



430 Radiology team

Lecture 7

Radiologic investigation of Chest and CVS diseases

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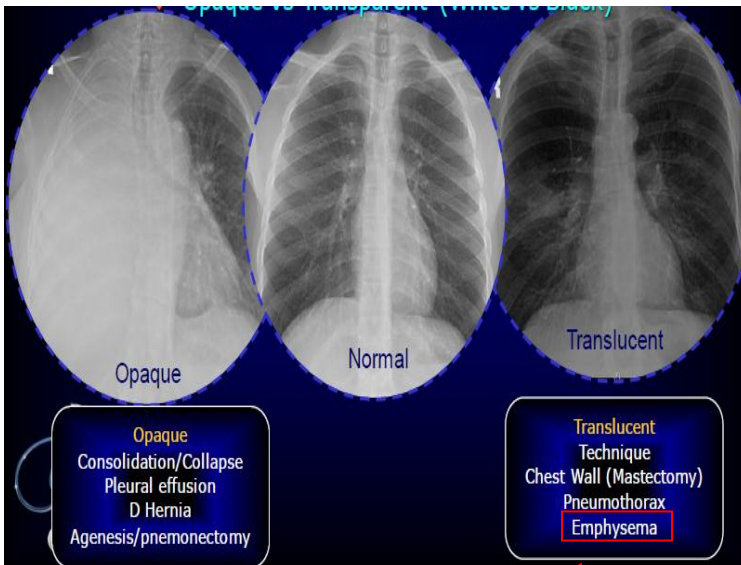
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❖ Important Terms:

- Opaque Vs Transparent (White vs. Black).

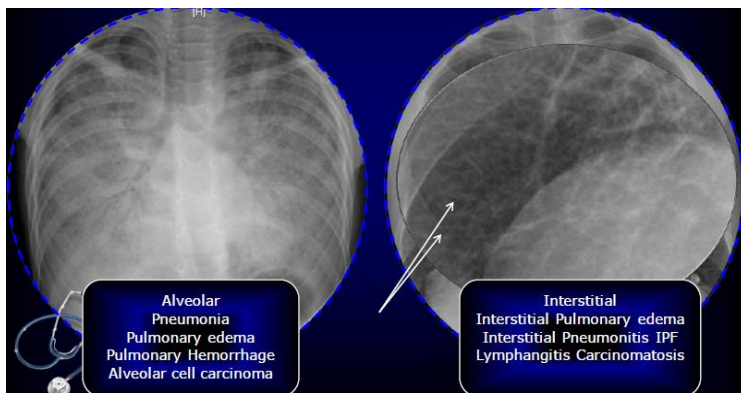
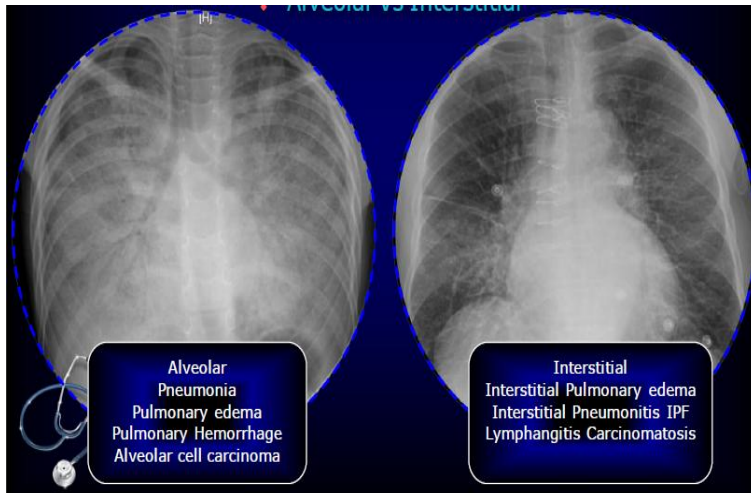


