Tests Your Pulmonologist Might Order

Lifespan Cardiovascular Institute

Rhode Island Hospital • The Miriam Hospital
Newport Hospital

Delivering health with care®

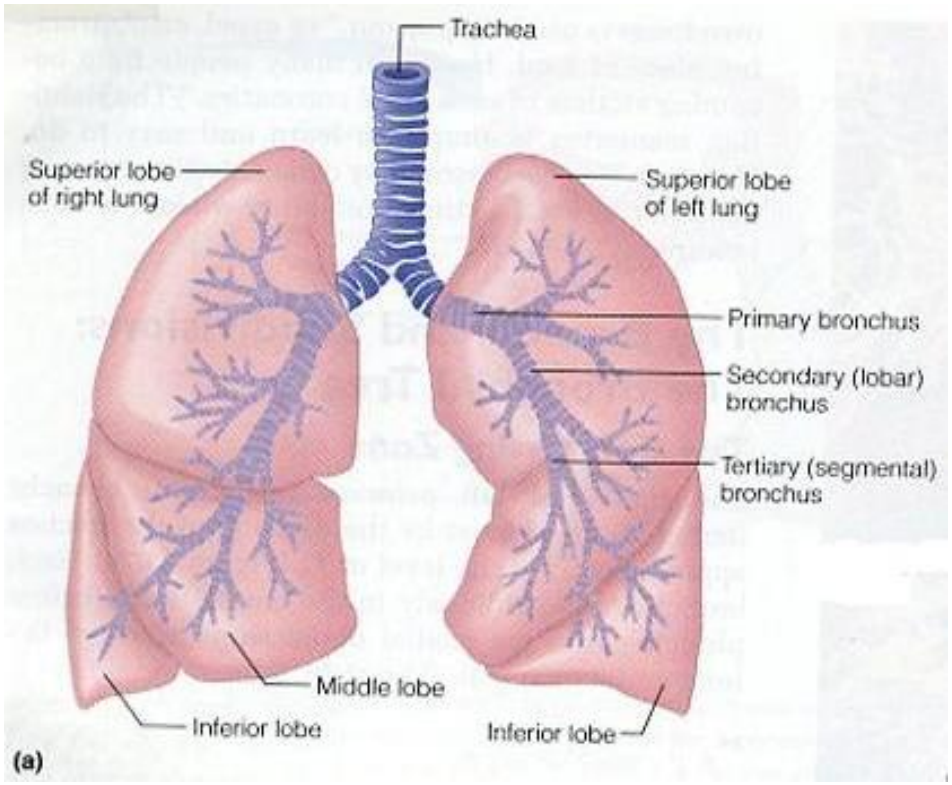
Center For Cardiac Fitness

Pulmonary Rehab Program

The Miriam Hospital

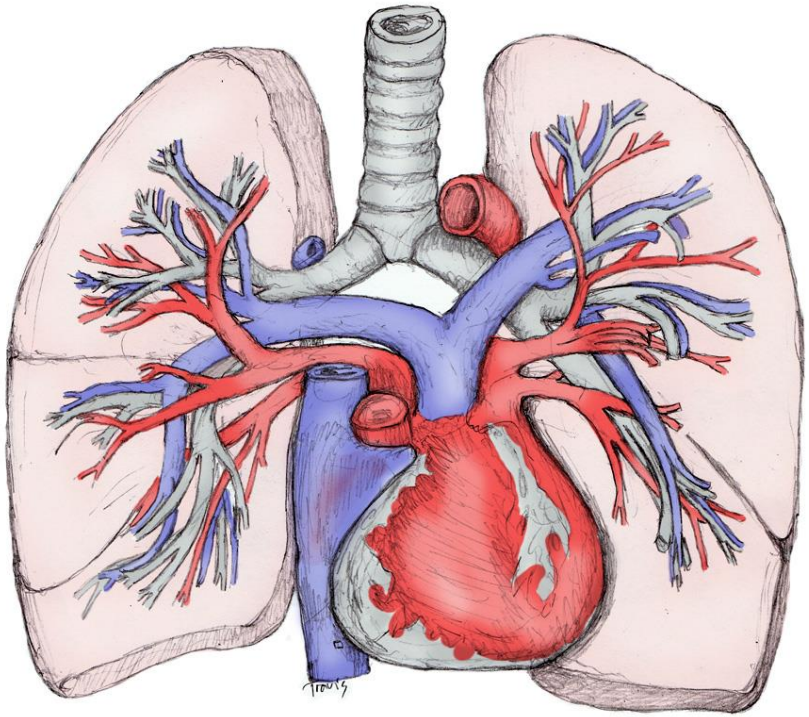
BASIC ANATOMY OF THE LUNGS

Lobes of Lung



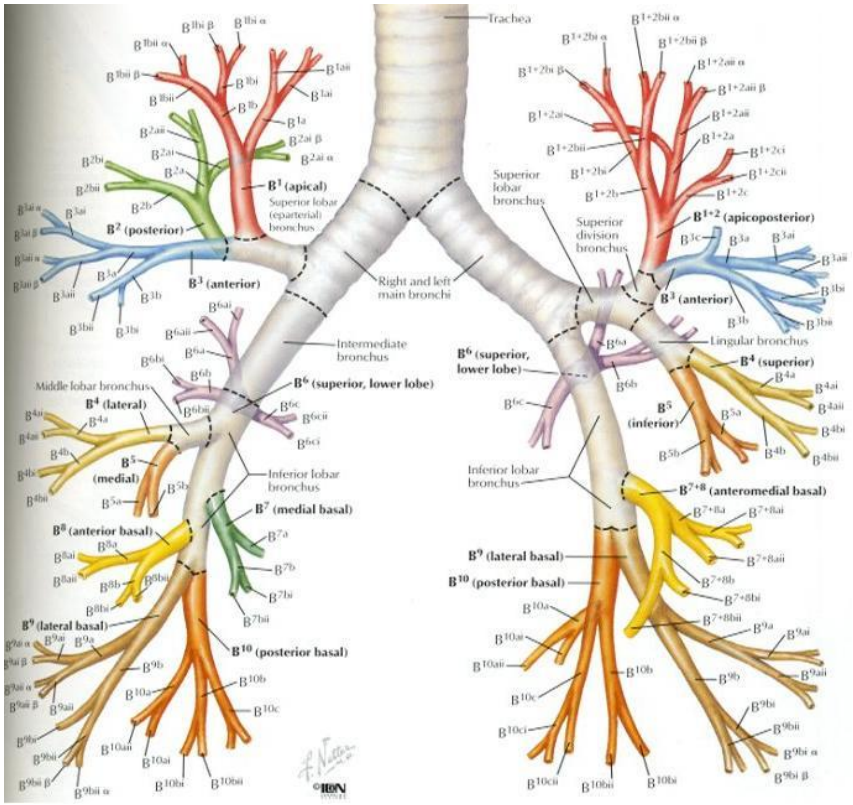
- 3 lobes on the Right lung
- 2 lobes on the Left

Blood Vessels



- Pulmonary arteries (red) carry blood from the heart to the lungs
- Pulmonary veins (blue) carry blood from the lungs back to the heart

