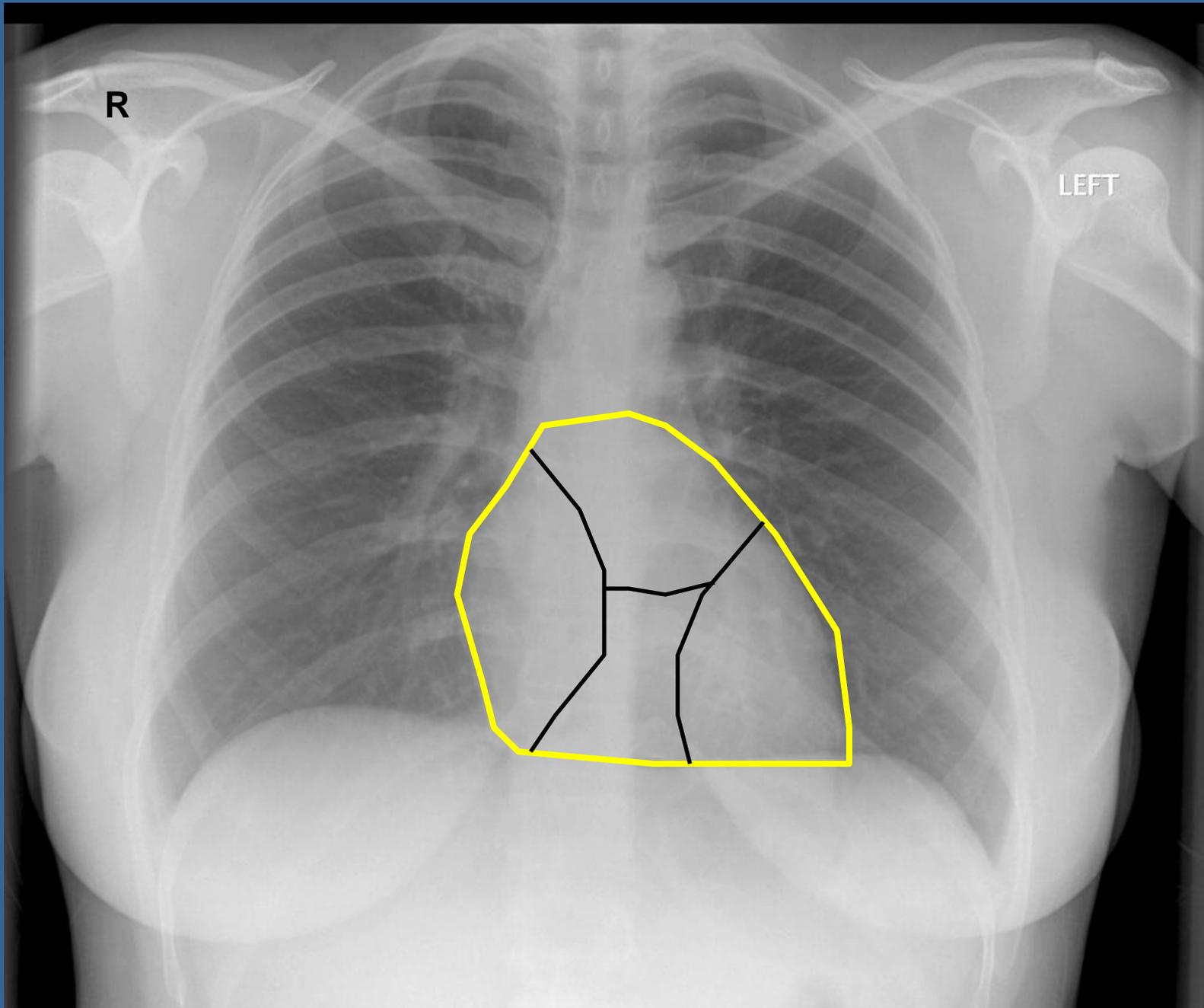
FL
MCS
O

Anatomy of the Lungs

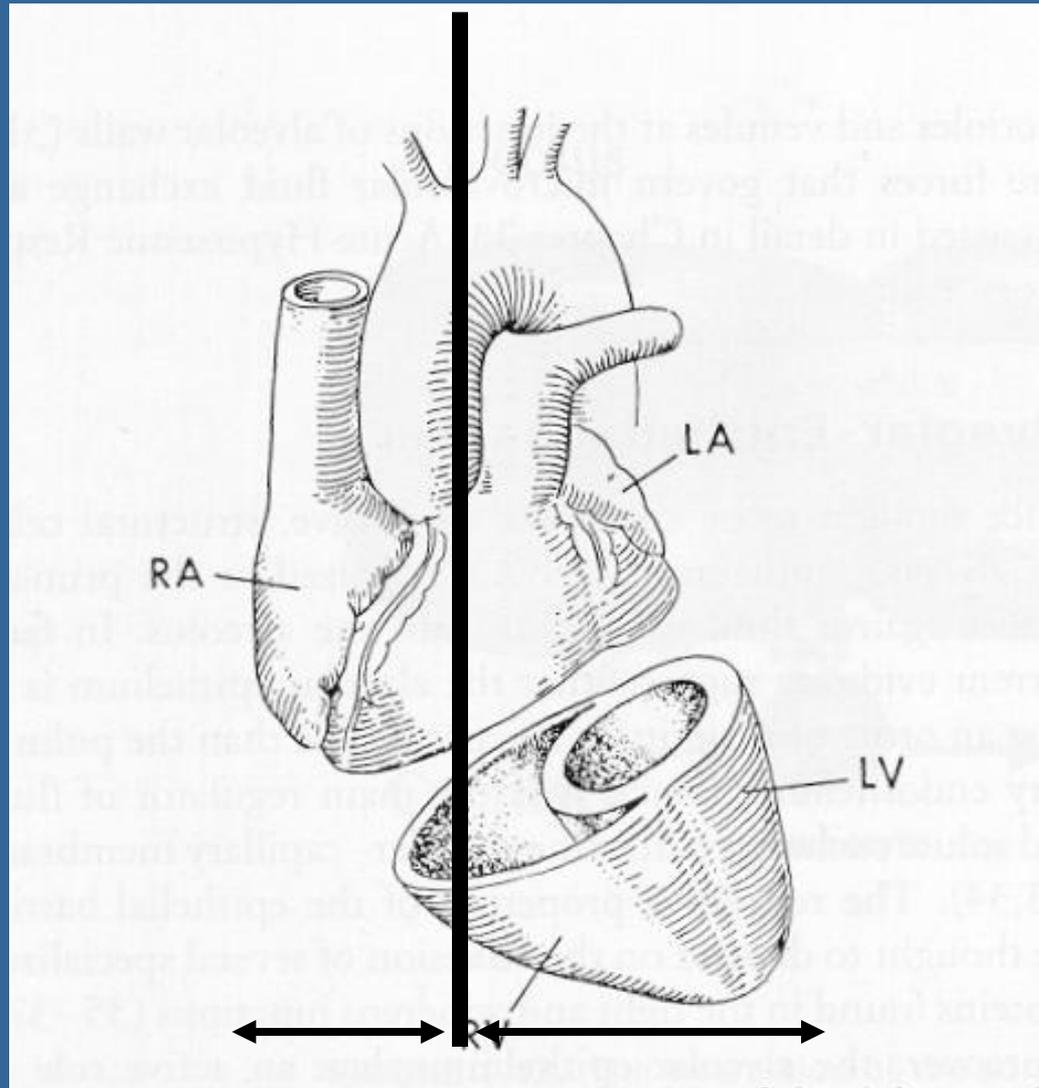
1. Apical
2. Posterior
3. Anterior
4. Superior lingular (LUL)
Lateral (RML)
5. Inferior lingular (LUL)
Medial (RML)
6. Apical
7. Medial basal (not in LLL)
8. Anterior basal
9. Lateral basal
10. Posterior basal