Important

- **Opaque** → any **condensed structured** (thick structured) → **e.g bone** → the x ray beam will hit that structure and will reflux back → wont pass through that structured → therefore , it will appear as **white** .
- **Translucent** (transparent) → any **structure that contain air** such as lungs, bronchial tree, colon or bubbles within the abdomen → x ray beam will transfer though that structure easily because of the presence of the air → therefore, it will appear as **black**.
- **Gray** → any **soft tissue** such as **breast** , muscles and heart → have different thickness → therefore, you will see different densities gradients **in between white and black** (gray)
- **Normally** → the lungs are translucent and gray (**black and white**)
- **Normally** → you **can't** see the **bronchial tree** because the lungs contain air and the bronchial tree also contains air → you will see only blackish areas.
- **Vascular structures** contains blood and fluids → appear as **white structures branching inside the lungs** (pulmonary artery and pulmonary vein)

- Breast is a soft tissue → on x ray appears as gray → decrease the blackish areas in the chest → if mastectomy is occurred → the gray area will disappear → the chest will be more black (translucent)

❖ Alveolar Vs Interstitial:

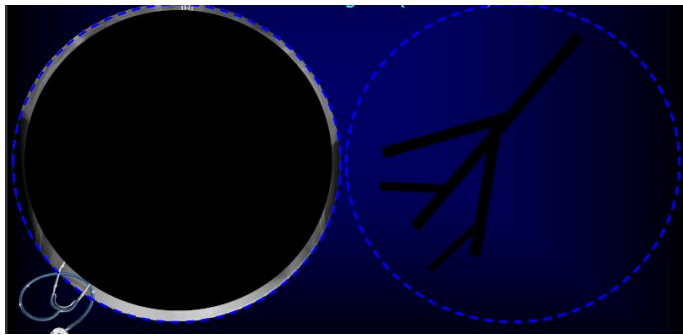


- Diseases involving the alveoli → called air space or alveolar sac diseases → if fluids entered the alveoli such as in CHF or the alveoli are filled with transudative or exudative fluids due to infections
- Diseases that involve the interstitial tissue → called interstitial lung diseases such as **idiopathic pulmonary fibrosis (IPF)** → there will be a reticulations.

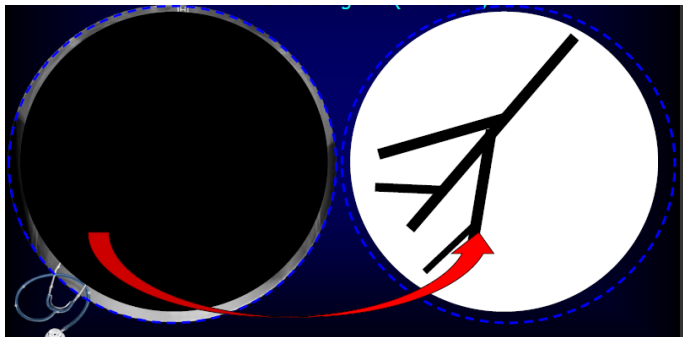
- White color arrows indicate → reticulation.

❖ **Airbronchogram (Alveolar):**

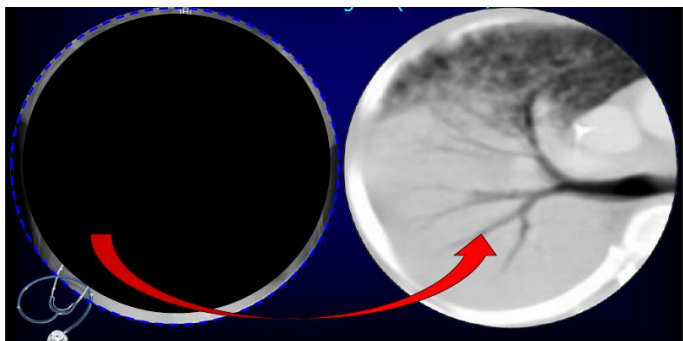
- It is a black branching line inside the lungs.
- The air inside the alveoli is replaced by fluids or pus due to infection → the alveoli will be filled with fluids whereas the bronchial tree is still filled with air.
- Whenever you see Airbronchogram → it is lung baranchymal pathology with edema, hemorrhage or infection.