Airways

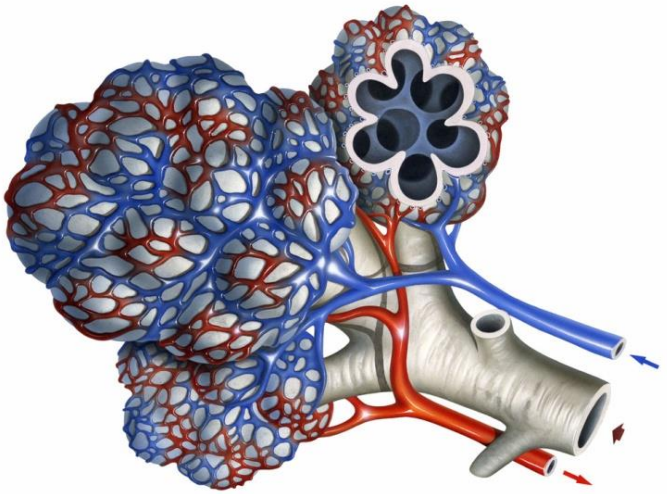


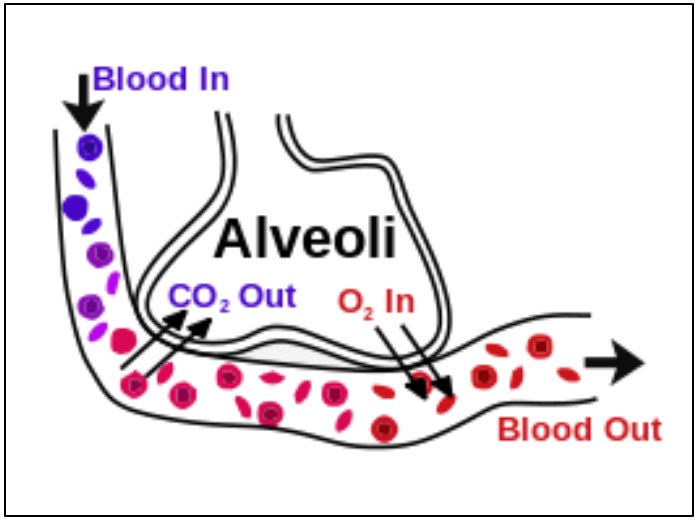
- Carry air that we inhale and exhale

Trachea -> Bronchi -> Alveoli

Alveoli
Functional Unit of Lungs

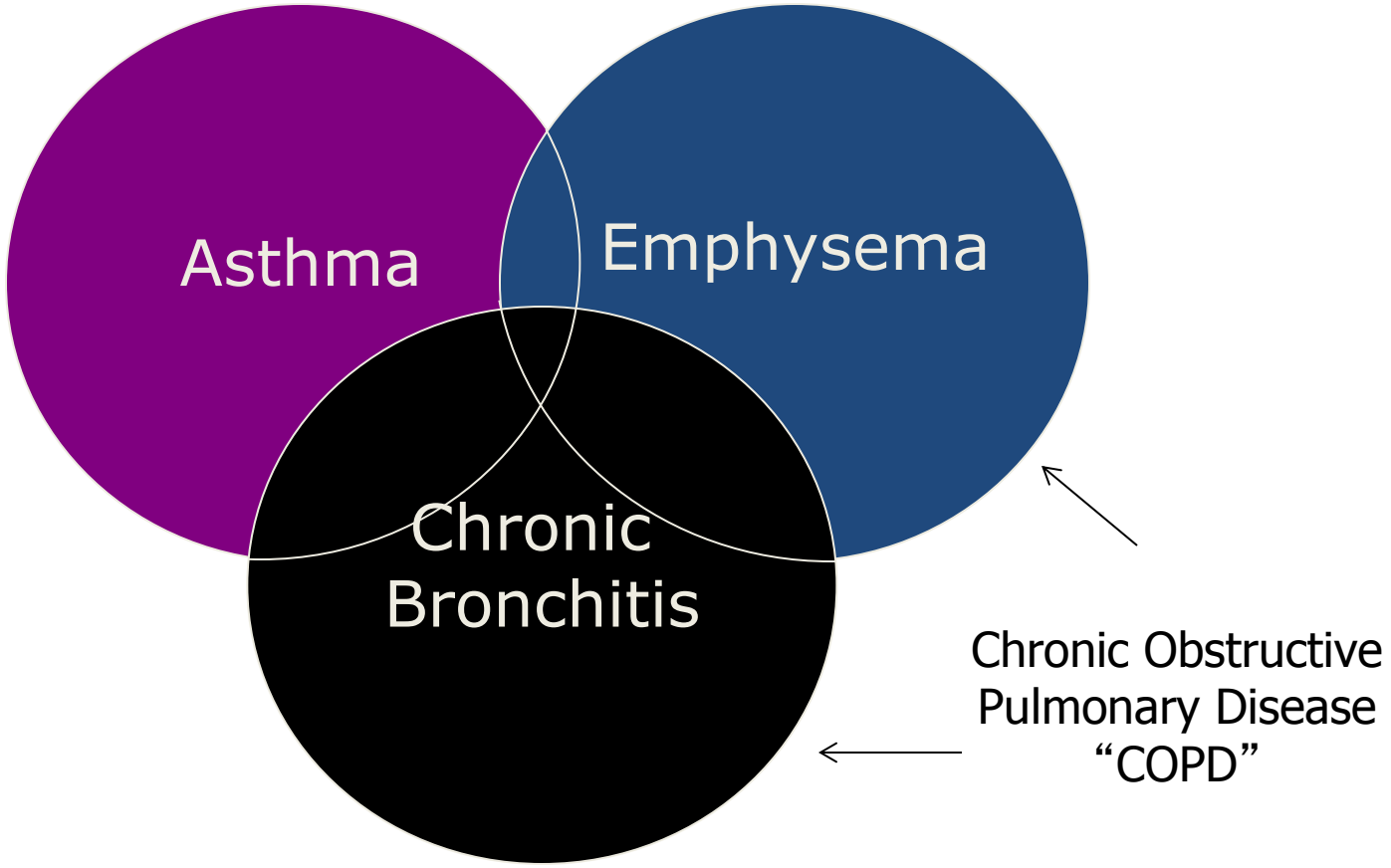
- 300 million tiny air sacs in the lungs
- Surface area of a tennis court
- Surrounded by capillaries
- Where gas exchange actually occurs
- Most chronic lung diseases affect the alveoli, the capillaries or both





COMMON DISEASE IN PULMONARY REHAB

Obstructive Lung Diseases

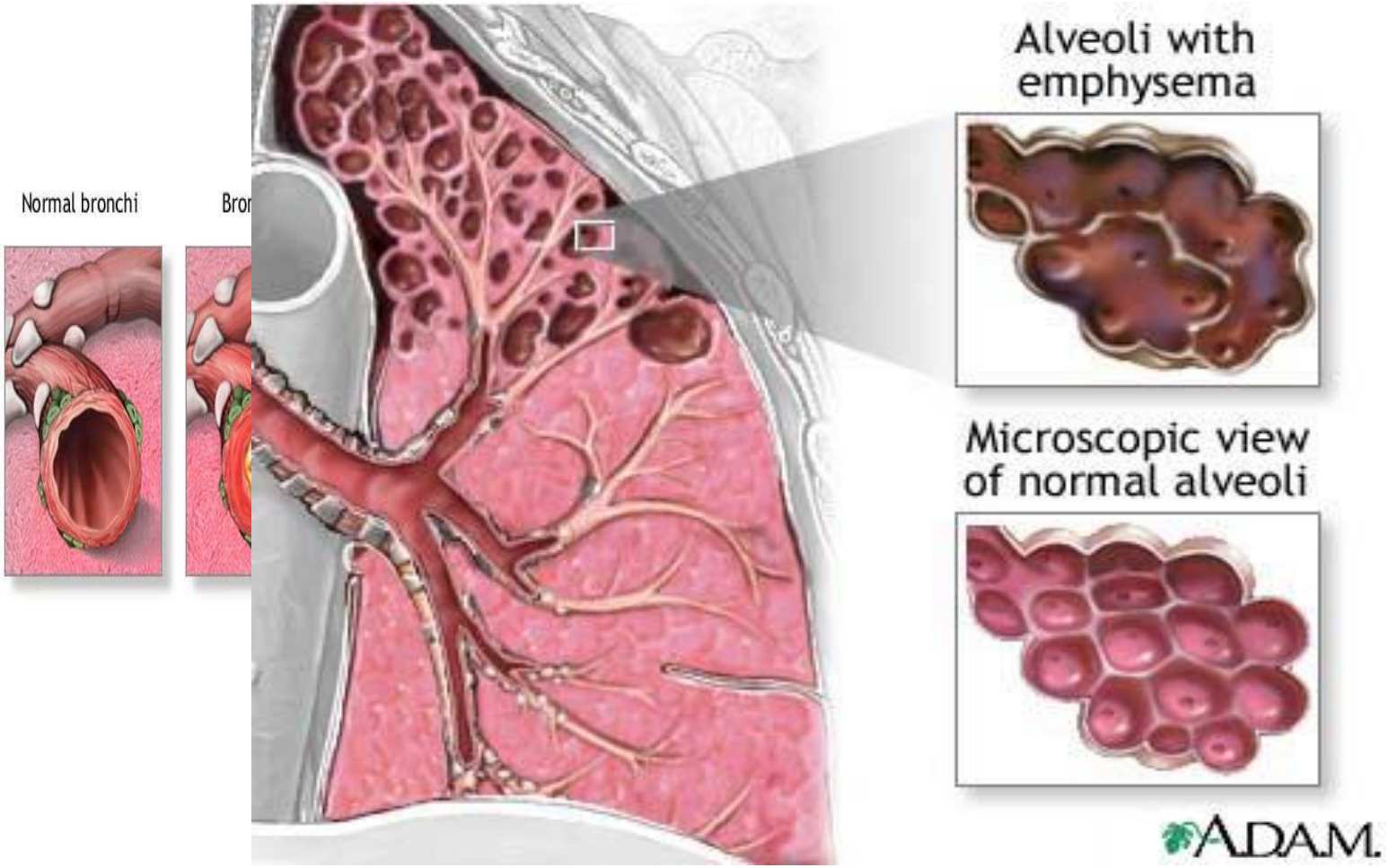


COPD: Chronic Bronchitis

Normal bronchi

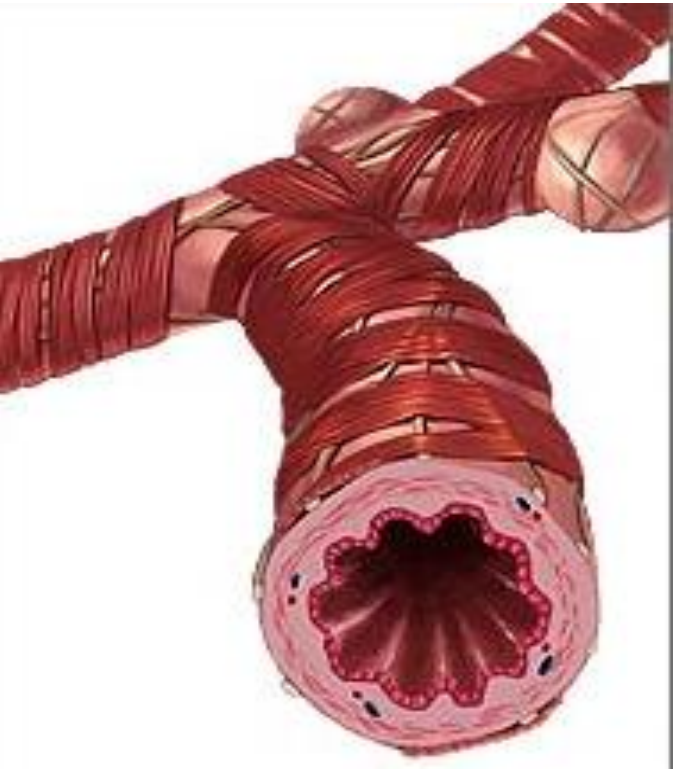
Bronchitis

COPD: Emphysema

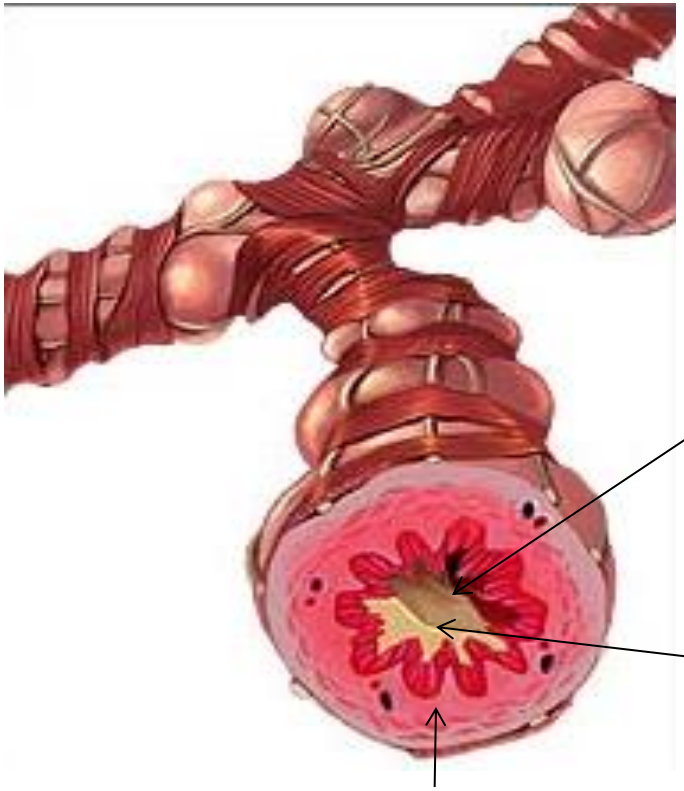


Asthma

Normal Airway



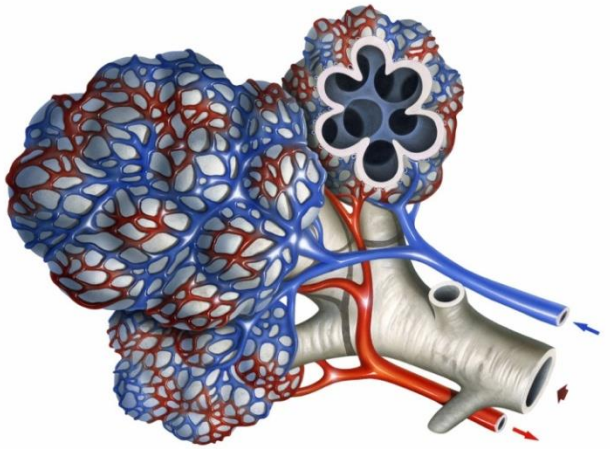
Asthmatic Airway



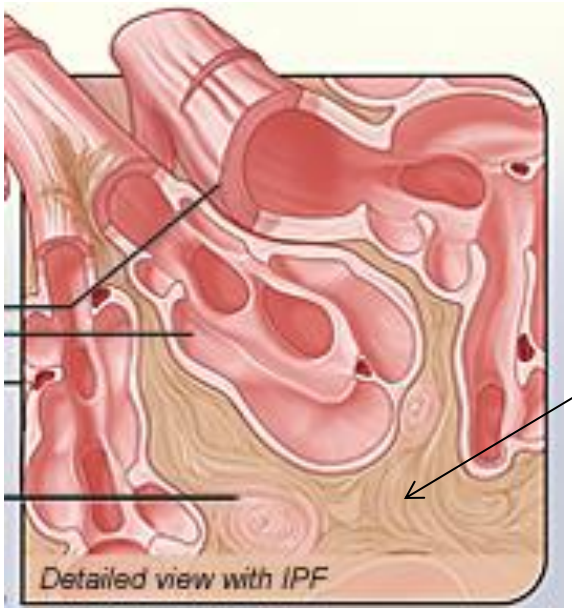
Compared to COPD, the changes in asthma are potentially reversible