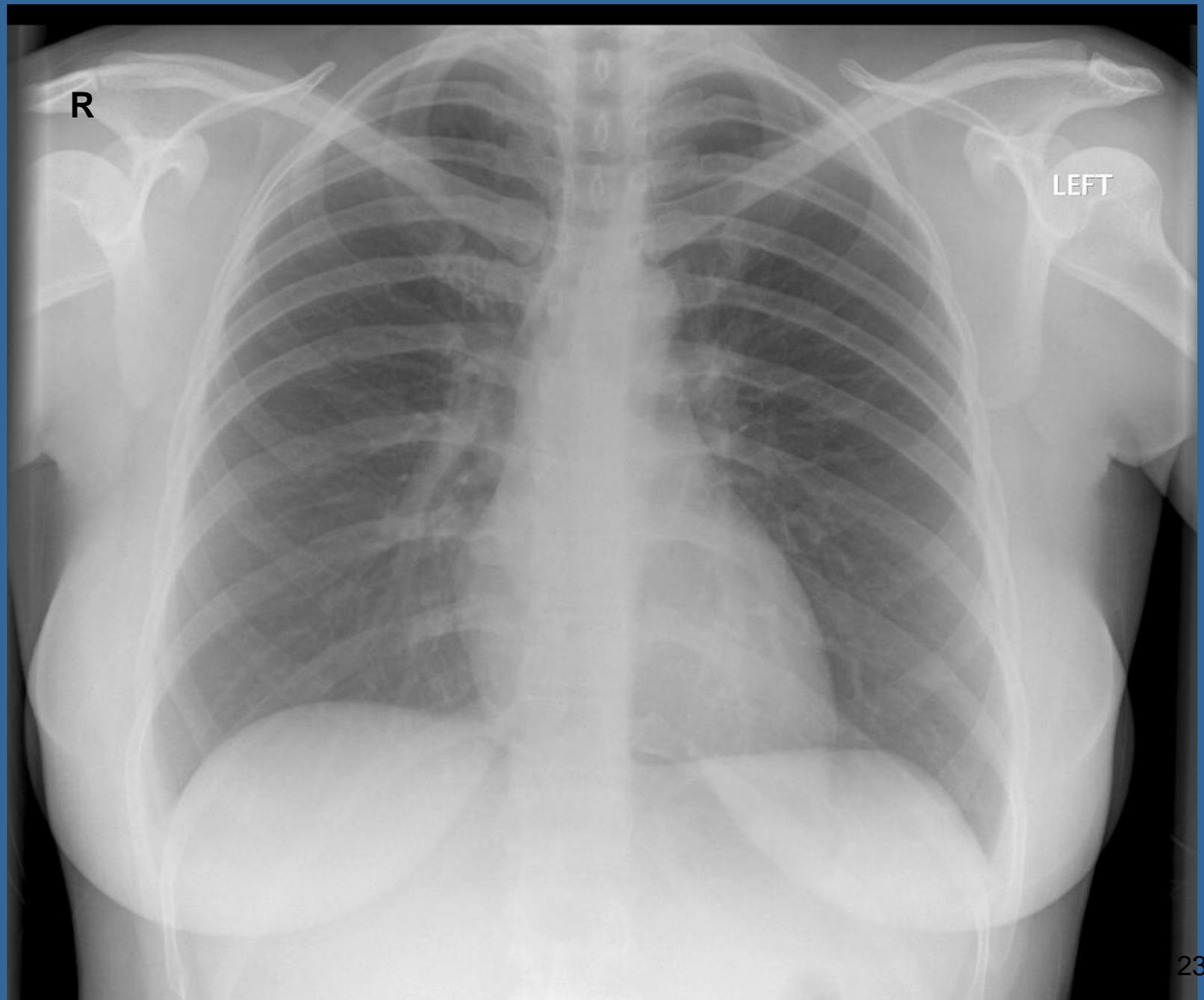




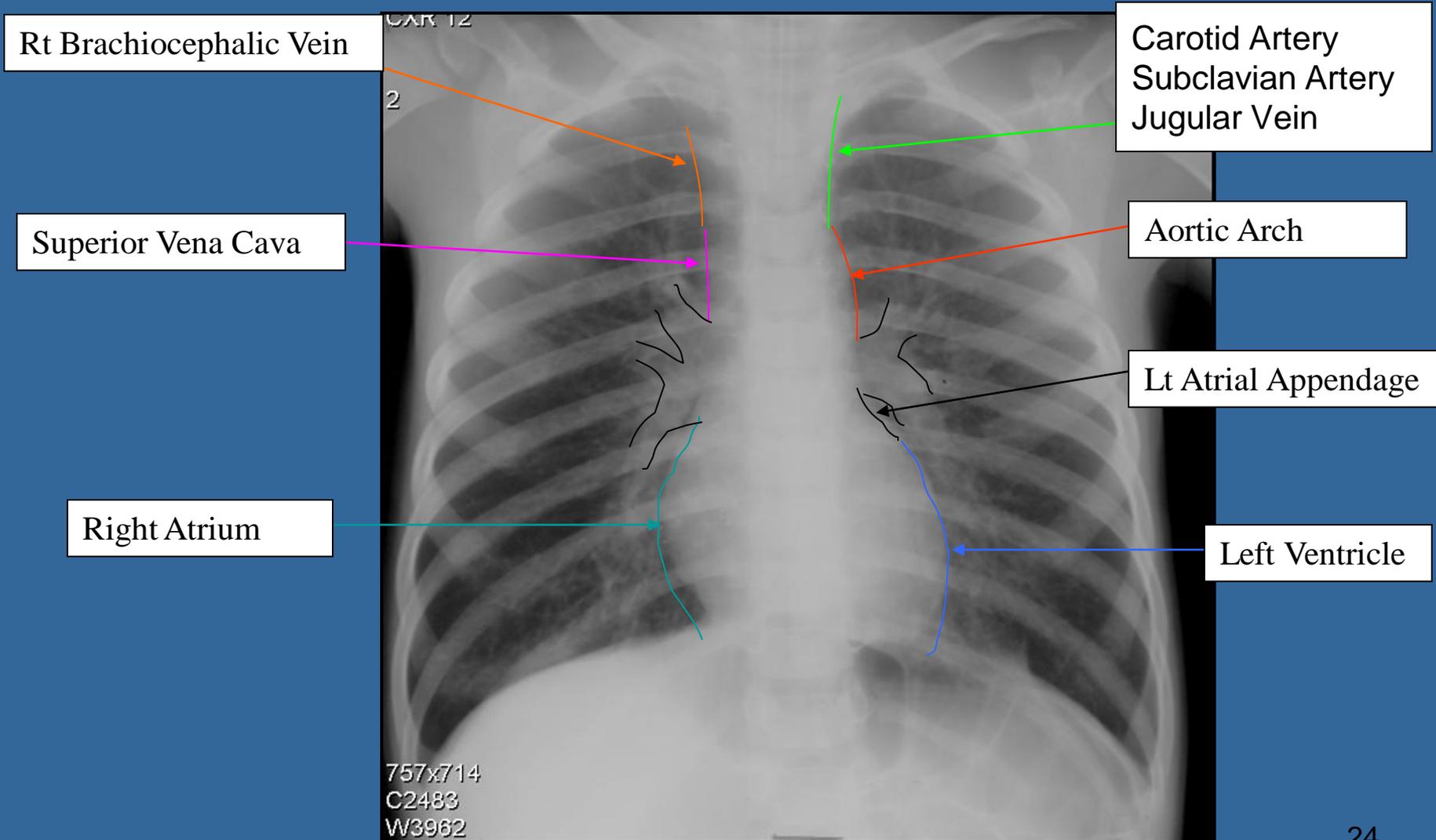


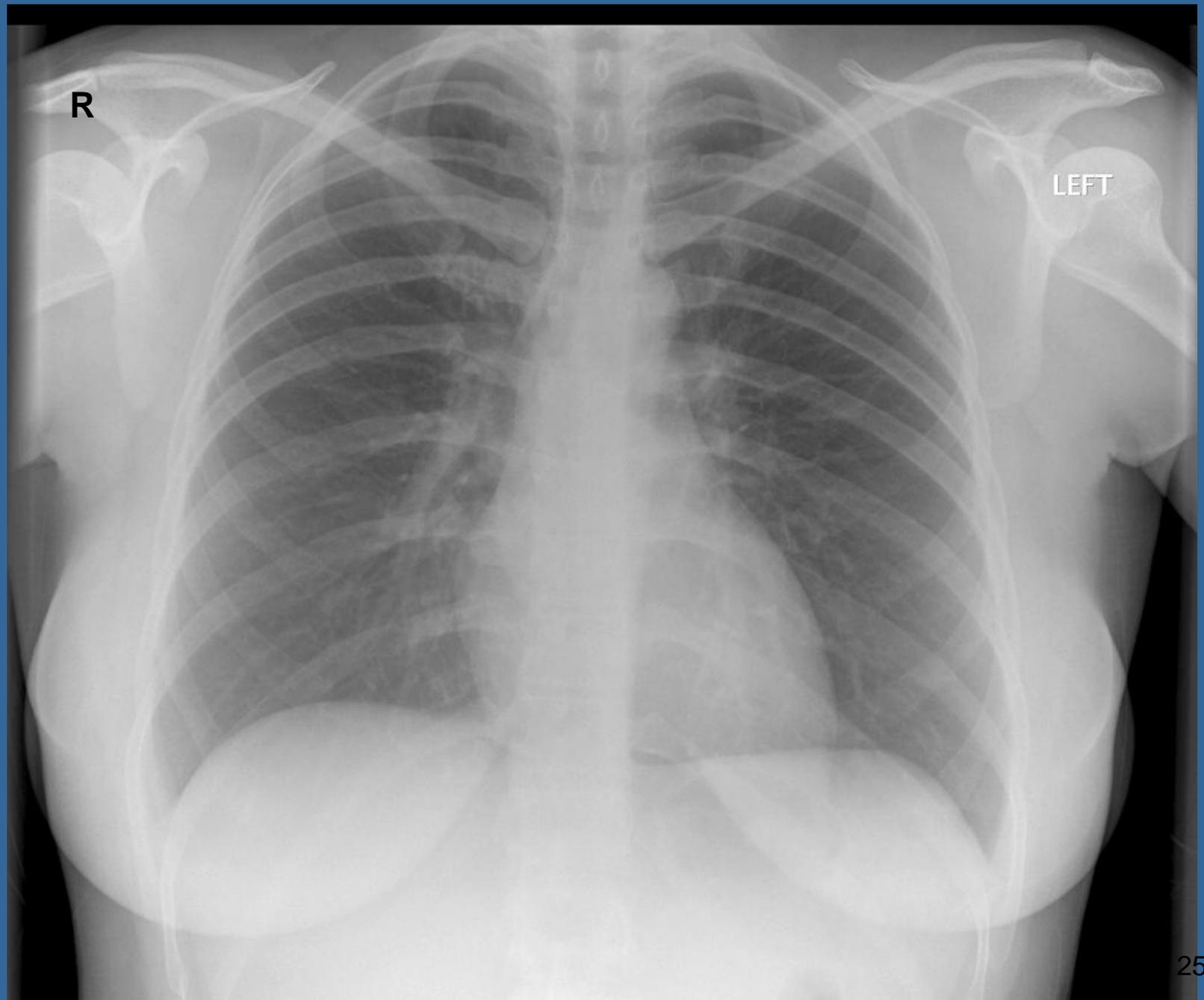
The Heart