- Normal lung baranchymal



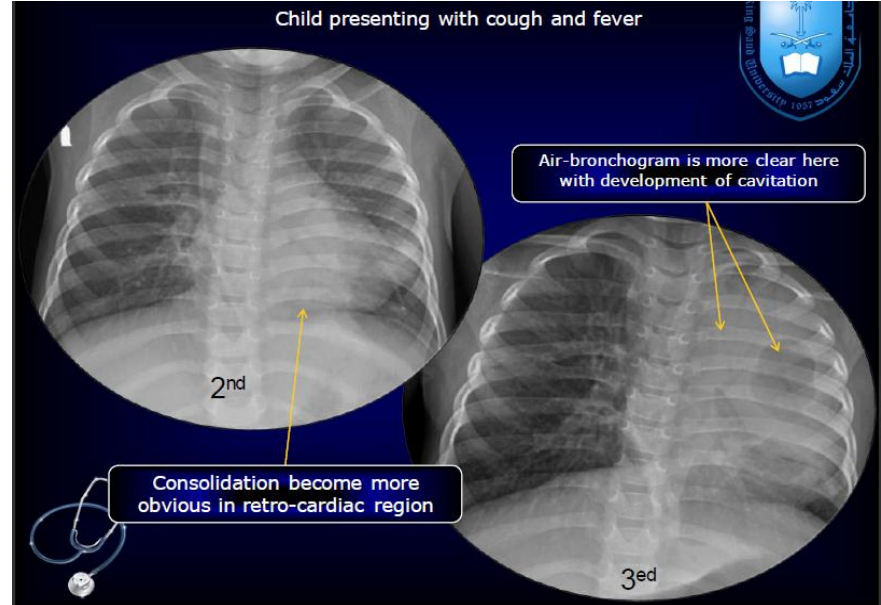
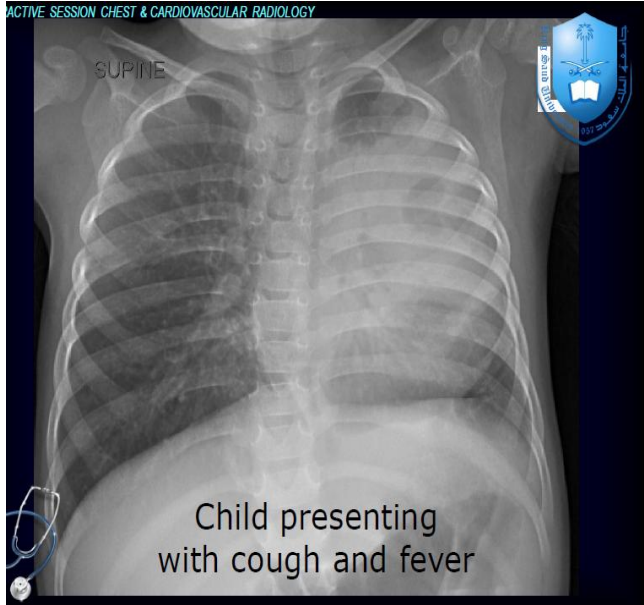
- Airbronchogram



- Airbronchogram

- In general → see if it is opaque or translucent → if it is opaque → meaning that your deferential diagnosis are consolidation, pleural effusion or agenesis → see if there is an Airbronchogram → yes → meaning that the disease is involving the lungs either intestinal or alveolar → see if there is a reticulation → yes → interstitial → no → alveoli.
- Note that the absence of Airbronchogram indicate that the disease could be chest wall.