Pulmonary Fibrosis

- In the normal lung the capillaries surround the alveoli allowing for gas exchange
- In fibrosis, scar forms between the alveoli and the capillaries

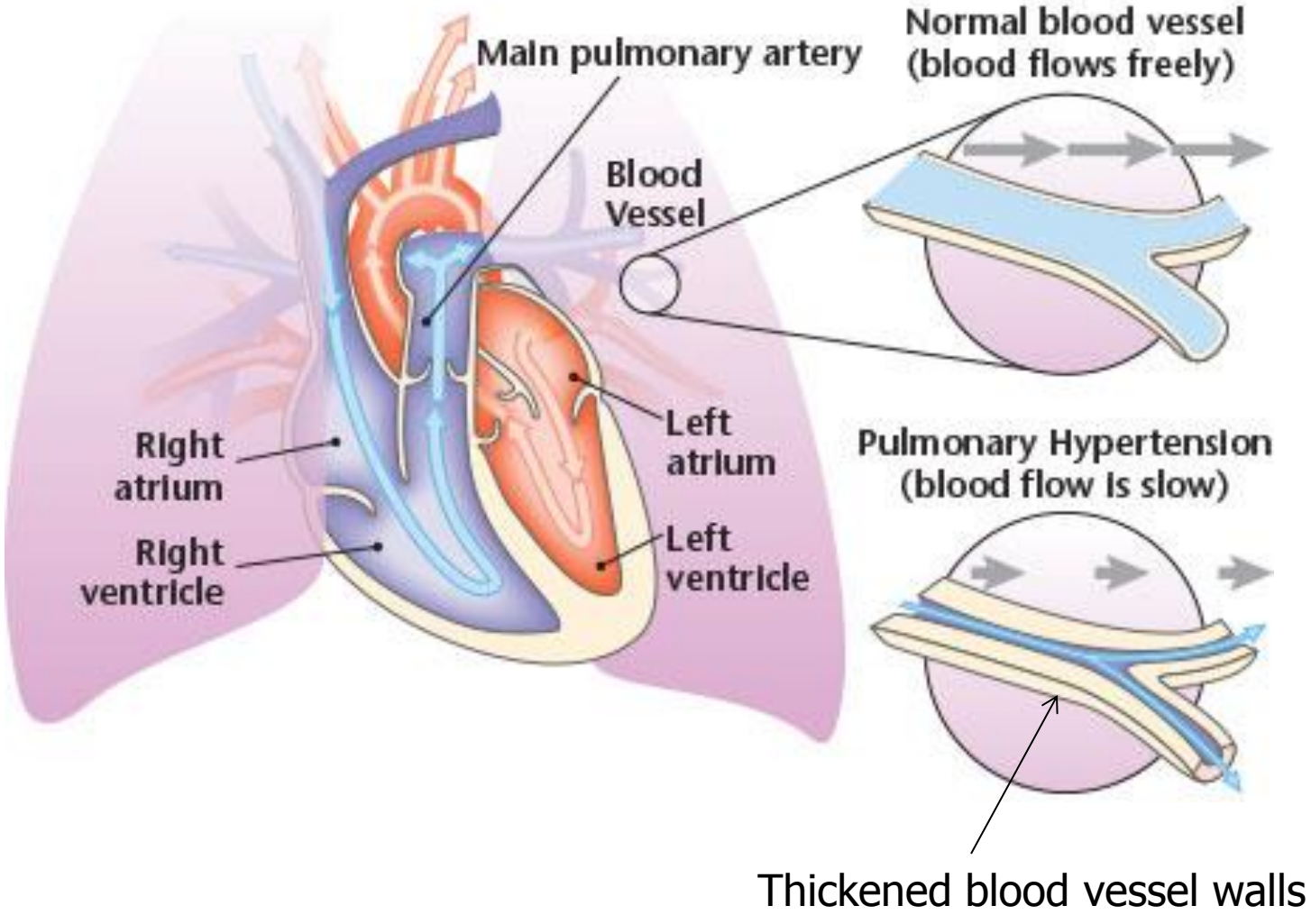


Normal



Fibrosis

Pulmonary Arterial Hypertension

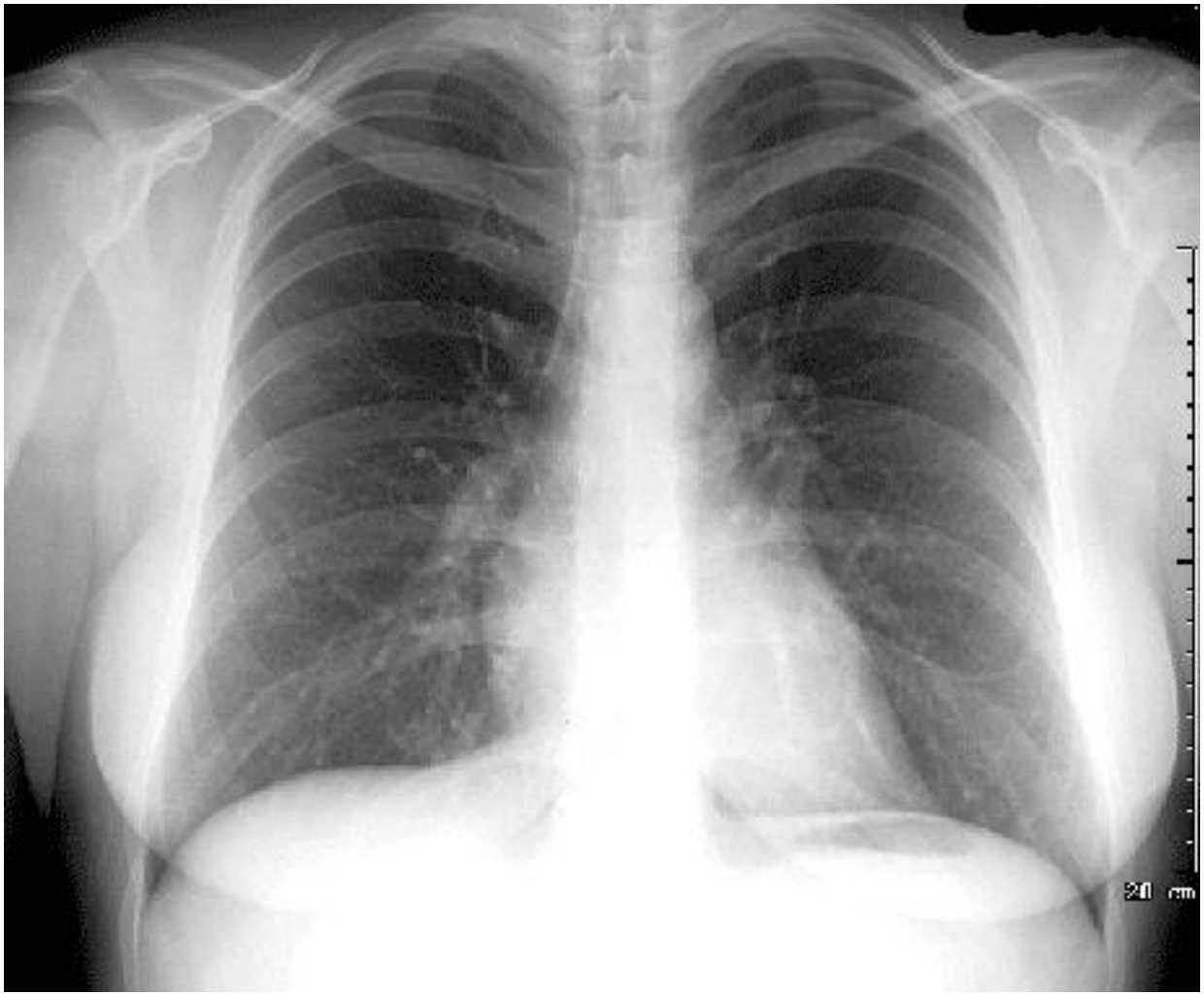


COMMON TESTS YOUR DOCTOR MIGHT ORDER

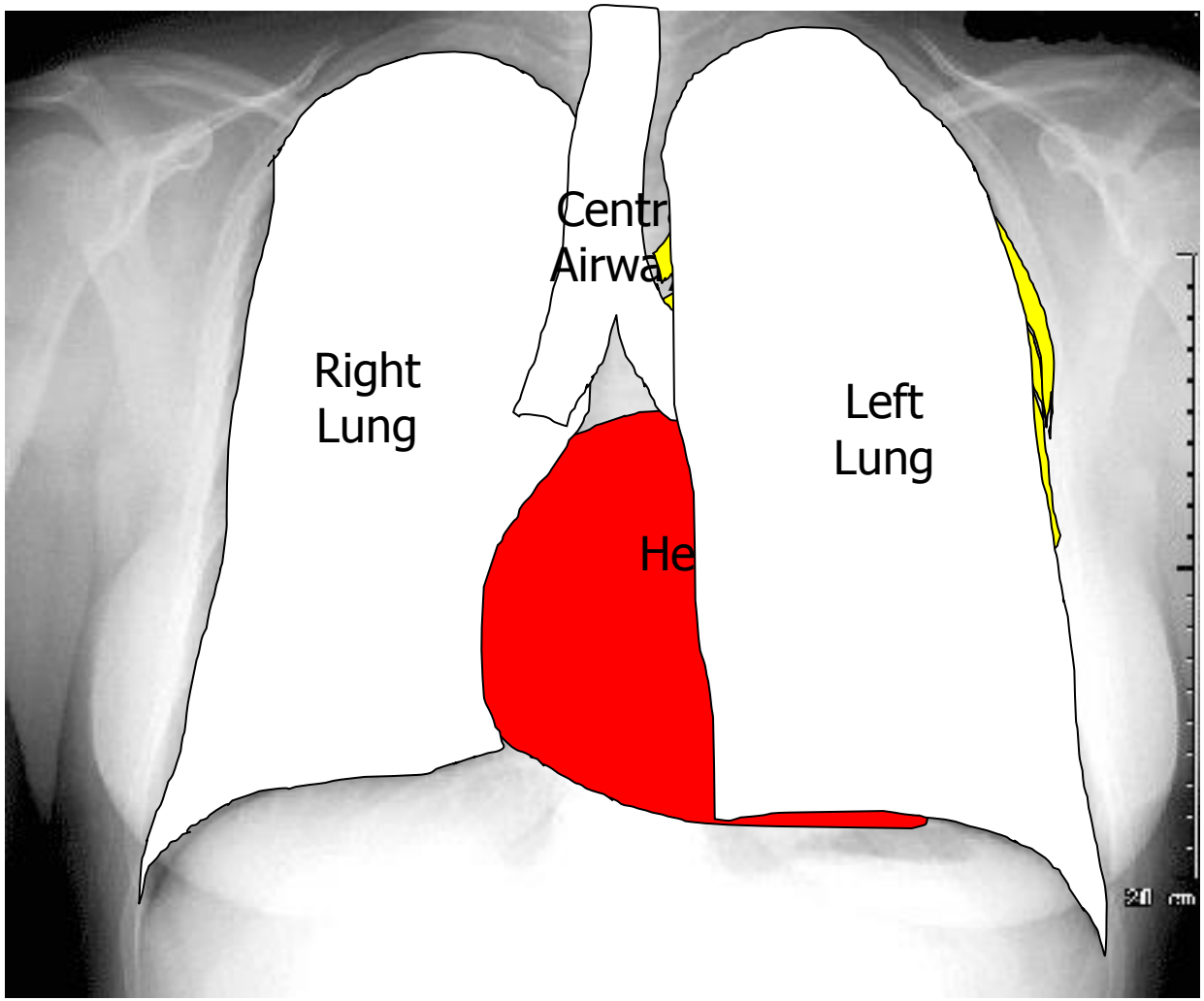
The Chest XRAY

- X-rays use radiation to create pictures of the inside of the body
- Different tissues absorb different amounts of radiation
  - Bone and metal absorb x-rays well and appear white
  - Air in the lungs doesn't absorb x-rays and appears black
  - Tissues appear different shades of gray
- Diseases that change the way radiation is absorbed can be detected on x-ray