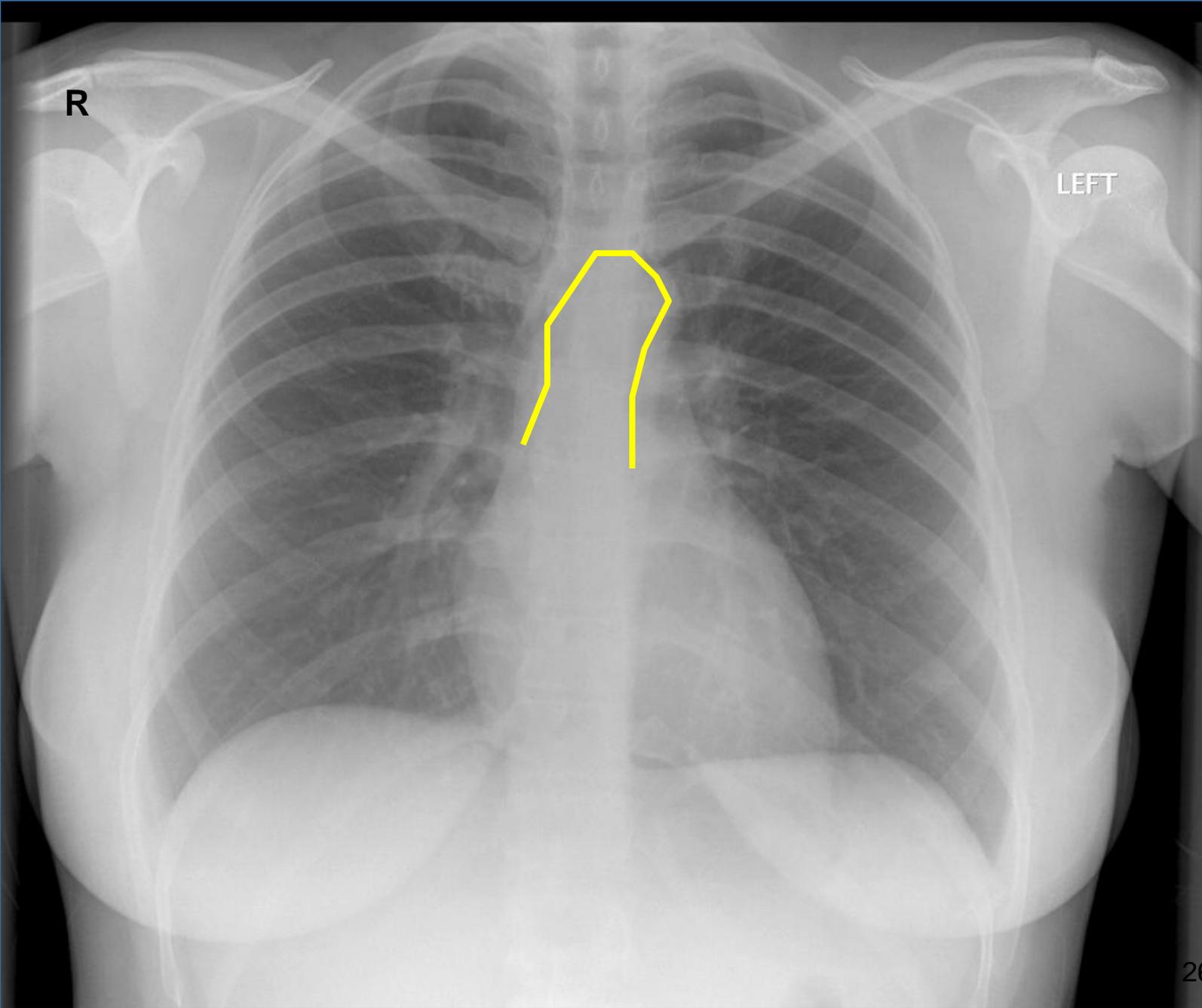




The Mediastinal Contour

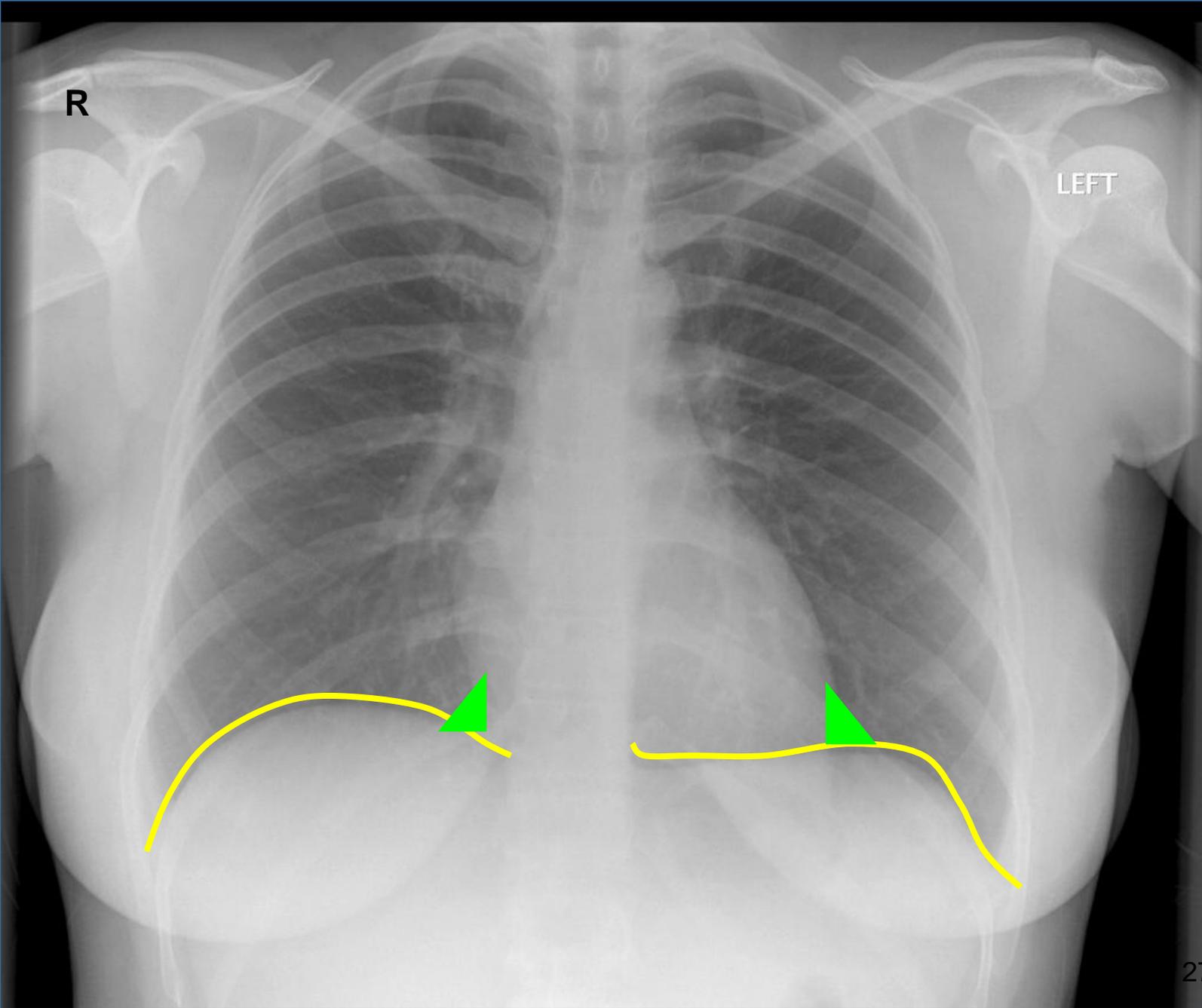


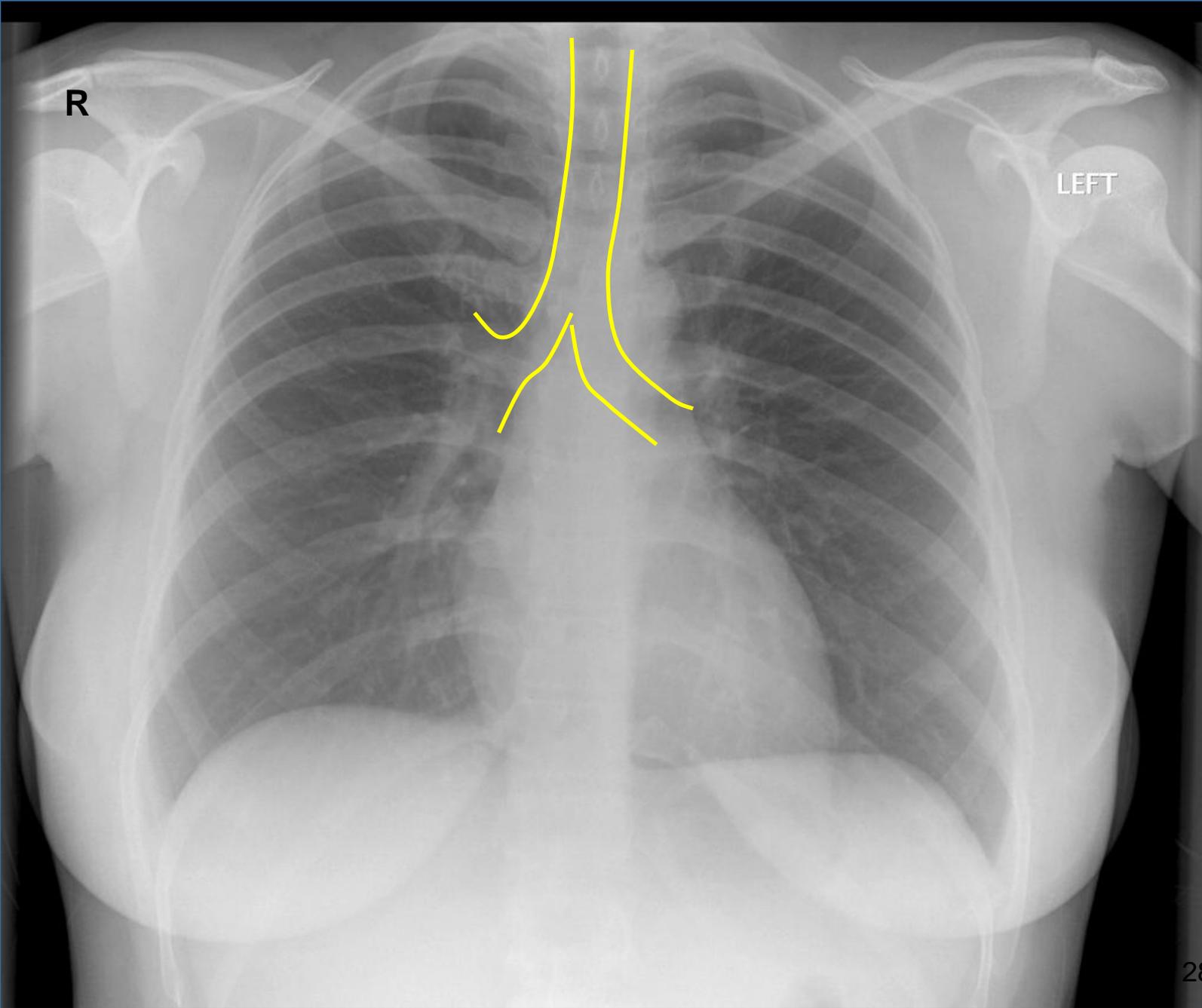