❖ Case:



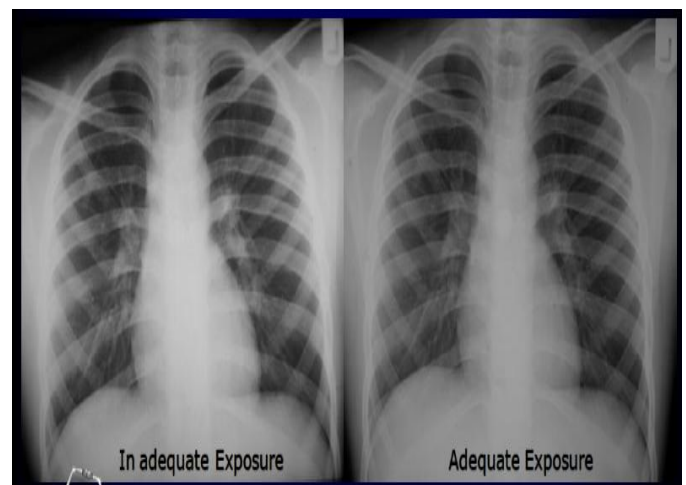
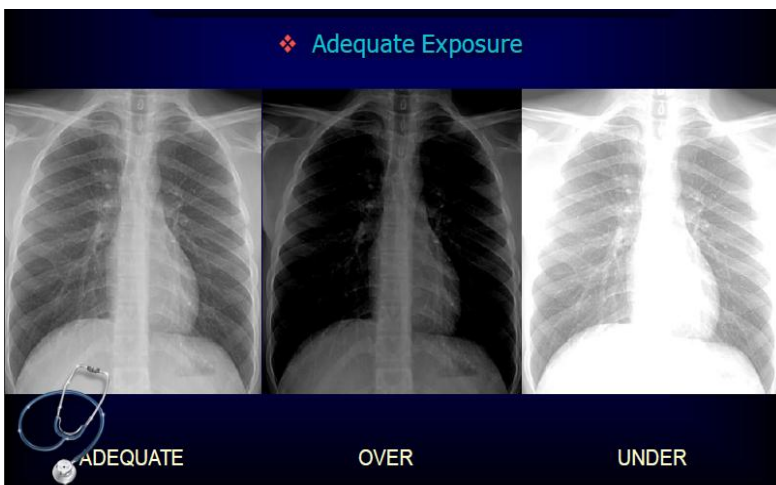
❖ Adequate Exposure:

- How to know if the patient was exposed adequately or not?

- Can you see the vascular structures of the lungs? → No → it is over exposure → (you should repeat the x ray several times in different techniques (several techniques means ask the pt to take hypo-inspiration) , if it still black, it is over exposure) → this x ray is called burned x ray
- If you can't see the vascular → look to the spins of vertebral → if you can see it, it is adequate exposure → if you can't see it → it is under exposure.

- How you can differentiate if it is burned x ray or it is a mastectomy? Usually if there is a mastectomy, it will be one breast plus you will be able to see the details of the lungs unlike burned x ray, you won't be able to see the details. (the details is the vascular structures)