The Normal Chest XRAY

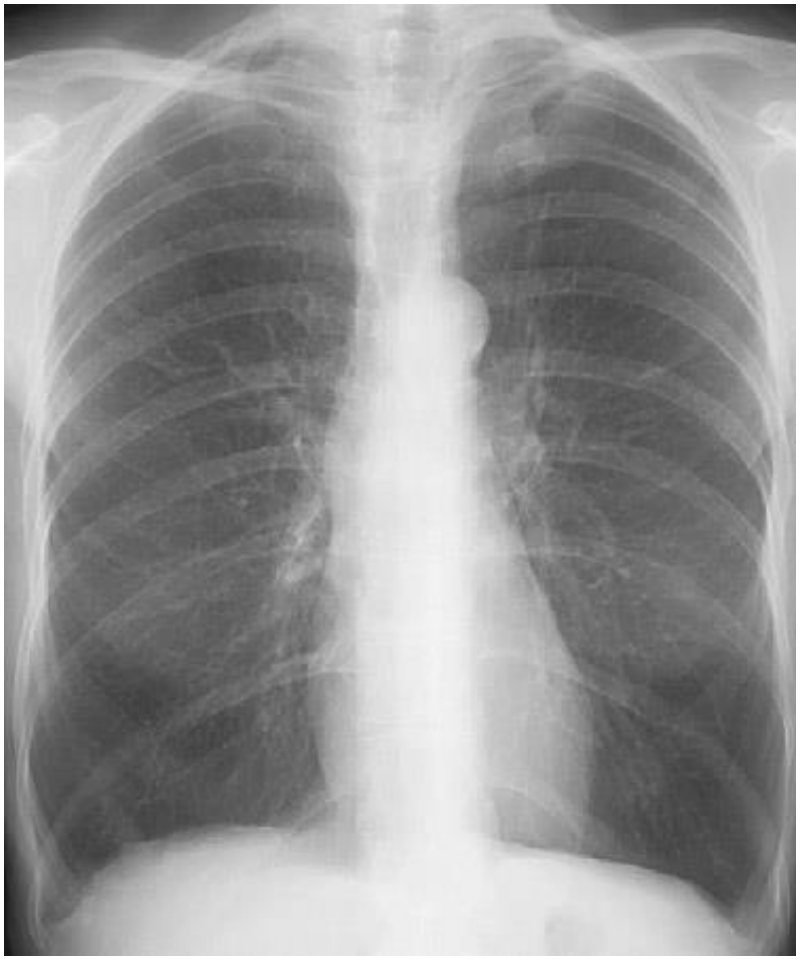


The Normal Chest XRAY



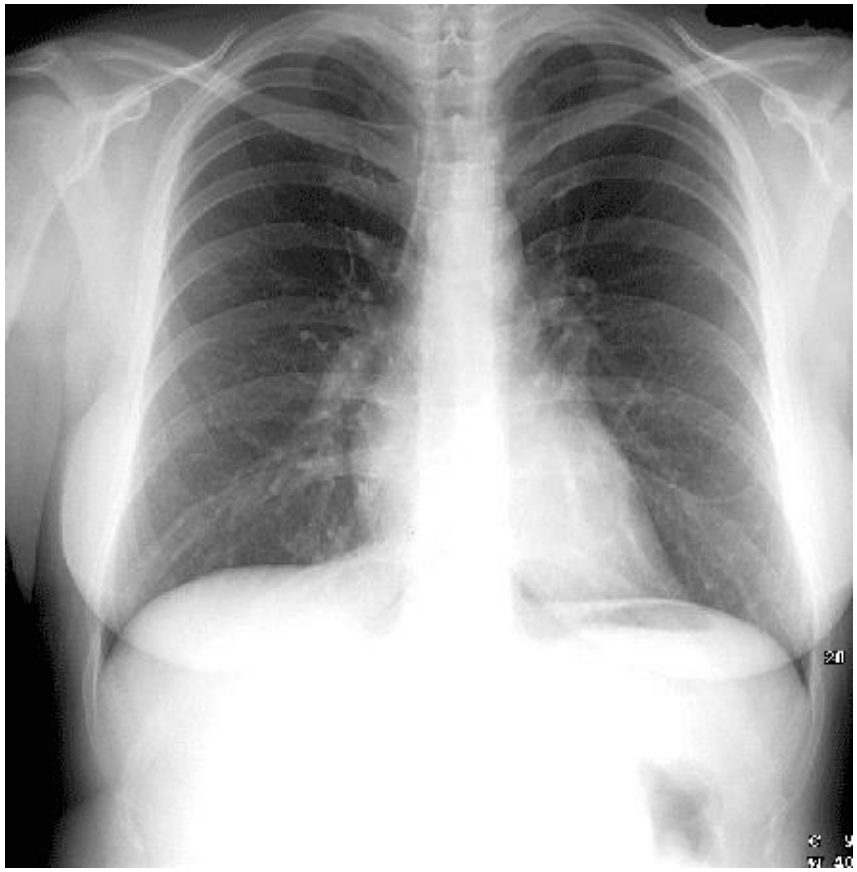
Emphysema

Normal



Emphysema

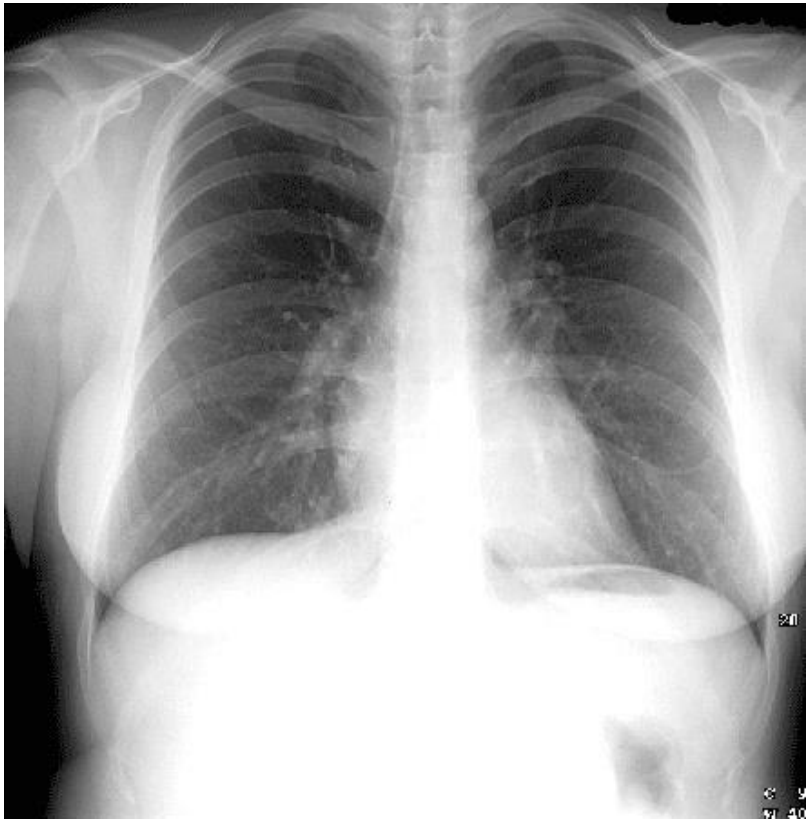
Pulmonary Fibrosis



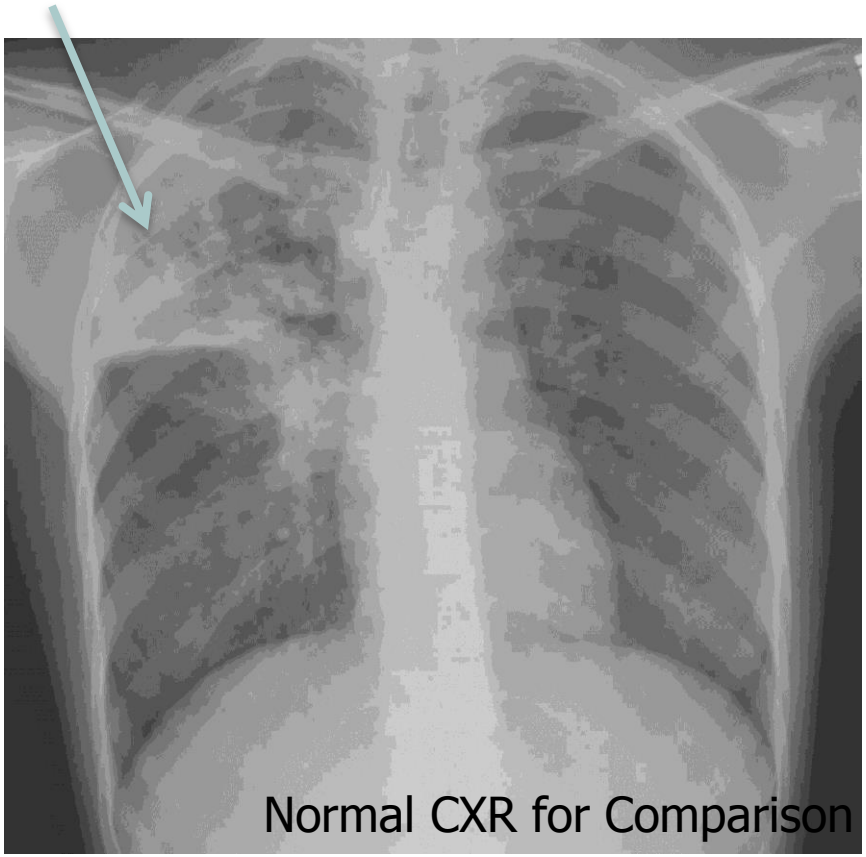
Normal

Pulmonary Fibrosis

Pneumonia



Normal



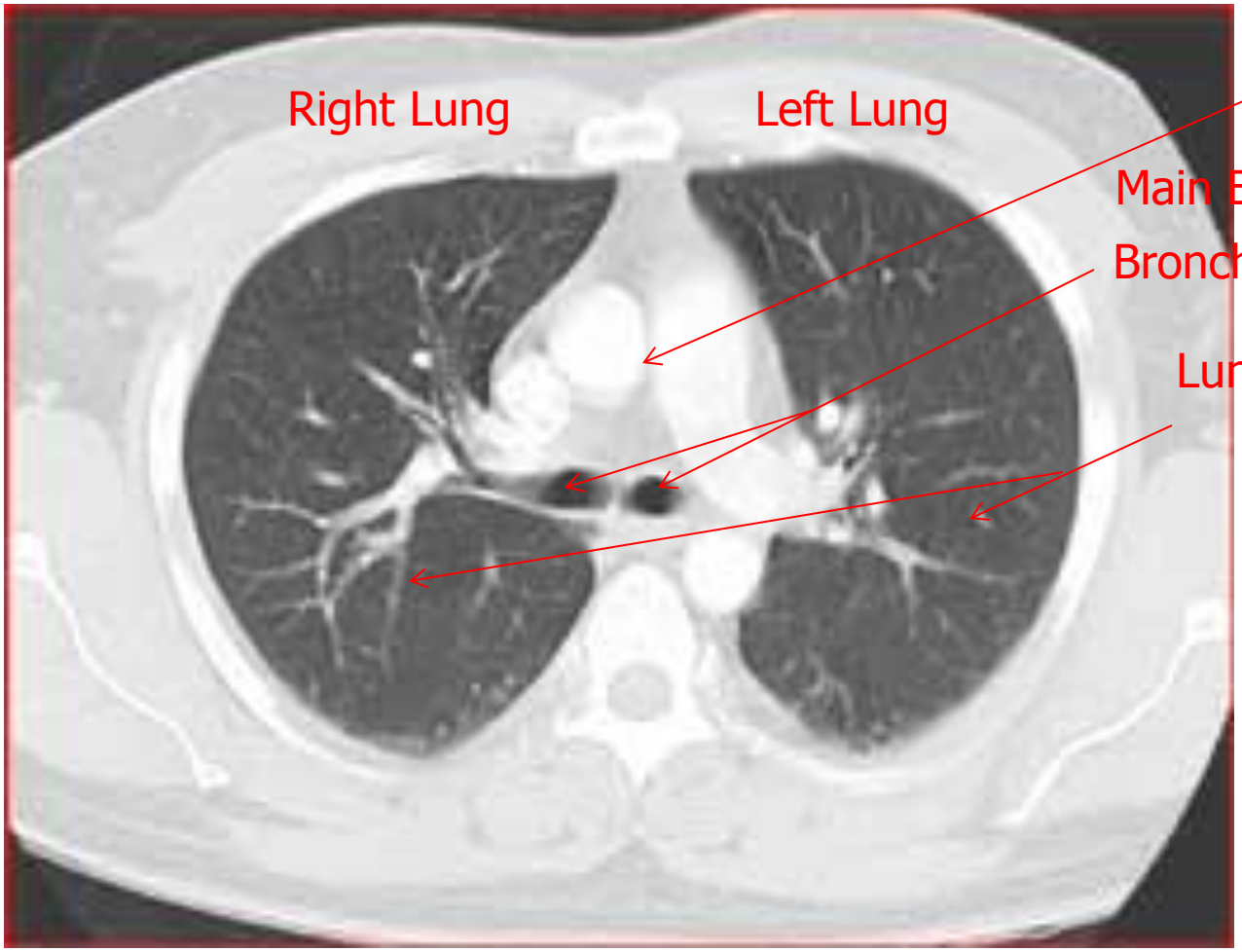
Pneumonia

Computed Tomography
“The Cat Scan”

- Uses similar technology and concepts as XRAY
- Many more detectors allows creation of a 2D image of the patient’s inside
- Provides much more detail than a chest XRAY
  - Risk is increased radiation exposure

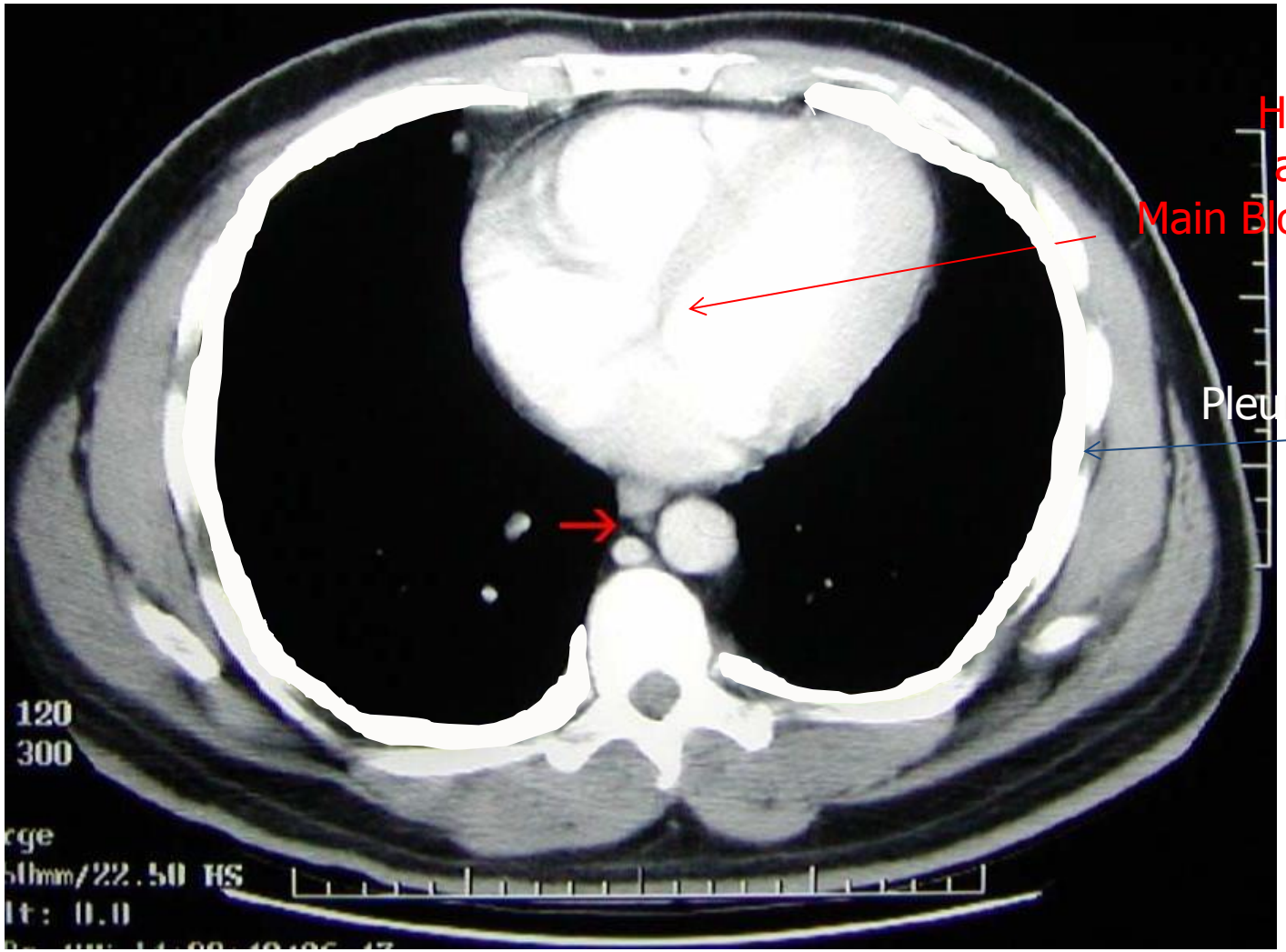
CT Scan Machine

Normal CT Images



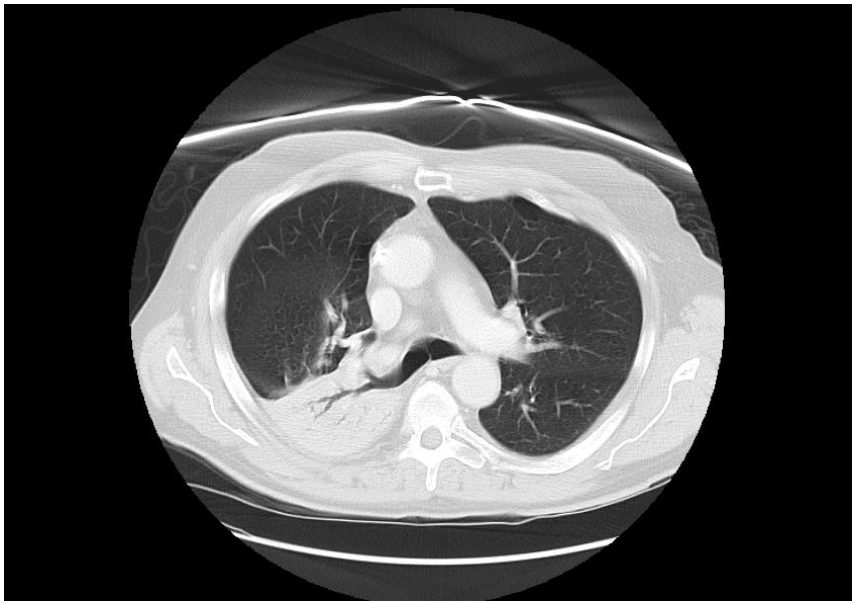
Slices are done as if lying with feet coming out of screen