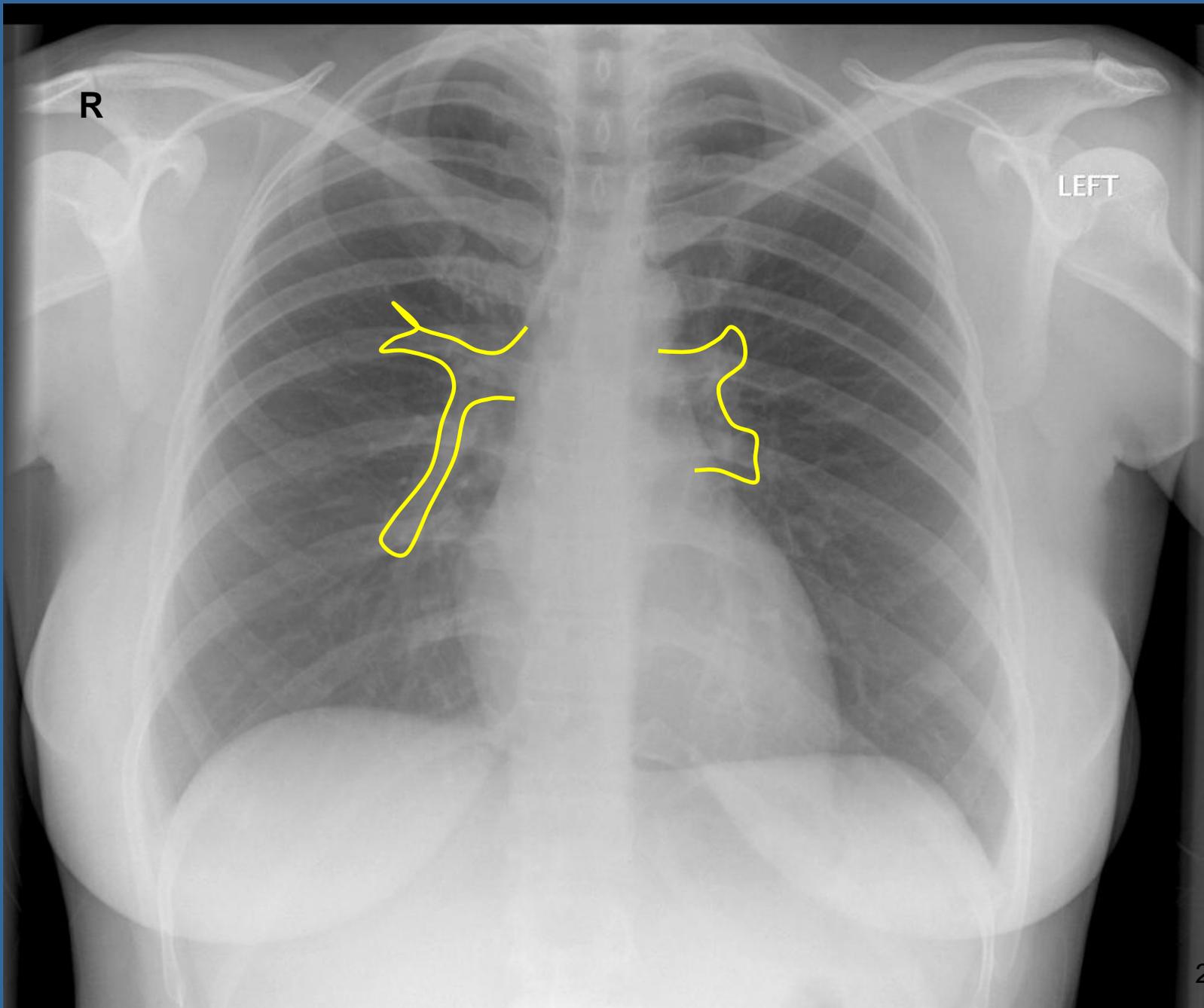


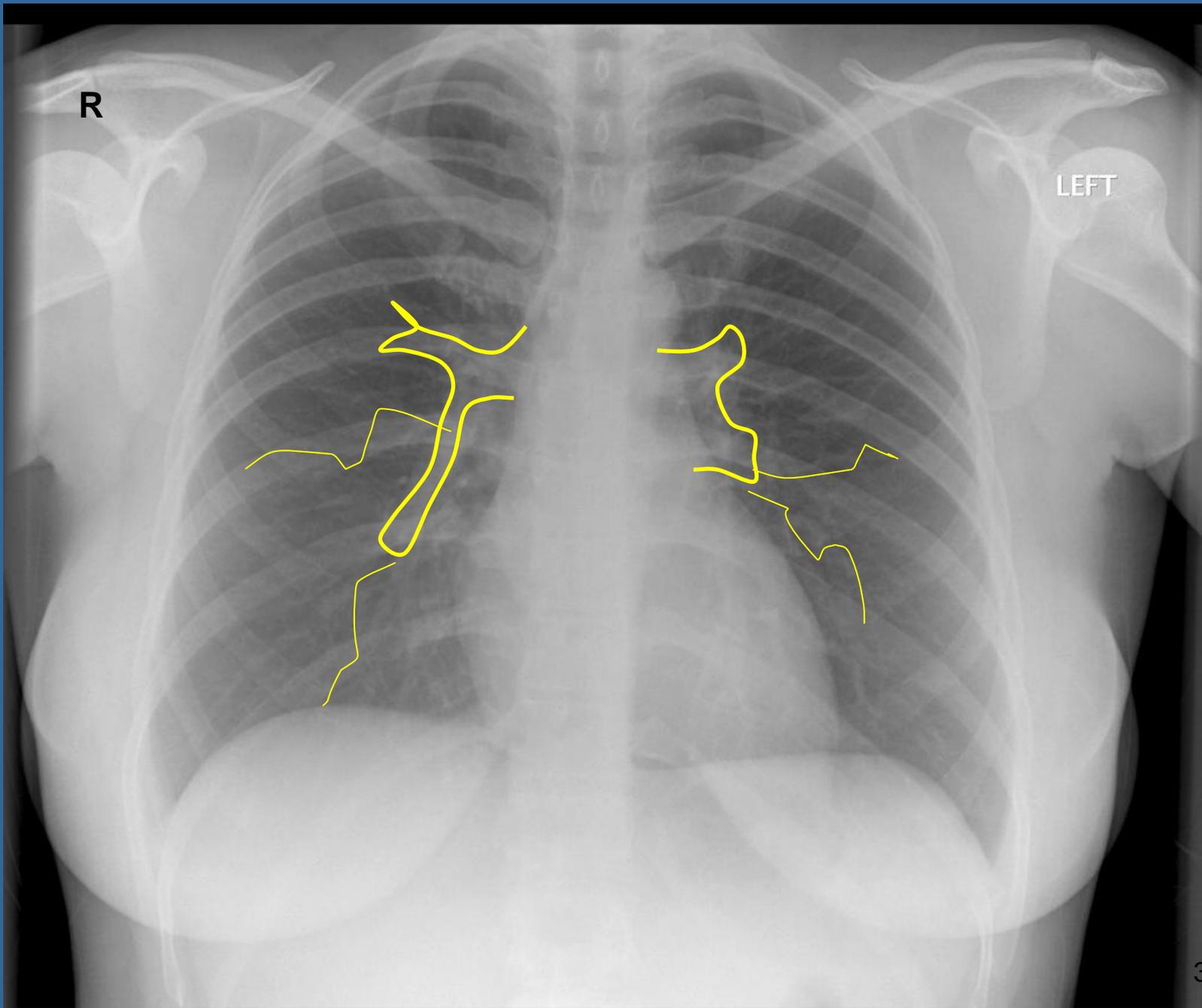
R

LEFT



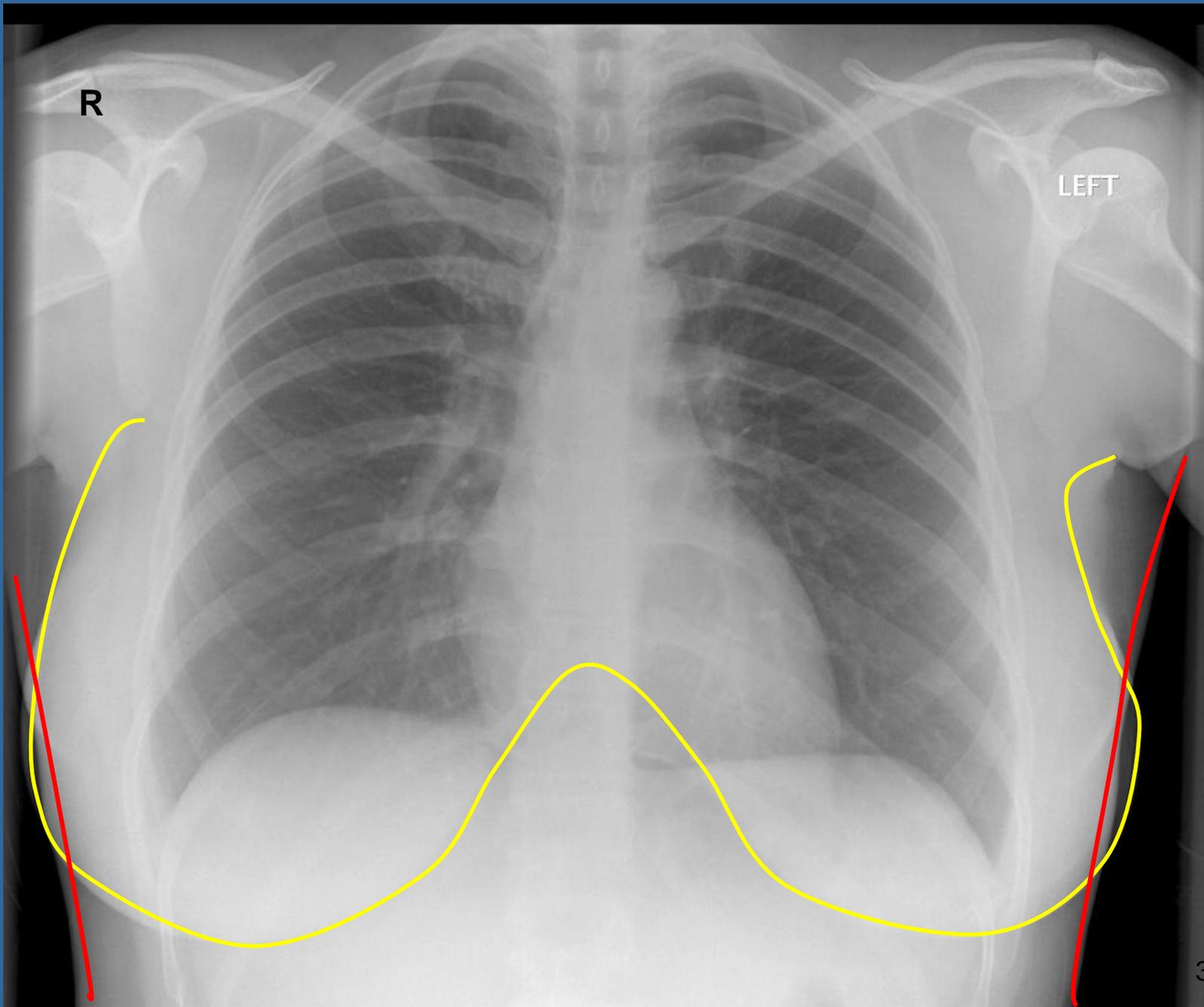