❖ Adequate Exposure

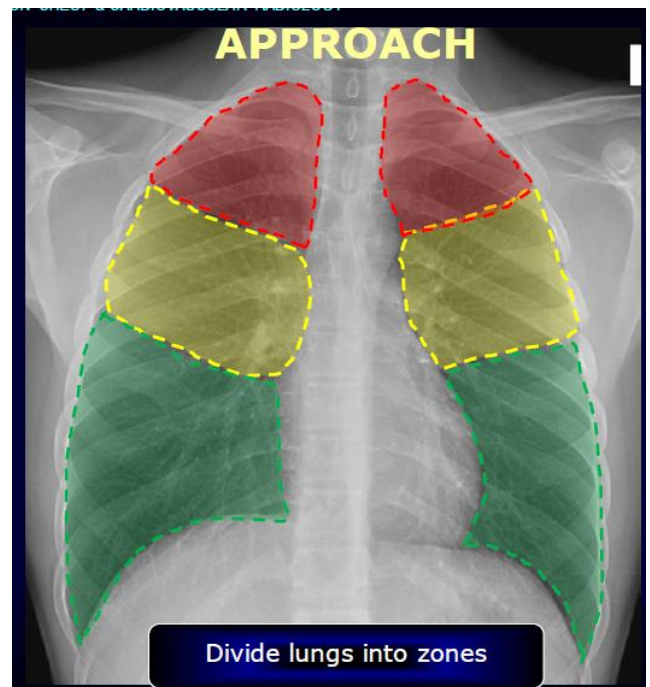
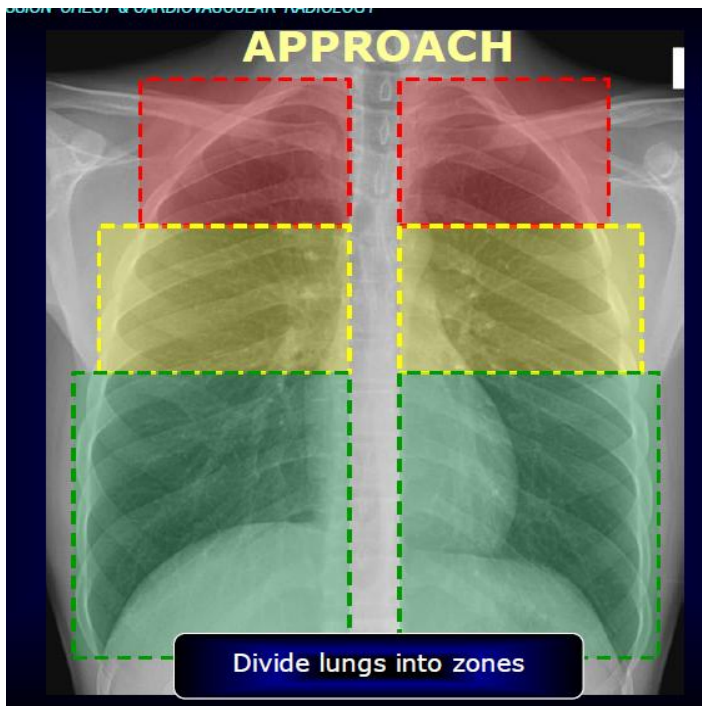


❖ Interpretation:

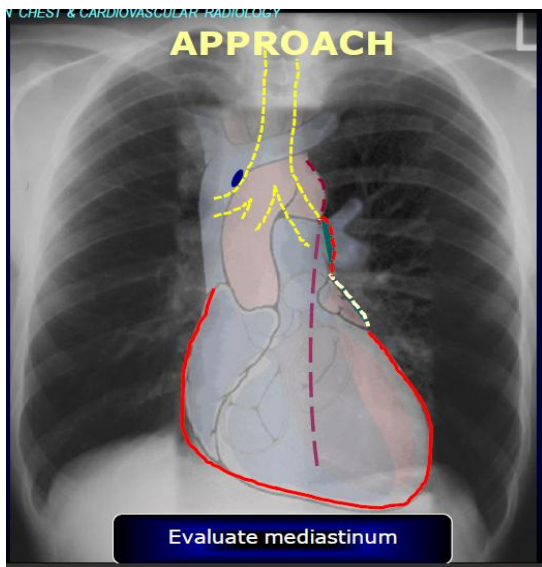
- Reading X-rays is like those quizzes in the newspaper where they say: "Our artist made ten changes when copying the picture". Can you spot them?
- In radiology the original is not given for comparison
- The original or normal radiograph of a person of a certain age and sex is a mental image that must be developed
- The best way to build up this mental picture is to understand the anatomy of that region and its variations
- The best way to interpret the findings is to use a consistent system in analyzing the radiograph

❖ The Chest Patterns:

- Define the chest pattern of abnormality seen on the X-ray.
- Develop appropriate differential for such pattern recognized.
- Decrease your differential by
 - 1- Careful analysis of the findings.
 - 2- Consider evaluation of previous exams.
 - 3- Correlate with clinical and laboratory data.
- Decide for the next step.