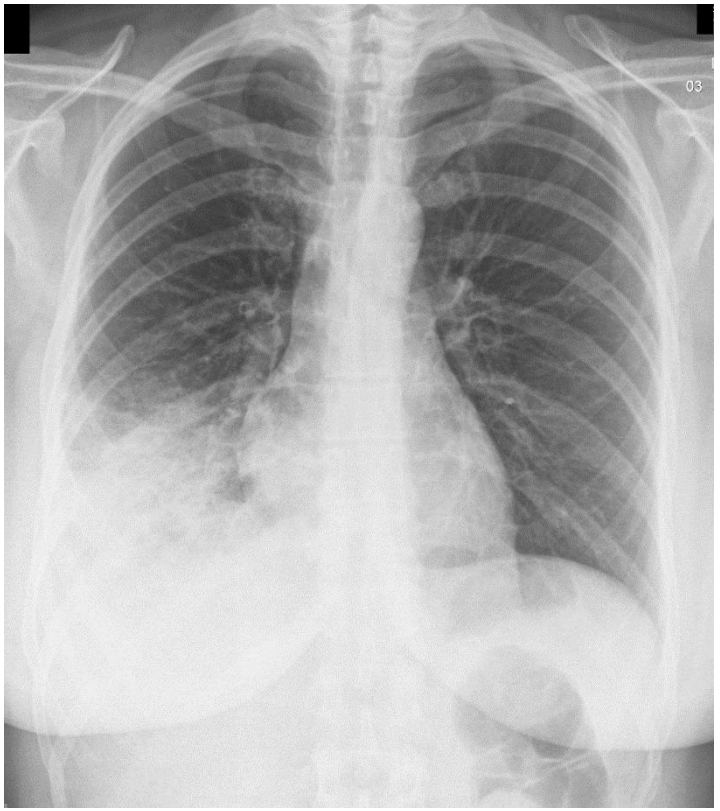
Normal CT Images



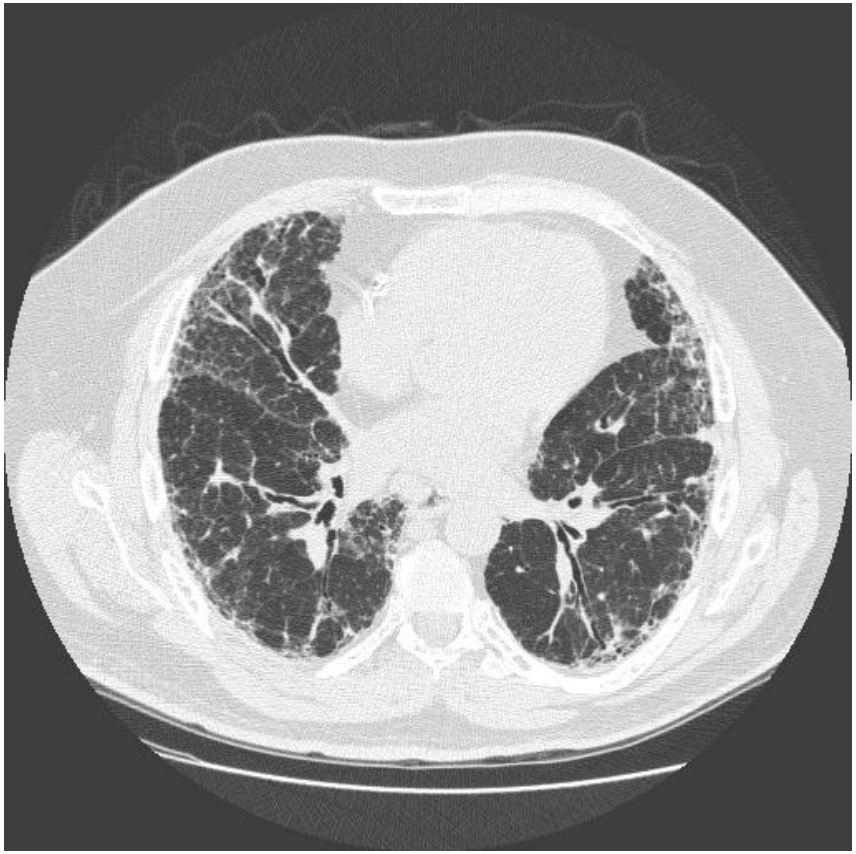
Mediastinal Windows:
To See Heart Structures, Blood Vessels, Pleural space