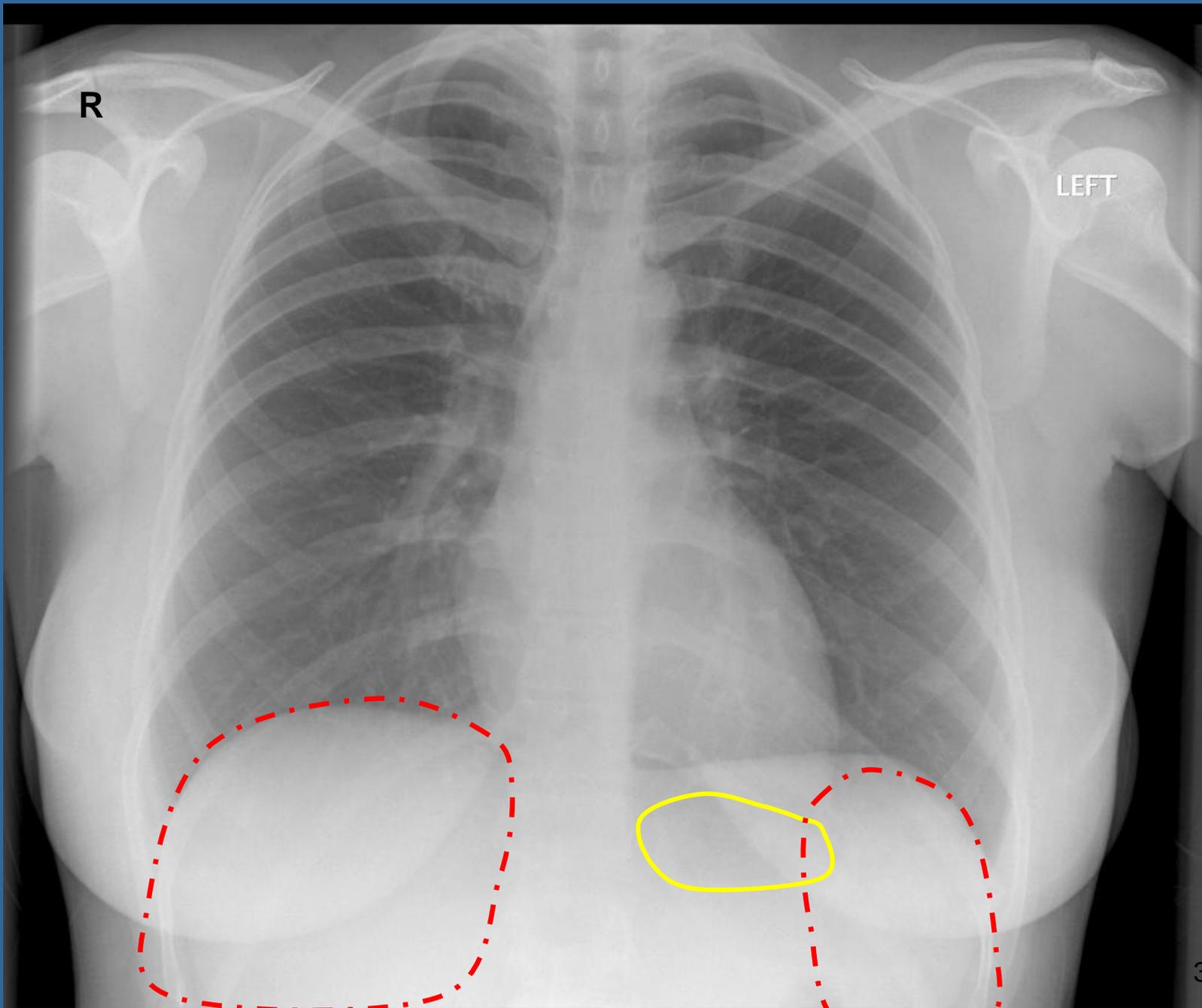
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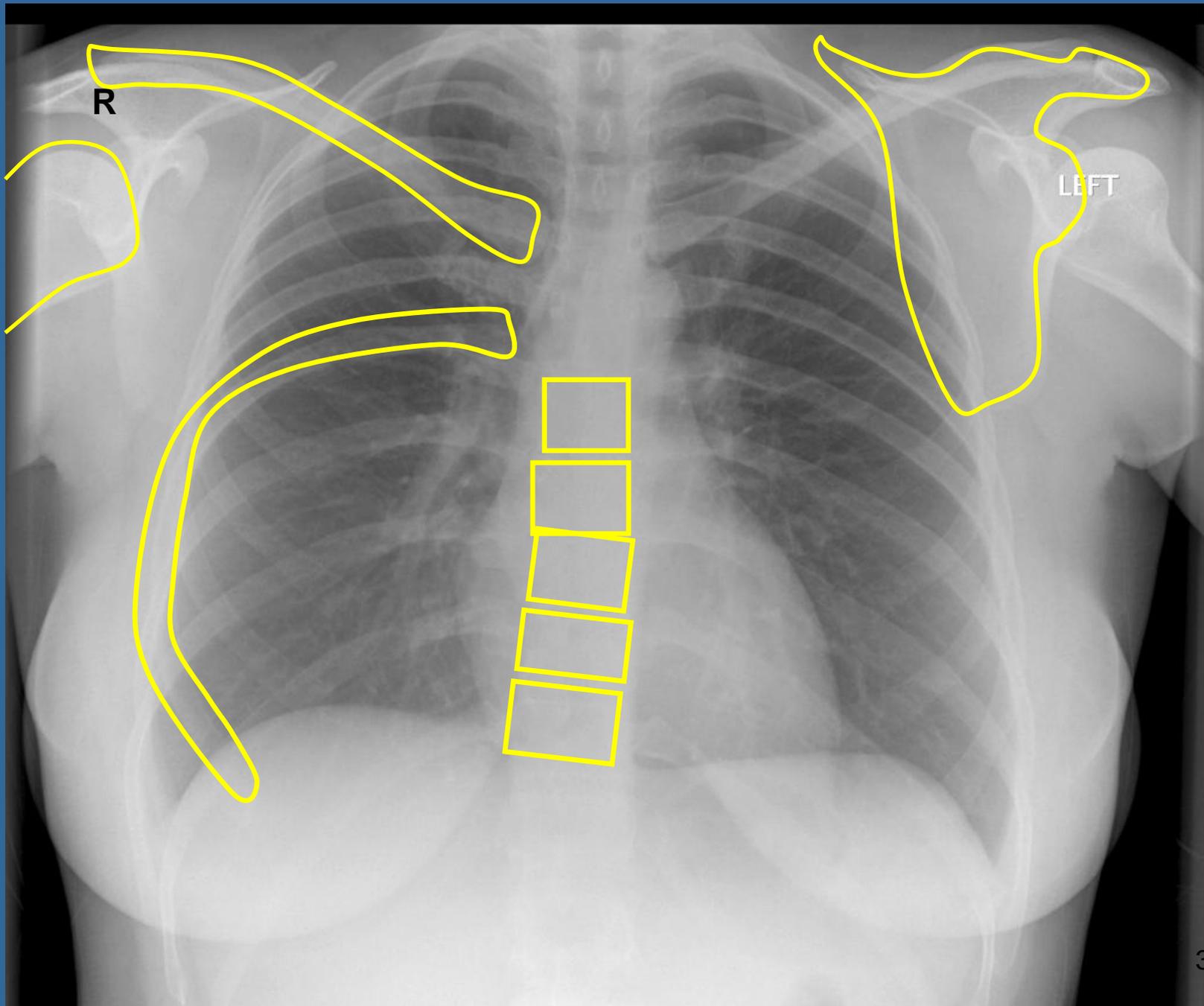
LEFT