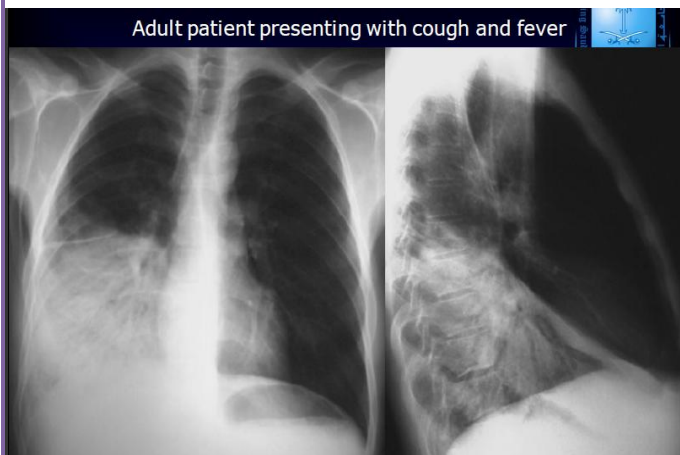
- To interpret the lung → you should divide the lungs into 3 zones :
 - 1- Upper zone → first 2 ribs → define the upper lobe.
 - 2- Middle zone → between 2nd and 4th rib → define the middle lobe.
 - 3- Lower zone → the rest of the chest.
- Compare upper right and upper left and so on.
- Remember, it just to simplify the interpretation of chest x ray.



- After evaluating the chest and lung, evaluate the Mediastinum.
- Component of Mediastinum:
 - 1- Aortic knob → superior left side.
 - 2- Pulmonary trunk
 - 3- Left ventricles → form the left border of the Mediastinum.
 - 4- Right atrium → form the right border of the Mediastinum.

❖ Examples:

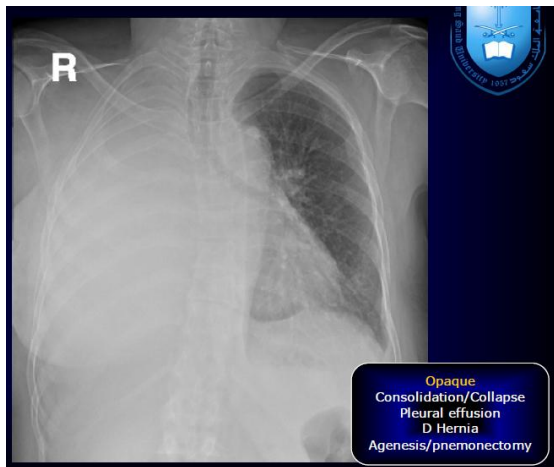
- 1- Case 1 (Increased Pulmonary Densities Pattern).
 - Adult patient presents with cough and fever for the last 3 days. His blood workup shows WBC of $18 \times 10^9/L$ (mainly neutrophils). Chest X-ray was done.
 - What is the most likely increased density pattern seen on this X-ray?
 - A- Bony thoracic cage lesion.
 - B- Lung parenchyma lesion.**
 - C- Mediastinal mass lesion
 - D- Pleural lesion.