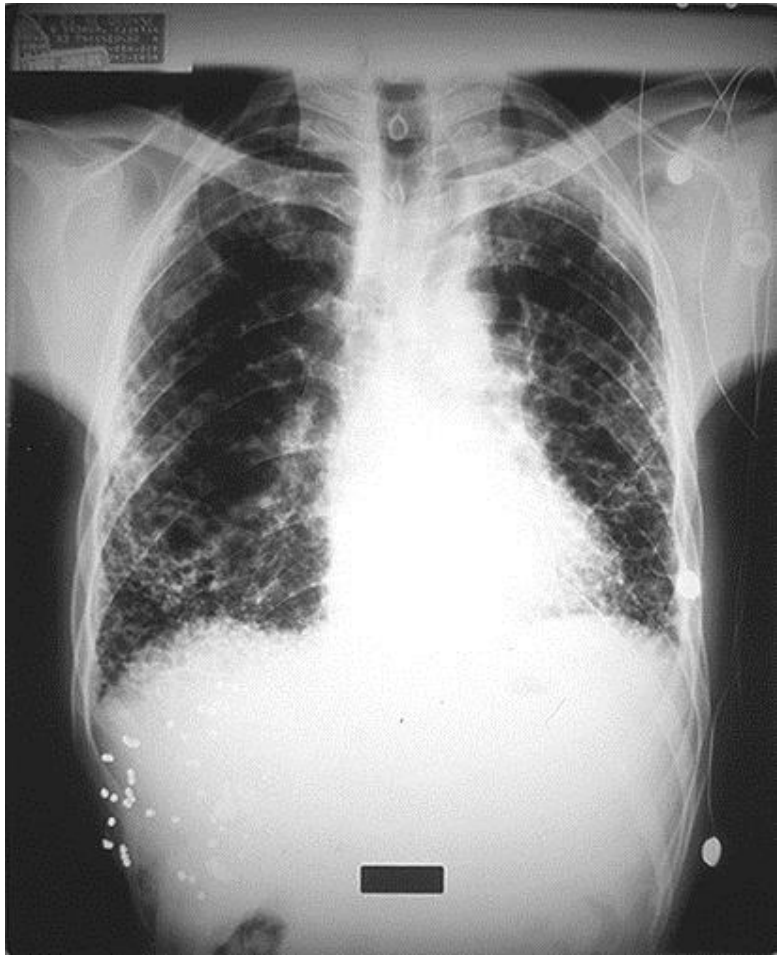
Right Lower Lobe Pneumonia



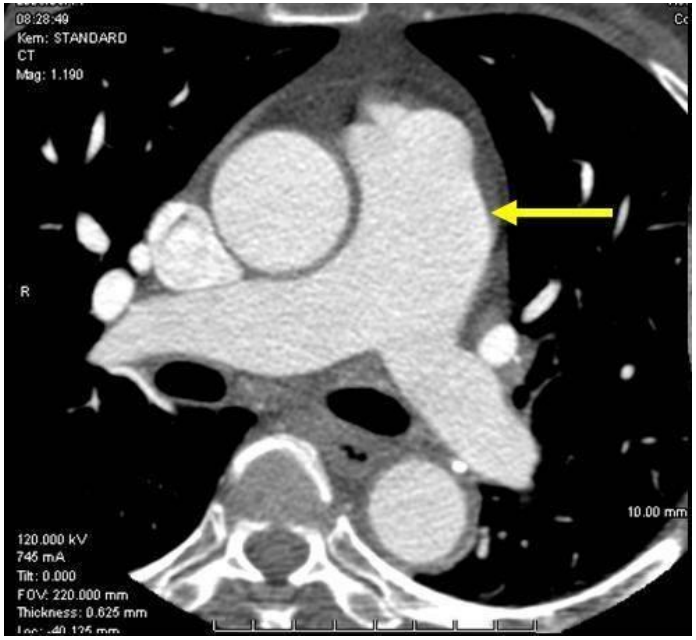


Pulmonary Fibrosis

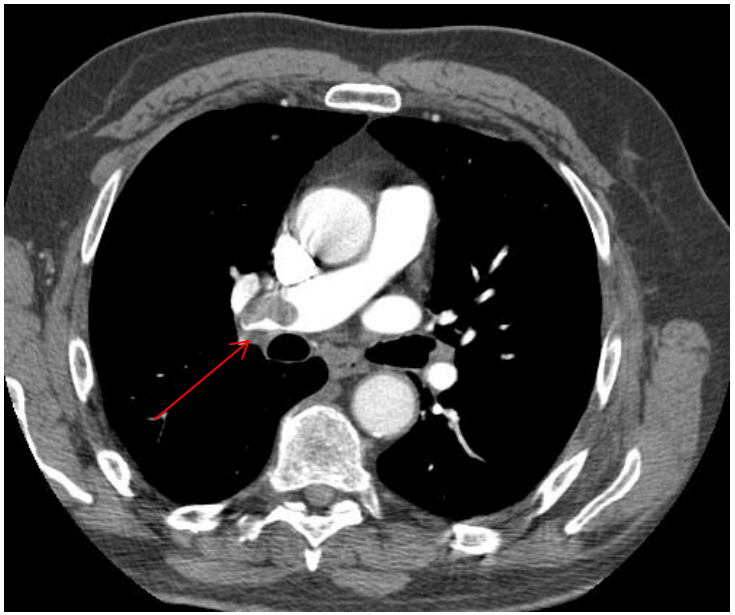




Pulmonary Embolism

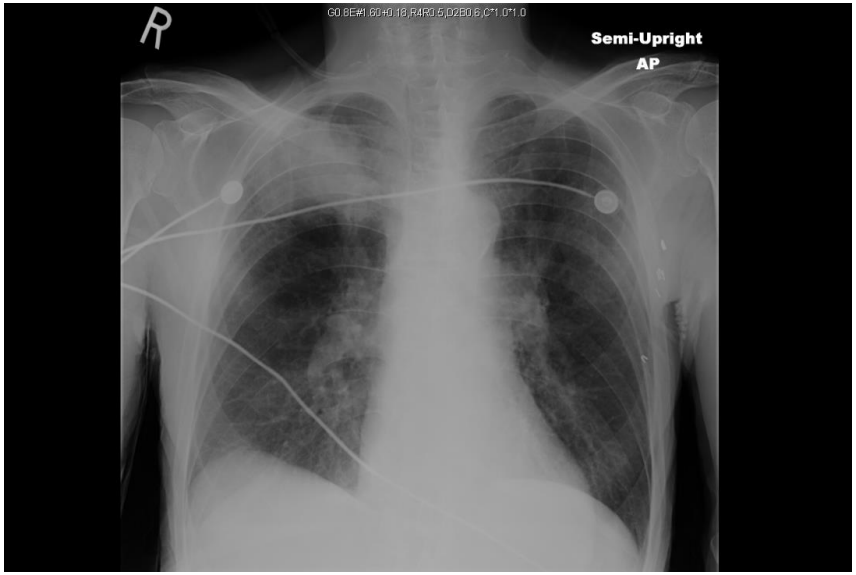


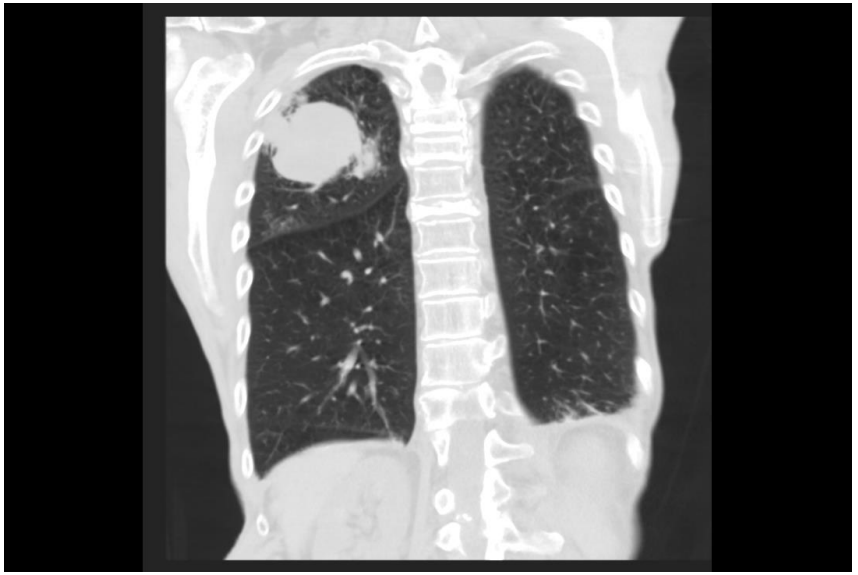
Normal Pulmonary Artery



Blood Clot in Pulmonary Artery

Lung Cancer





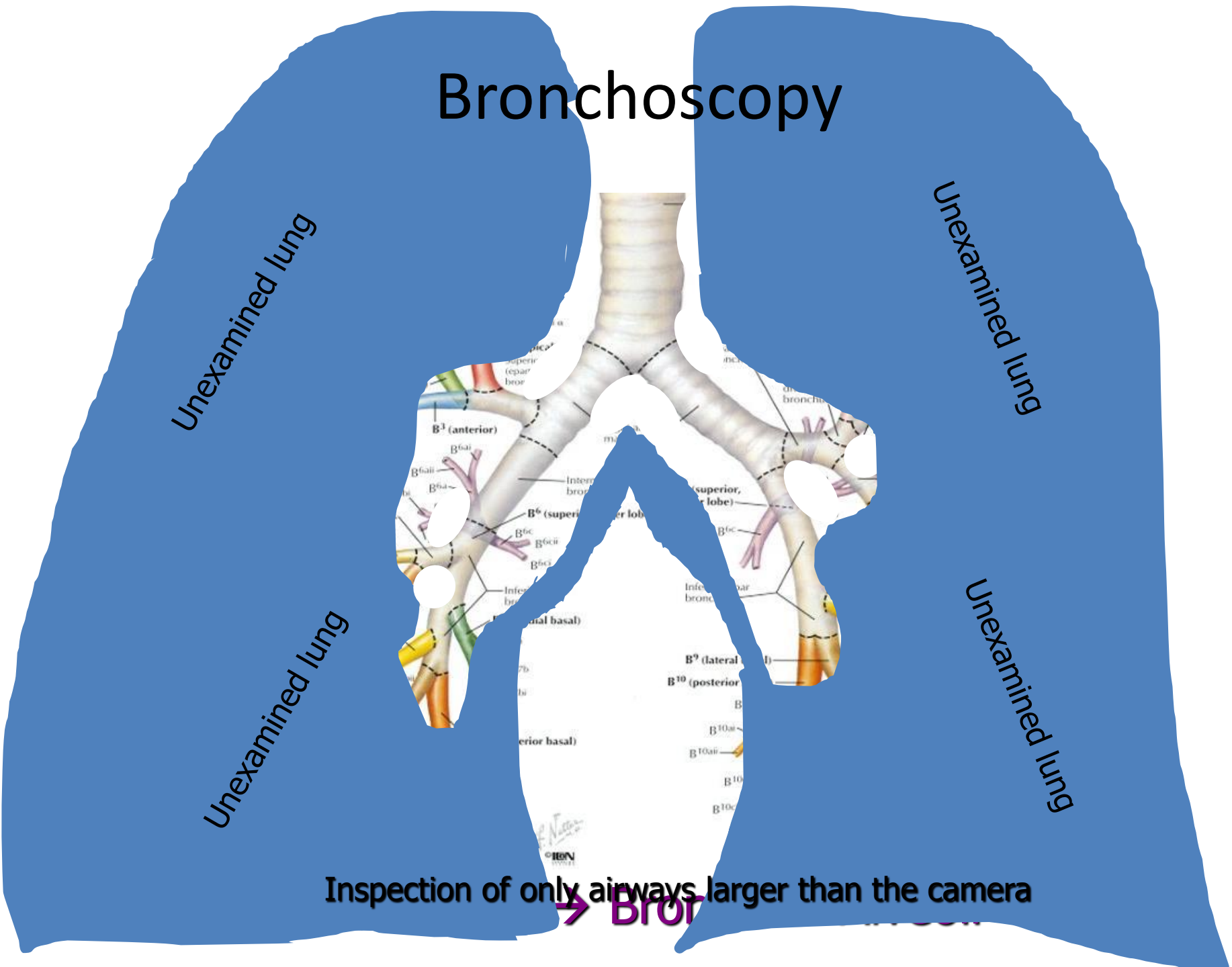
Bronchoscopy

Performed awake but with Sedation

Flexible camera at end