R

LEFT

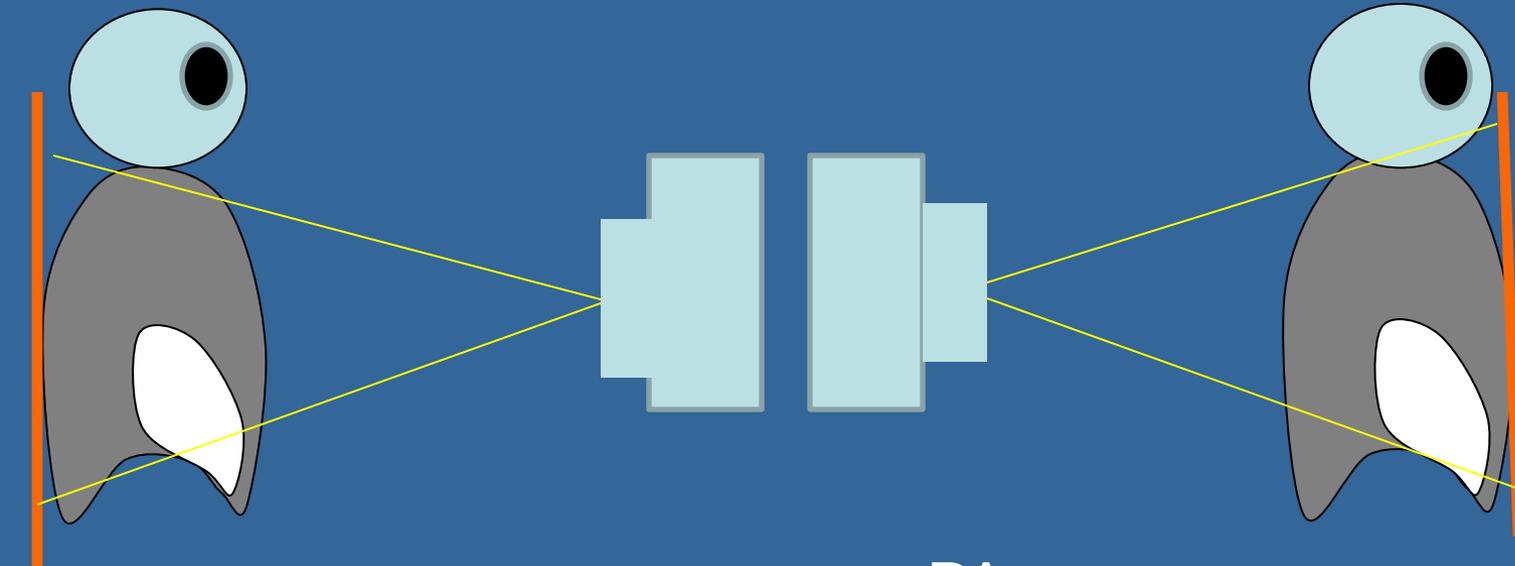




The image isn't always so pretty!

- Technical issues
 - Inspiration
 - Lordosis
 - Rotation
 - Erect/supine
- Patient issues
 - Condition related
 - Scoliosis
 - Kyphosis
 - Age variations

AP vs PA



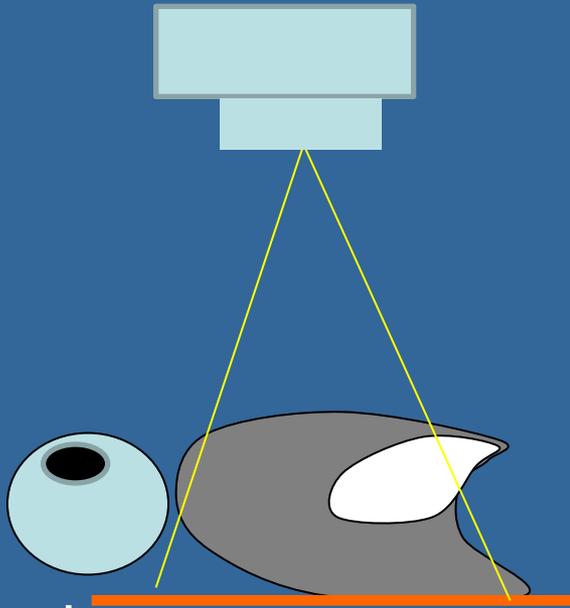
AP

- Heart bigger
- Mediastinum wider

PA

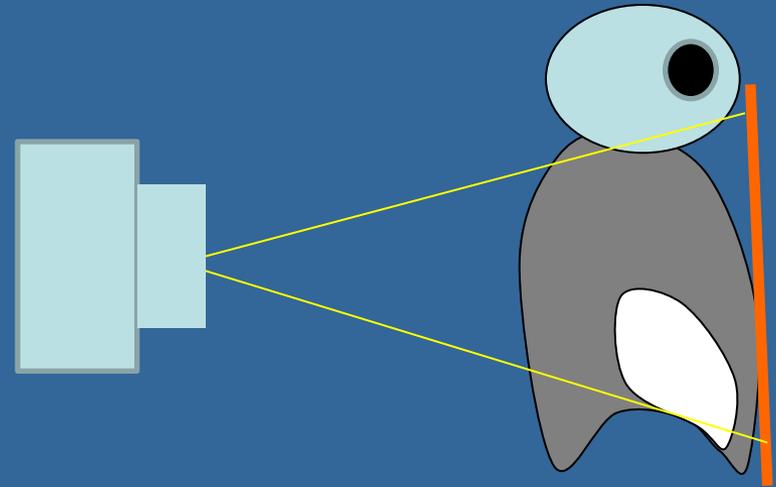
- Accurate measurement of heart and mediastinum

Erect vs Supine



Supine

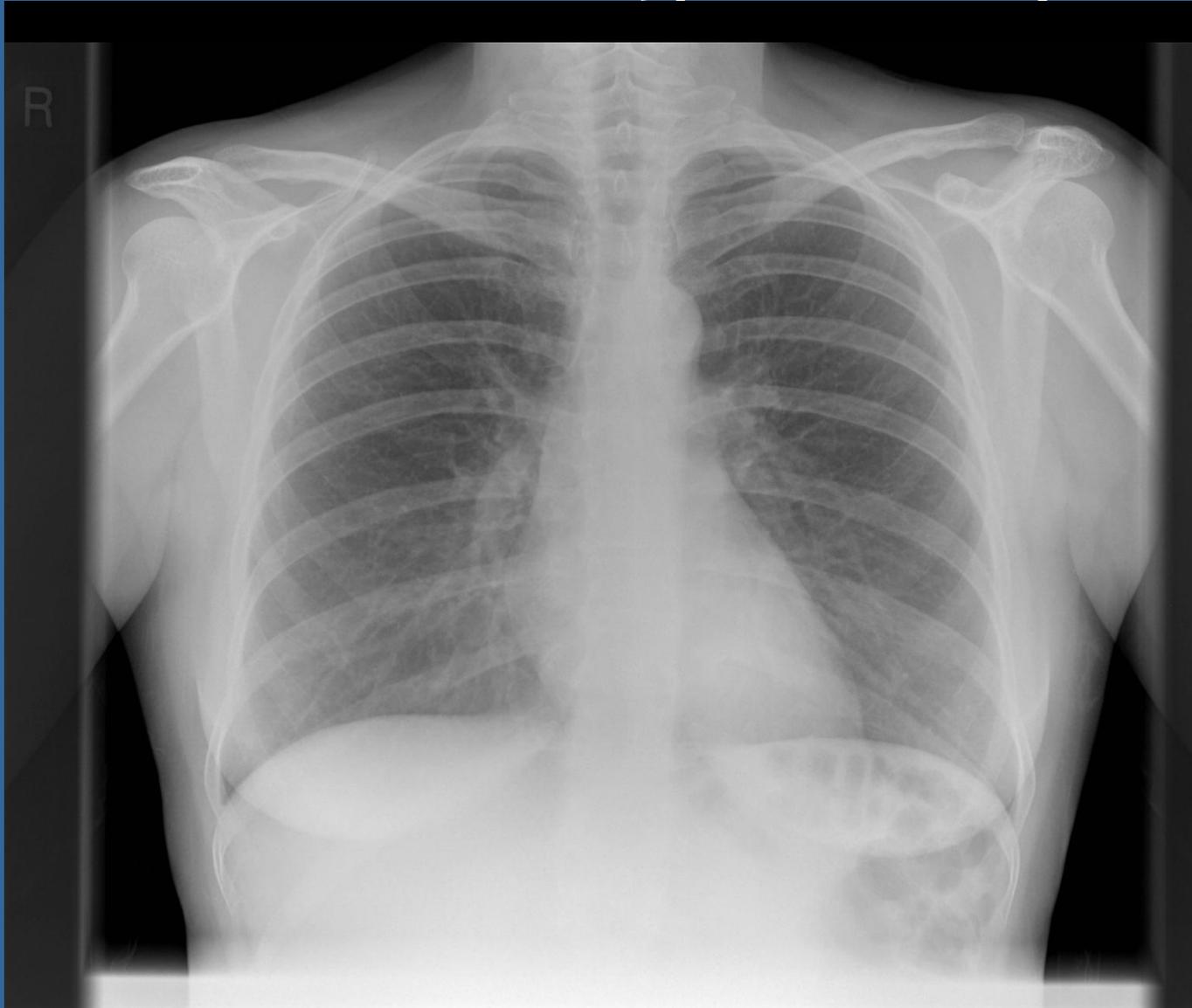
- Heart bigger
- Mediastinum wider
- Vessels change