- Because of the presence of the **Airbronchogram**

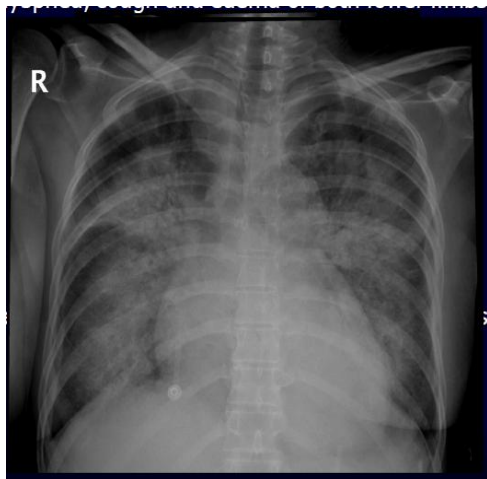


- Most likely consolidation (collapse) because we don't see Airbronchogram

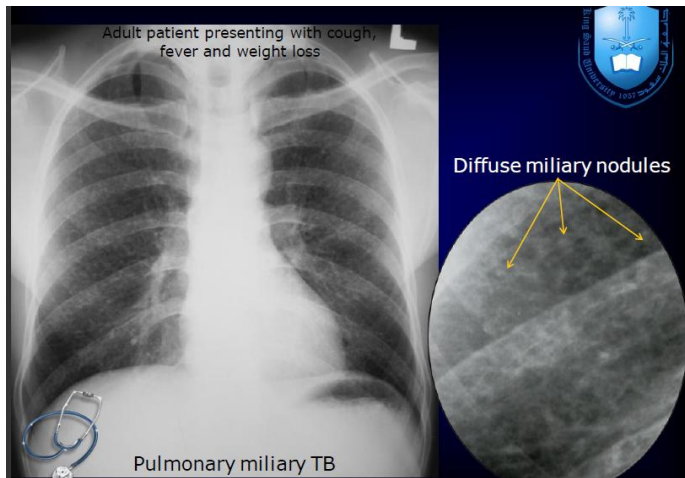


2- **CASE 2:**

- Elderly patient presenting with dyspnea, cough and edema of both lower limbs.
- What is the most likely increased density pattern seen on this X-ray?
 - A- Pneumonia. (Excluded because there is no history of fever).
 - B- Interstitial pneumonitis.
 - C- Pulmonary edema.**
 - D- Pleural lesion.

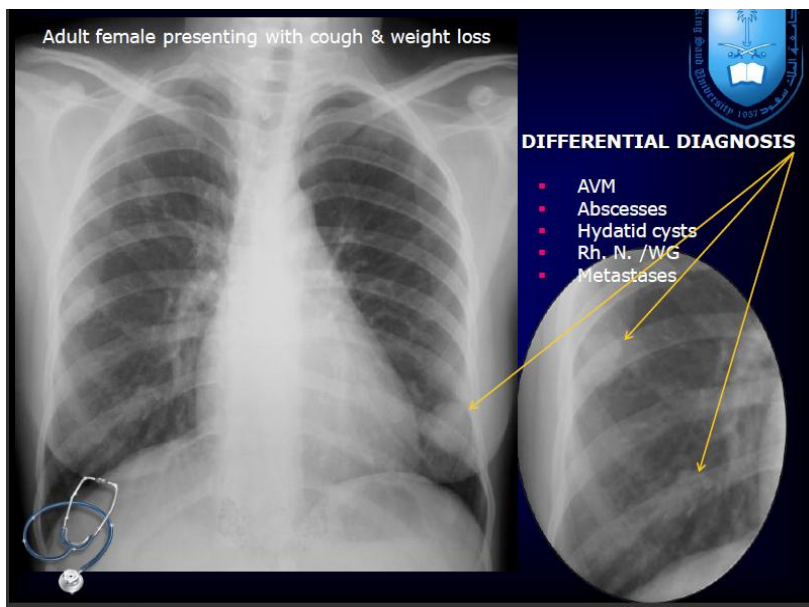


3- Case 3 (Increased Nodular Pulmonary Densities Pattern)