A bronchoscopy is used to view the airway to check for any abnormalities and perform biopsies

Bronchoscopy



Inspection of only airways larger than the camera

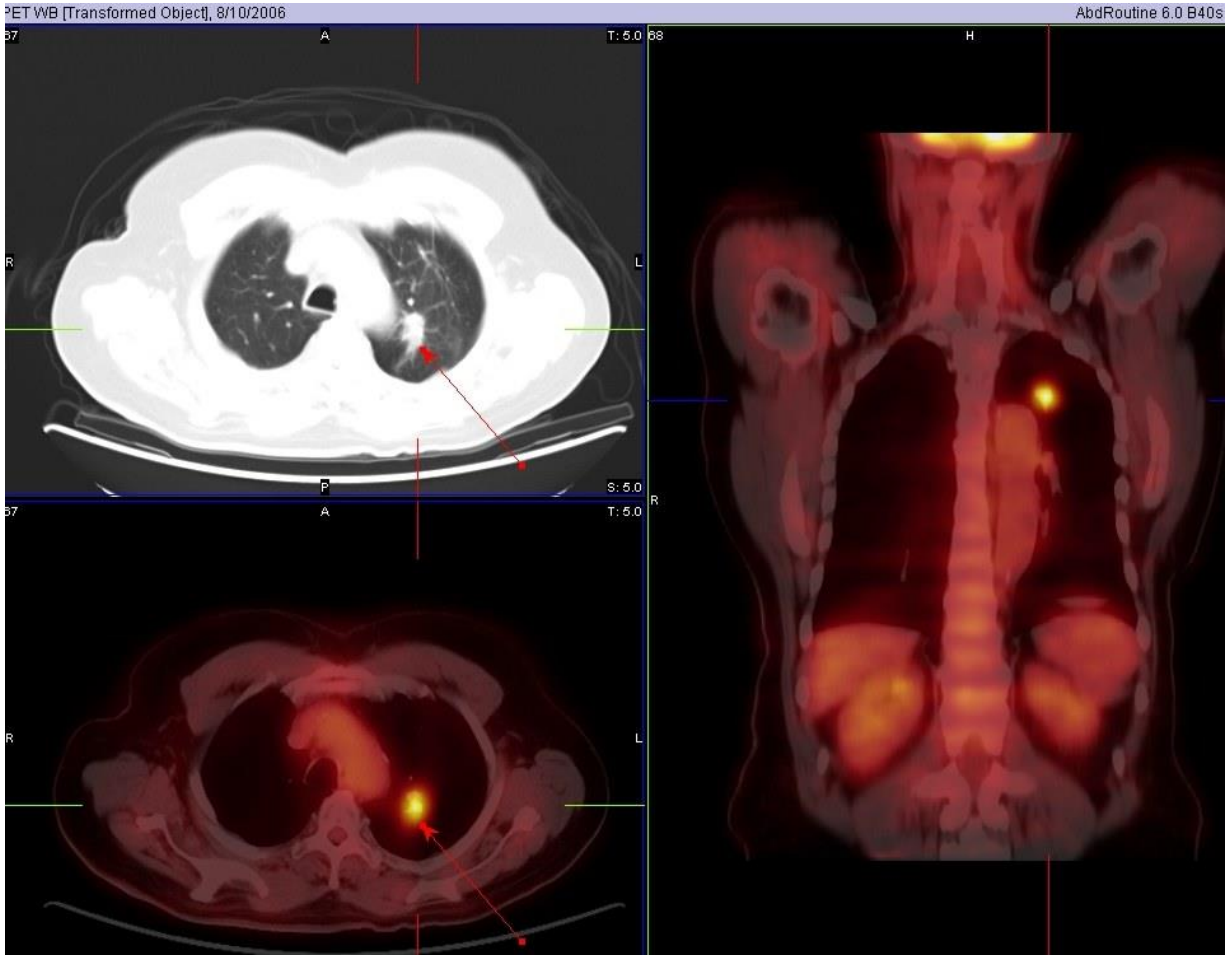
→ Bron

PET- CT Scan

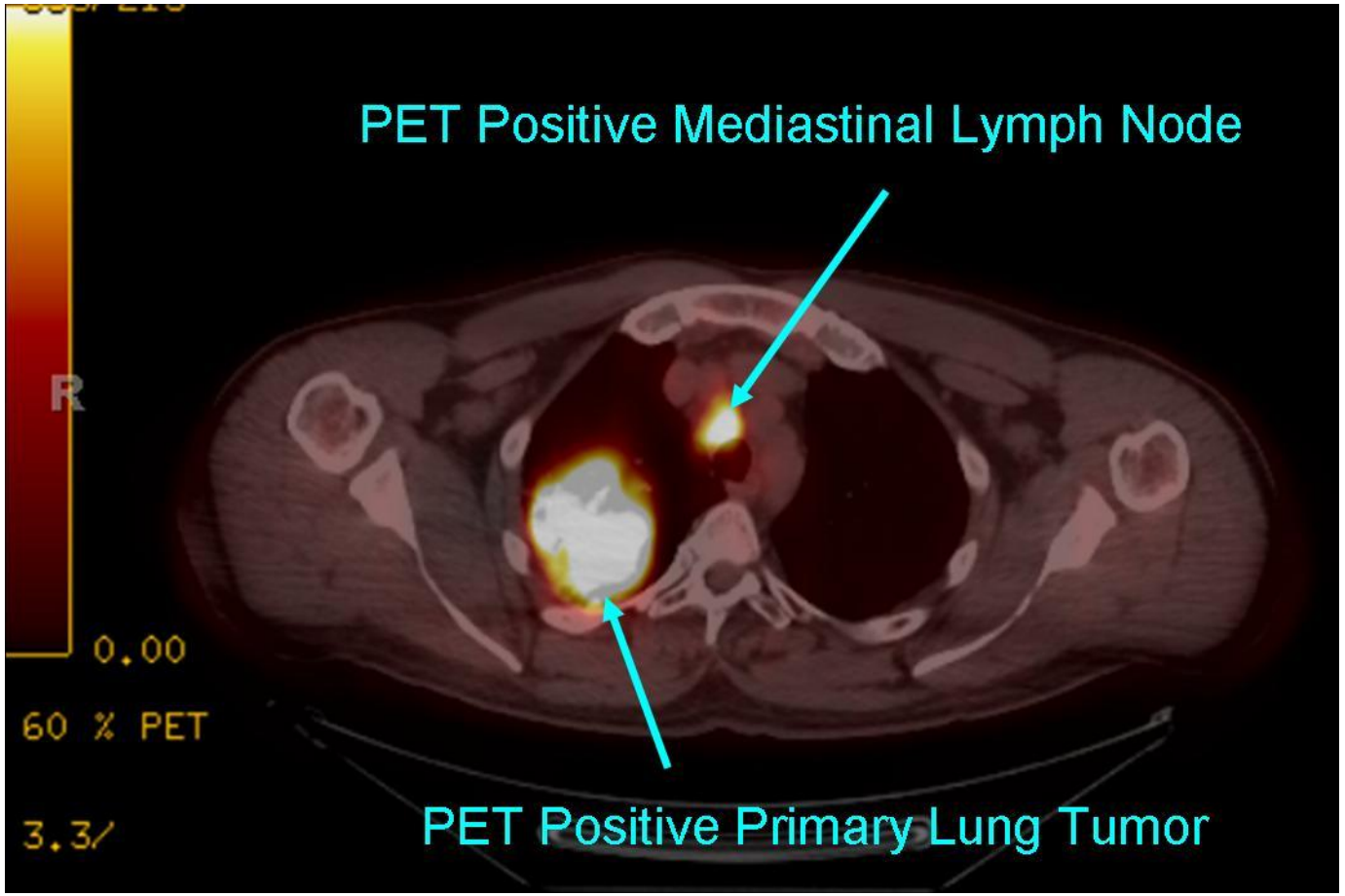
- Used primarily to evaluate suspected or known cancer
- Tumor cell grow rapidly
- Cells that grow rapidly consume high amounts of sugar
  - Injection of radiolabeled glucose to see what cells are metabolically active