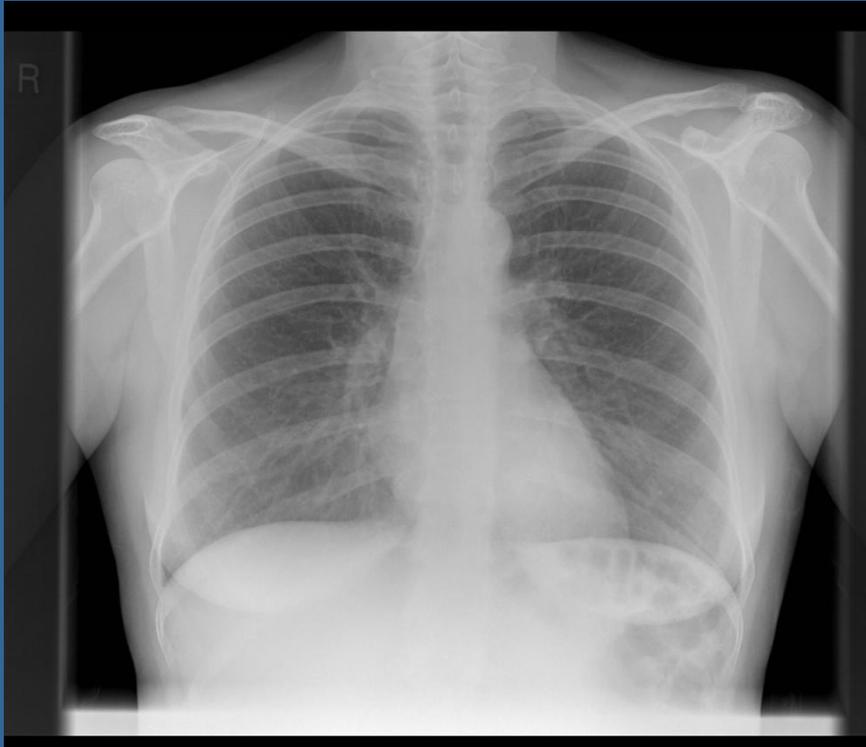
Erect

- Better inspiration
- Better representation of anatomy

Understanding technique



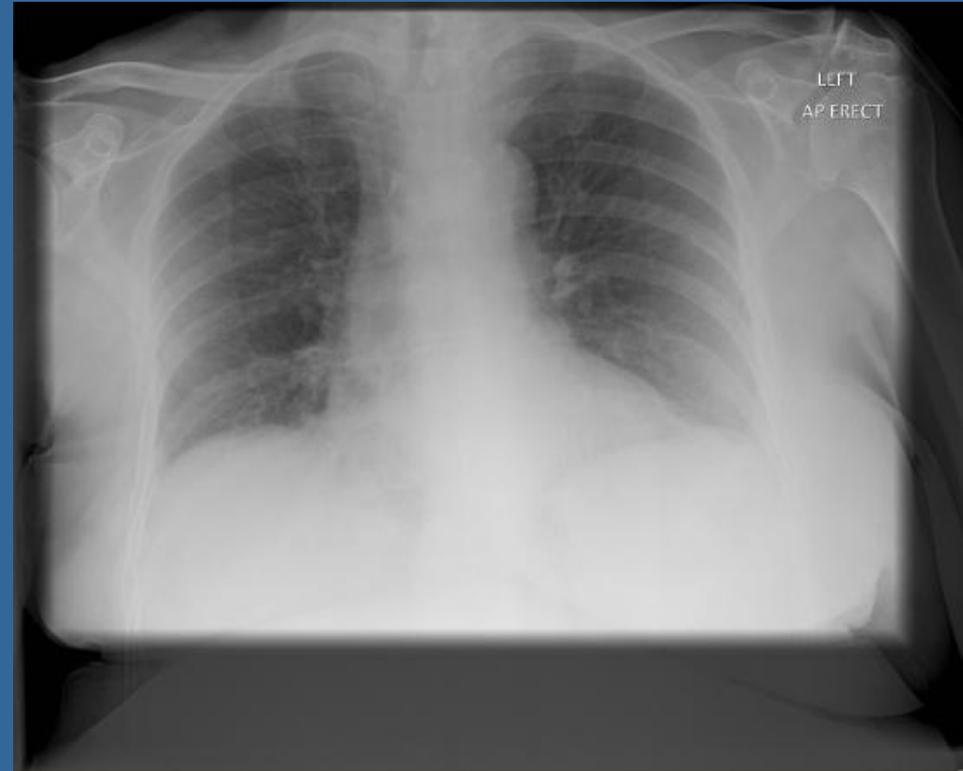
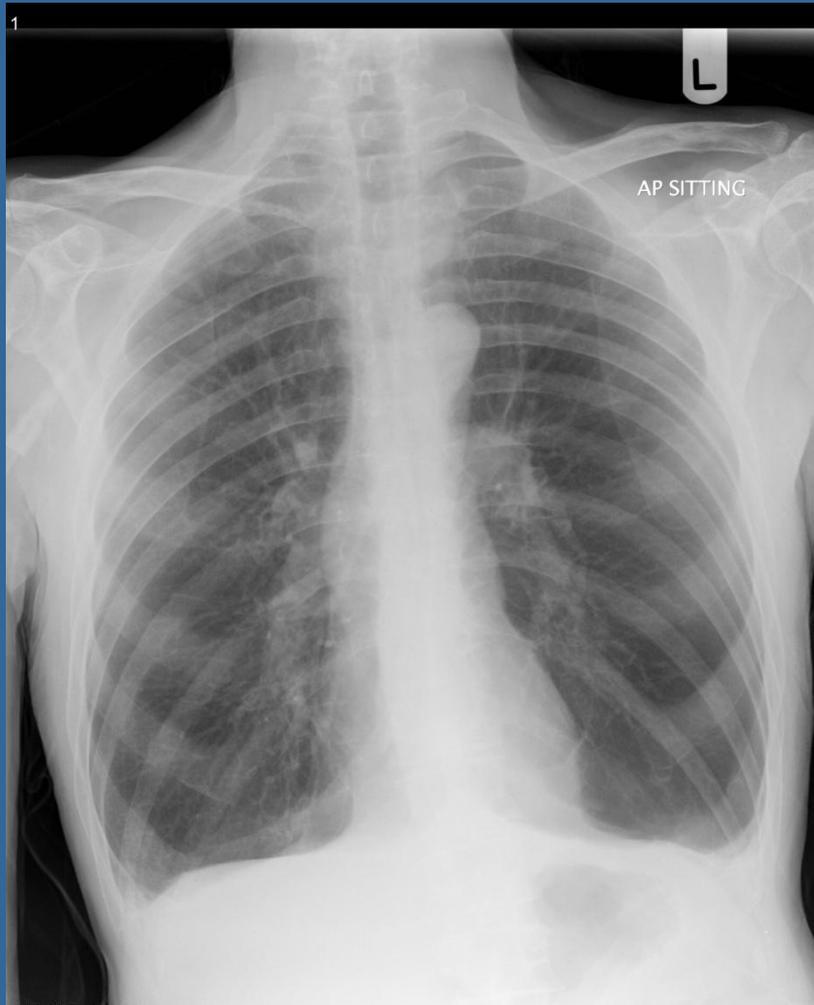
Inspiration



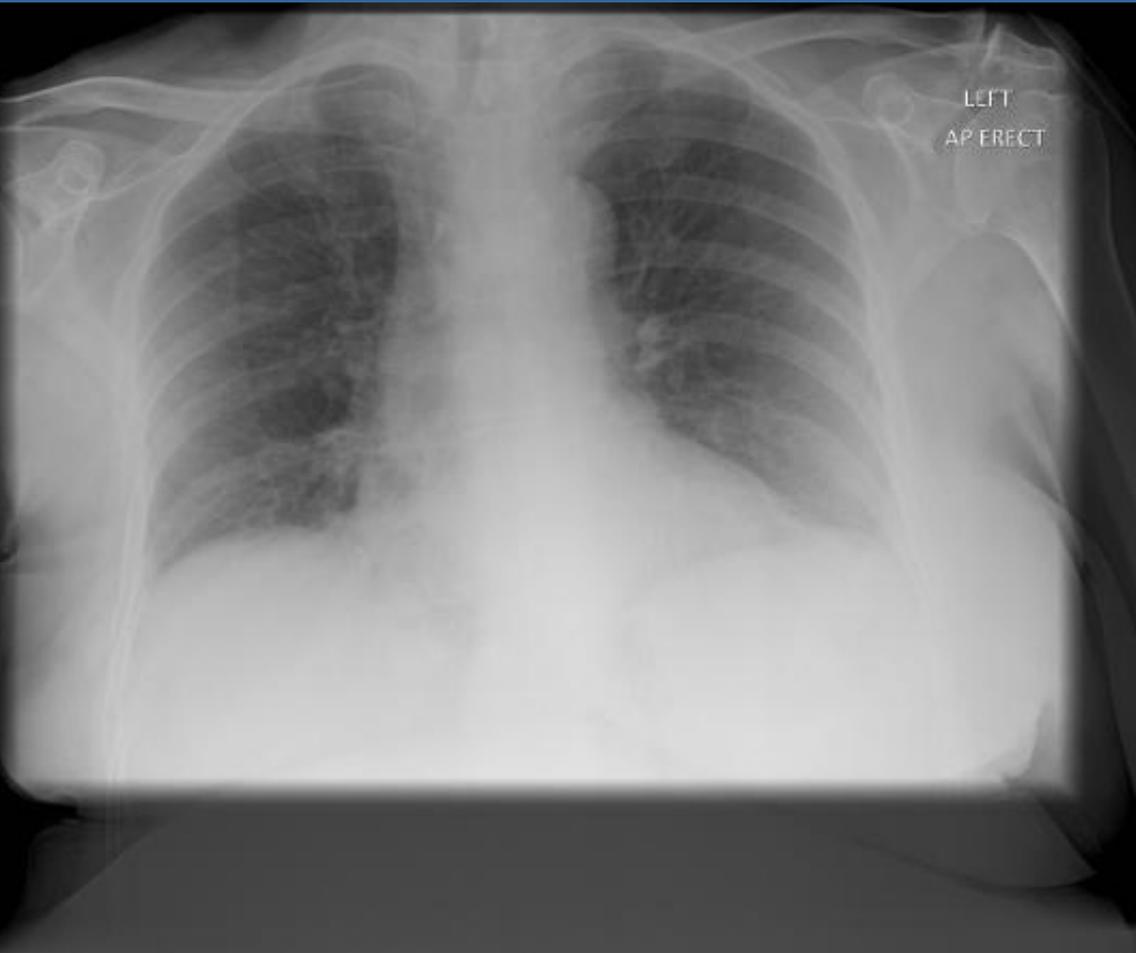
- 9 posterior ribs
- 6 anterior ribs

above right dome
diaphragm

Inspiration



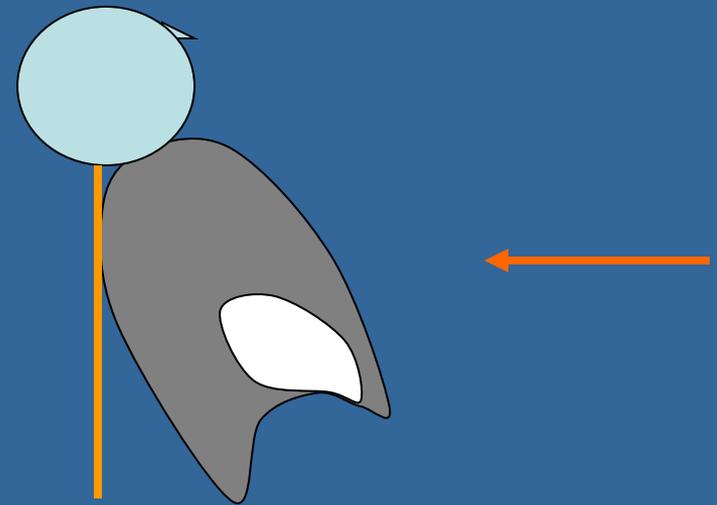
Inspiration



Poor inspiration

- Vascular crowding
- Enlarged heart

Lordosis

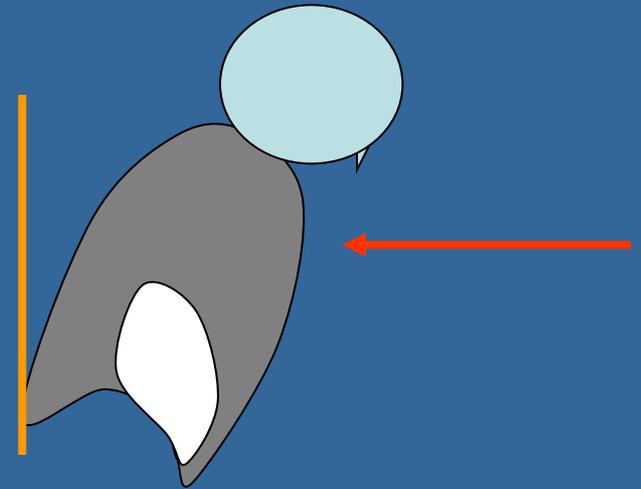


AP Lordotic



- Flattened diaphragm
- Widened mediastinum
- Hila appear prominent
- Clavicles high
- Heart may appear more 'rounded'
- Ribs horizontal
- Only decision lung