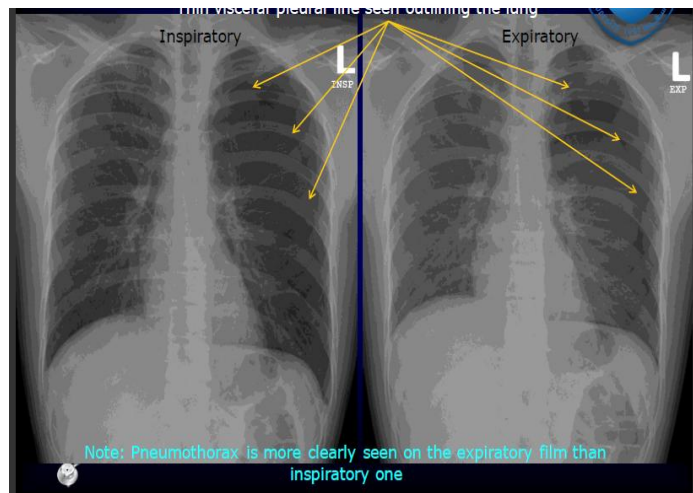
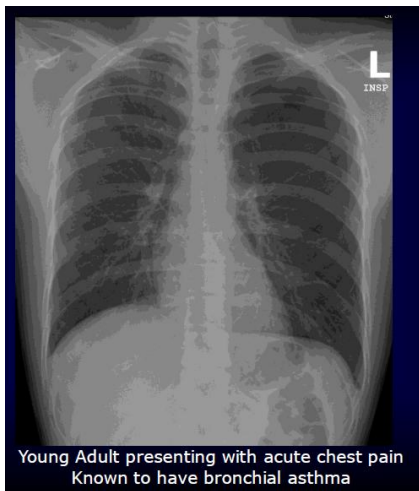
- Yellow arrows → several small nodule → indicates → Diffuse Miliary Nodules.

4- Adult female presenting with cough & weight loss



- Yellow arrows → variant sizes of masses → your differential diagnosis → **metastasis**, AVM, hydatid cysts or abscesses.

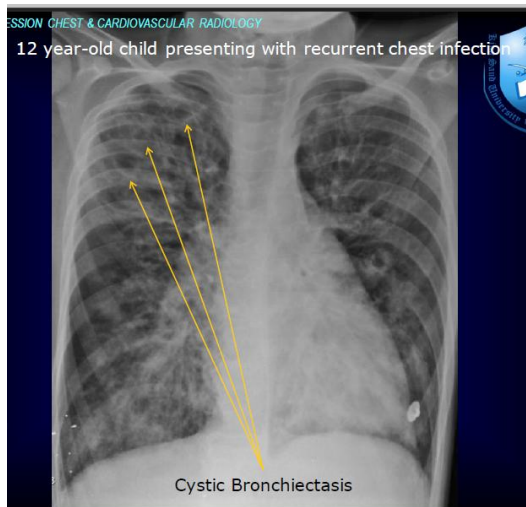
5- Decreased Pulmonary Densities:



- Pneumothorax on the left side
- Evident by increased decreased density of the periphery of the lung
- No vascular marking in that region
- Thin visceral pleural line seen outlining the lung
- **Note: Pneumothorax is more clearly seen on the expiratory film than inspiratory**

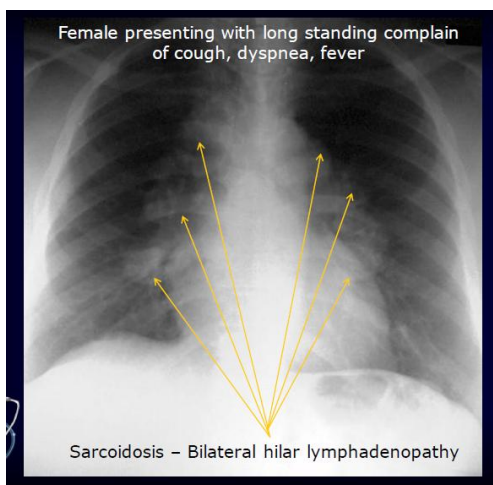
6- Cavitory/Cystic pulmonic lesions:

- 12 year-old child presenting with recurrent chest infection Cystic.





❖ Mediastinal Masses:



- Yellow arrows → lobulated outlines → gives the shape of Dubai fountain → so, it is sarcoidosis.

- Acute chest pain Known hypertensive.