- Used to better define features of lung nodules
- Used in patients with known lung cancer to evaluate whether the cancer has spread

PET Scan
Left Sided Lung Mass



PET Scan
Right Sided Lung Mass



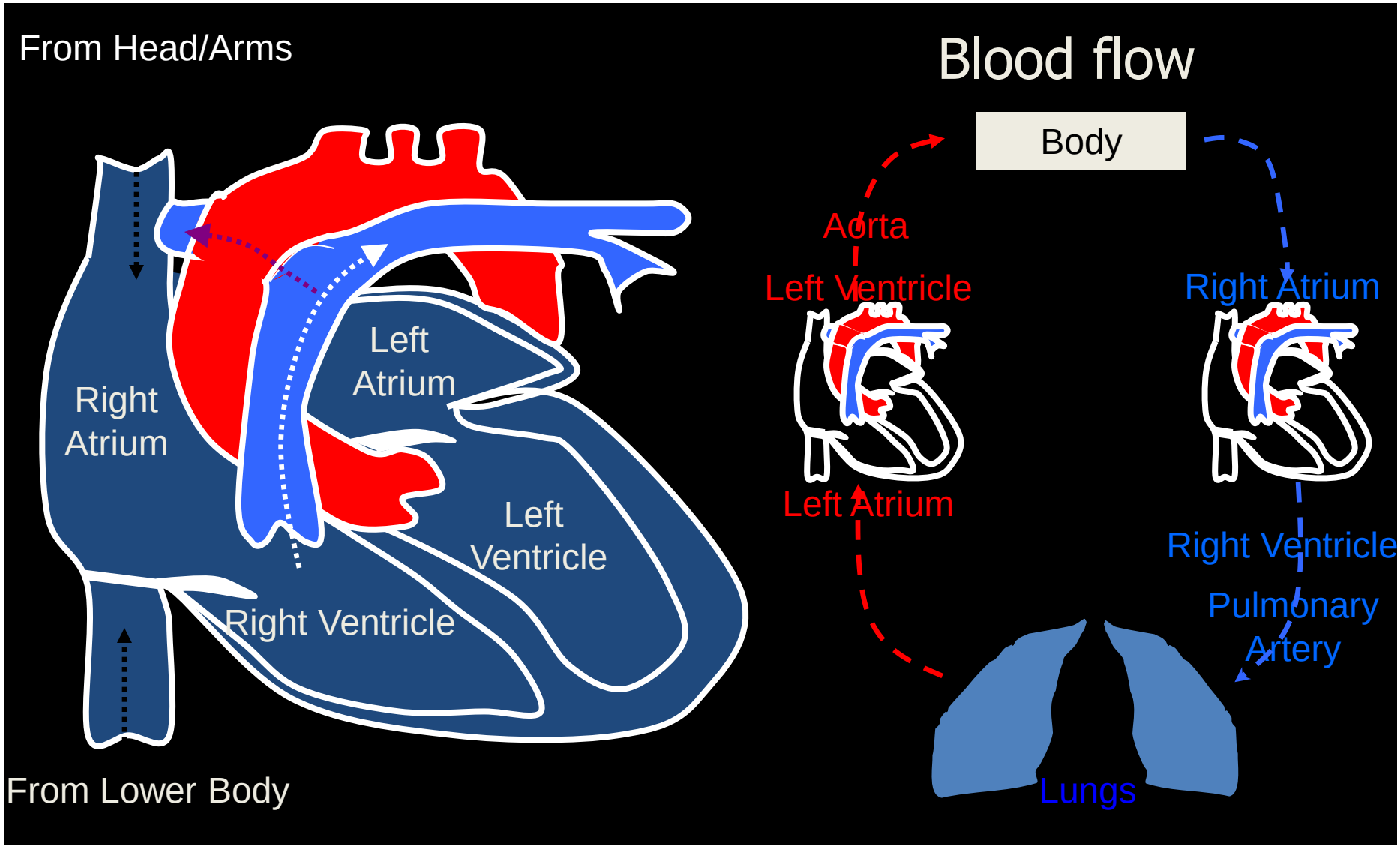
Pulmonary Function Tests (PFTs)

- Routine breathing tests to assess lung health
  - Important in the evaluation "shortness of breath" of unknown cause
  - Evaluation of other pulmonary complaints: cough
- Once diagnosis is known:
  - Allow for classification of severity of disease
  - Used to follow progress over time

Pulmonary Function Tests

- 

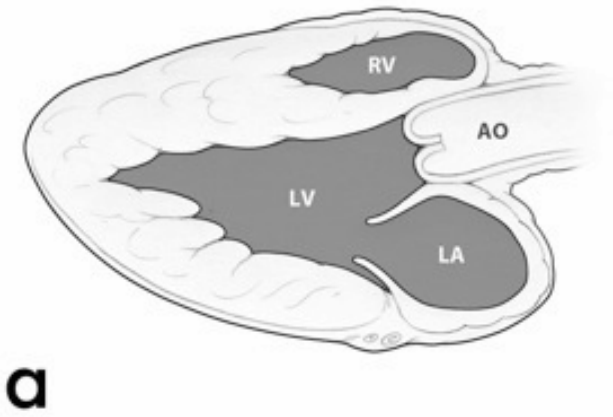
Echocardiography
Normal Heart Structures

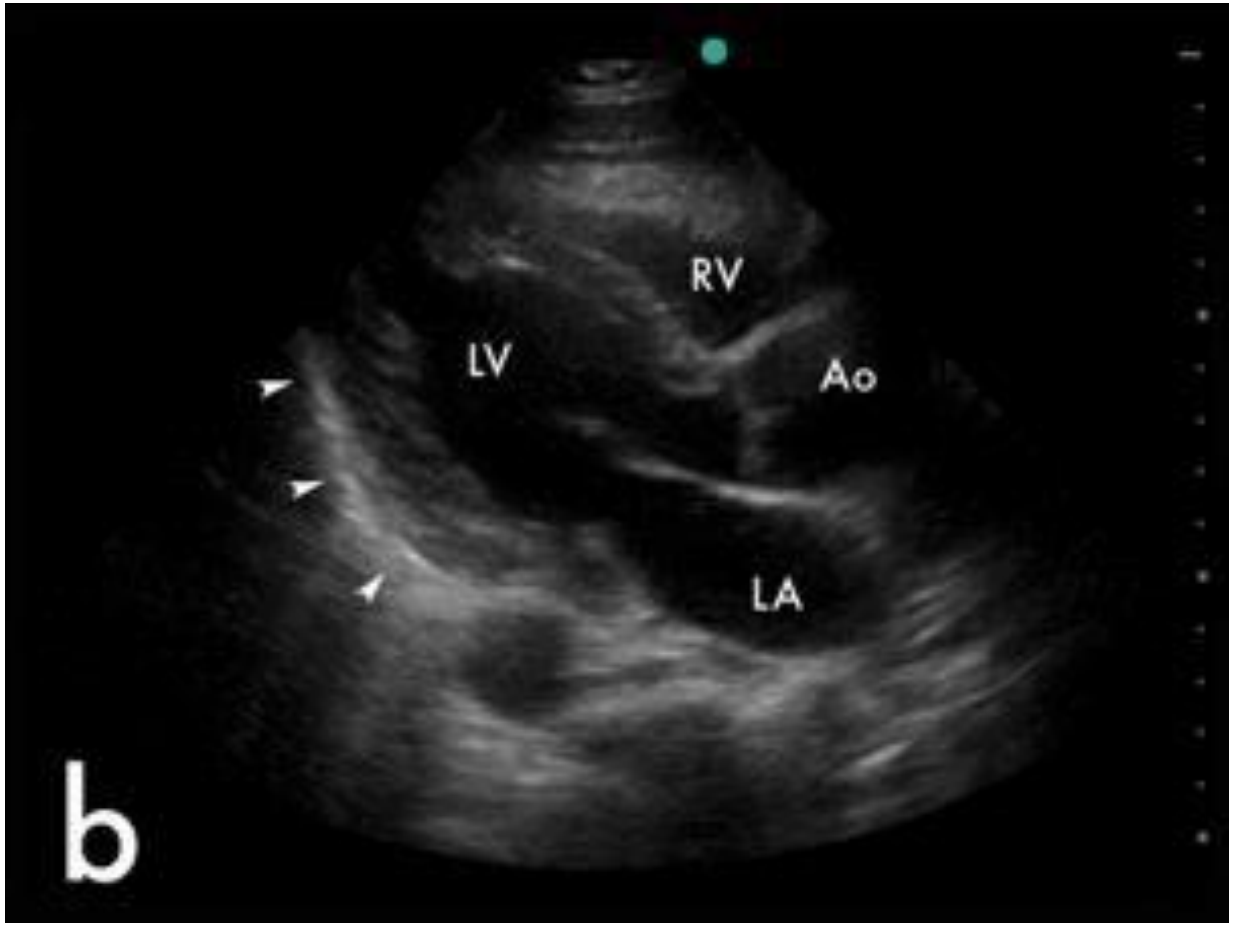


Echocardiography

- Left heart evaluation
  - Function
  - Valves
- Right heart structures and function
  - Presence of pulmonary hypertension

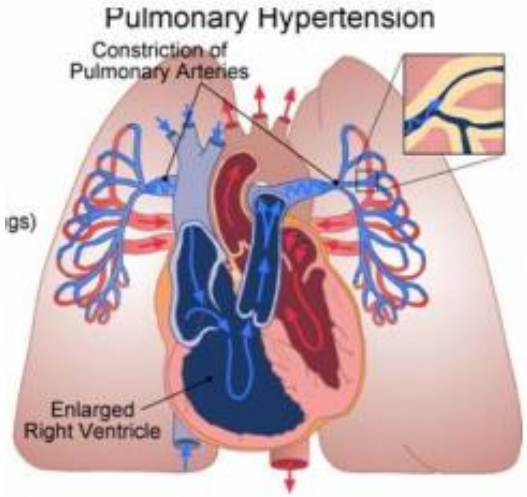
Echocardiography

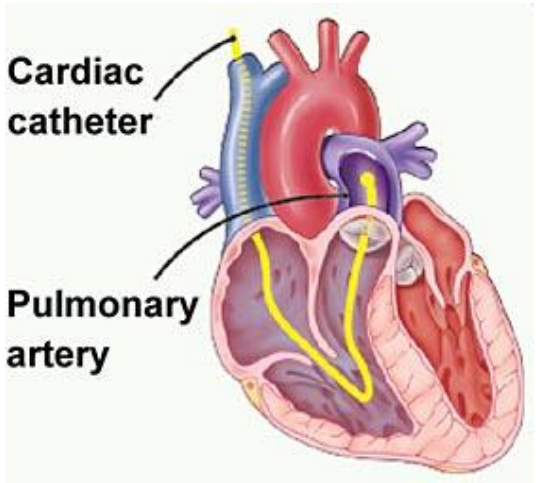




Right Heart Catheterization

- Used to measure pressures in the right side of the heart
- Primarily used to diagnosis and monitor pulmonary hypertension





Comments or Questions?