Kyphosis

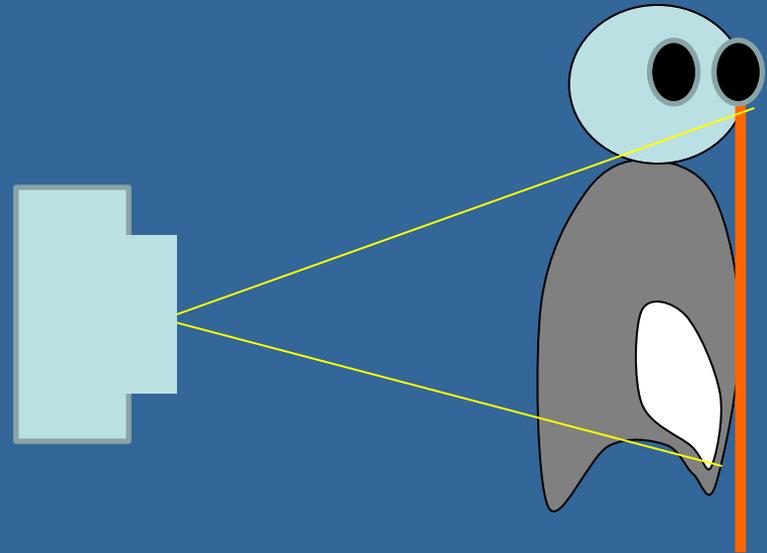


Kyphosis



- Heart projected onto diaphragm
- Hilar appear low
- Clavicles low
- Lungs appear smaller
- Ribs exaggerated curve
- Only decision lung

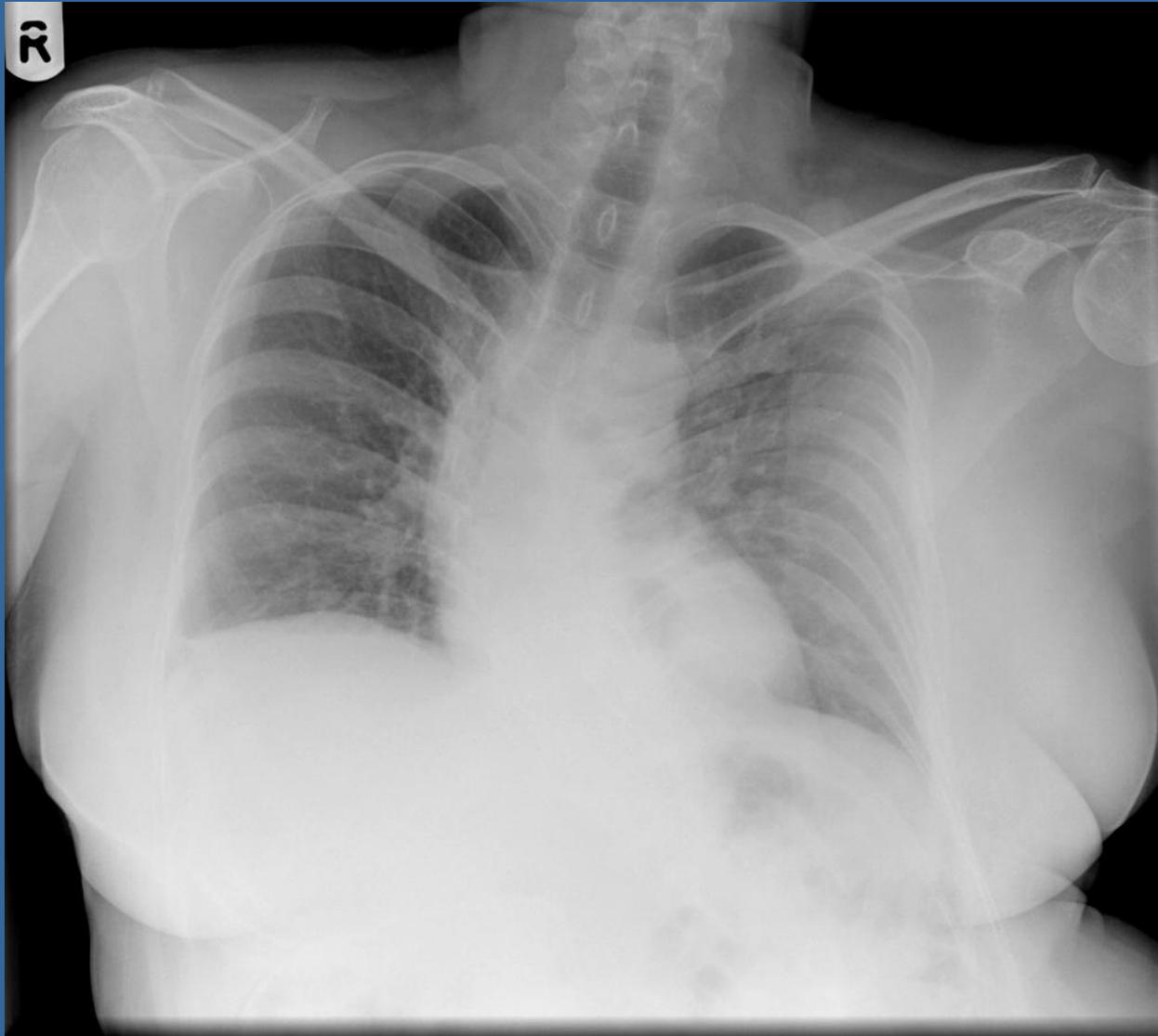
Rotation



Rotation



Scoliosis



Exposure

- Sufficient to see spine through superior mediastinum
- Detail of lung markings
- Film vs CR vs DR
- Automatic exposure/manual
- Radiation protection – waist apron?

Take home points

- Chest anatomy – not everyone is the same
- What orientation is best
- Think about opportunities for development

Clinical Governance

Relevance to Radiography

Clinical governance

- To maintain and improve standards of patient care
 - Patient focus
 - Information focus
 - Quality improvement
 - Staff focus
 - Leadership

Patient focus

- Patient information
- Consent
- Radiation dose
- Infection control
 - cassettes, markers, tables, radiographers

Aim: to improve patient experience



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An investigation of infection control for X-ray cassettes in a diagnostic imaging department

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KEYWORDS

Infection control;
X-ray cassettes;
Nosocomial infections;
Hospital-acquired
infections;
Cross infection

Abstract *Introduction:* This research was conducted to investigate if X-ray cassettes could be a possible source of pathogens capable of causing nosocomial infections, and if they could be a possible vector for cross infection within the hospital environment.

Method: The research involved the swabbing of X-ray cassettes in a Diagnostic Imaging Department of a large hospital in the east of England. Two areas of the Diagnostic Imaging Department were included in the study. Research concentrated on X-ray cassettes used for mobile radiography, accident and emergency and inpatient use. Forty cassettes were swabbed in total

be a possible vector for cross infection within the hospital environment.

Method: The research involved the swabbing of X-ray cassettes in a Diagnostic Imaging Department of a large hospital in the east of England. Two areas of the Diagnostic Imaging Department were included in the study. Research concentrated on X-ray cassettes used for mobile radiography, accident and emergency and inpatient use. Forty cassettes were swabbed in total specifically for general levels of bacterial contamination, also for the presence or absence of methicillin-resistant *Staphylococcus aureus* (MRSA). A mapping exercise was completed following the location of an X-ray cassette typically used in mobile radiography. The exercise noted the level of direct contact with patient's skin and other possible routes of infection.

Results: The results demonstrated that there were large levels of growth of samples taken from cassettes and developed in the Microbiology Department. *Coagulase-negative Staphylococcus, Micrococci, Diptheroids and species of Bacillus* were all identified. The mapping exercise in which the journey of a 35/43 cm cassette used for mobile radiography was tracked found that contact with patient's skin and potential pathogens or routes of cross infection was a common occurrence whilst undertaking mobile radiography.

Conclusion: The research has identified the presence of bacterial contamination on cassettes. The research established that X-ray cassettes/imaging plates are often exposed to pathogens and possible routes of cross infection; also that patient's skin often comes directly in contact with the X-ray cassette/imaging plate. The research also shows that as cassettes/imaging plates are a potential source of cross infection, the Diagnostic Imaging Department may be partly responsible for adding to the transference of pathogens around the hospital.

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Information focus

- Accurate patient data
- Number of examinations/patients
- Workload

Aim: to demonstrate need for developments

Quality focus

- Quality assurance
 - Equipment tests (including processors)
- Reject analysis
- Image review

Aim: to ensure optimum diagnostic images

Staff focus

- Radiation protection
 - Monitoring
- Training
- Ongoing education
- Welfare

Aim: to develop a committed (and happy) workforce

Leadership

- Effectively manage resources
 - Staff and equipment
- Lead practice and service
- Collaborate with other professionals

Aim: To improve services and patient care

Questions

- Does clinical governance apply to you?
- Can you see opportunities to improve?
- How do you go about change?

