



Diagnosis of TB Disease: Radiology

Megan Devine, MD

August 25, 2026

Clinical Management of TB for Physicians • August 25, 2026 • San Antonio, Texas



Megan Devine, MD

Has the following disclosures to make:

- No conflict of interests
- No relevant financial relationships with any commercial companies pertaining to this activity





Diagnosis of TB Disease: Radiology

Megan Devine, MD

Heartland TB Center

Professor, Pulmonary and Critical Care Medicine
University of Texas Health Science Center at Tyler

No disclosures relevant to this presentation



Chest Xray Basics



Chest Xray Basics

- X-Rays penetrate air, absorbed by fluids/solids
 - Dark = Air
 - Dense White = Calcium (Bone Density)
 - White = Water Density (Everything else)
 - Water
 - Blood
 - Fat
 - Tissue
 - Pus
- Chest radiographs are just shadows of structures, tissue and air
- Interpretation of a chest radiograph is pattern recognition that requires clinical correlation for diagnosis



Posterior-Anterior CXR

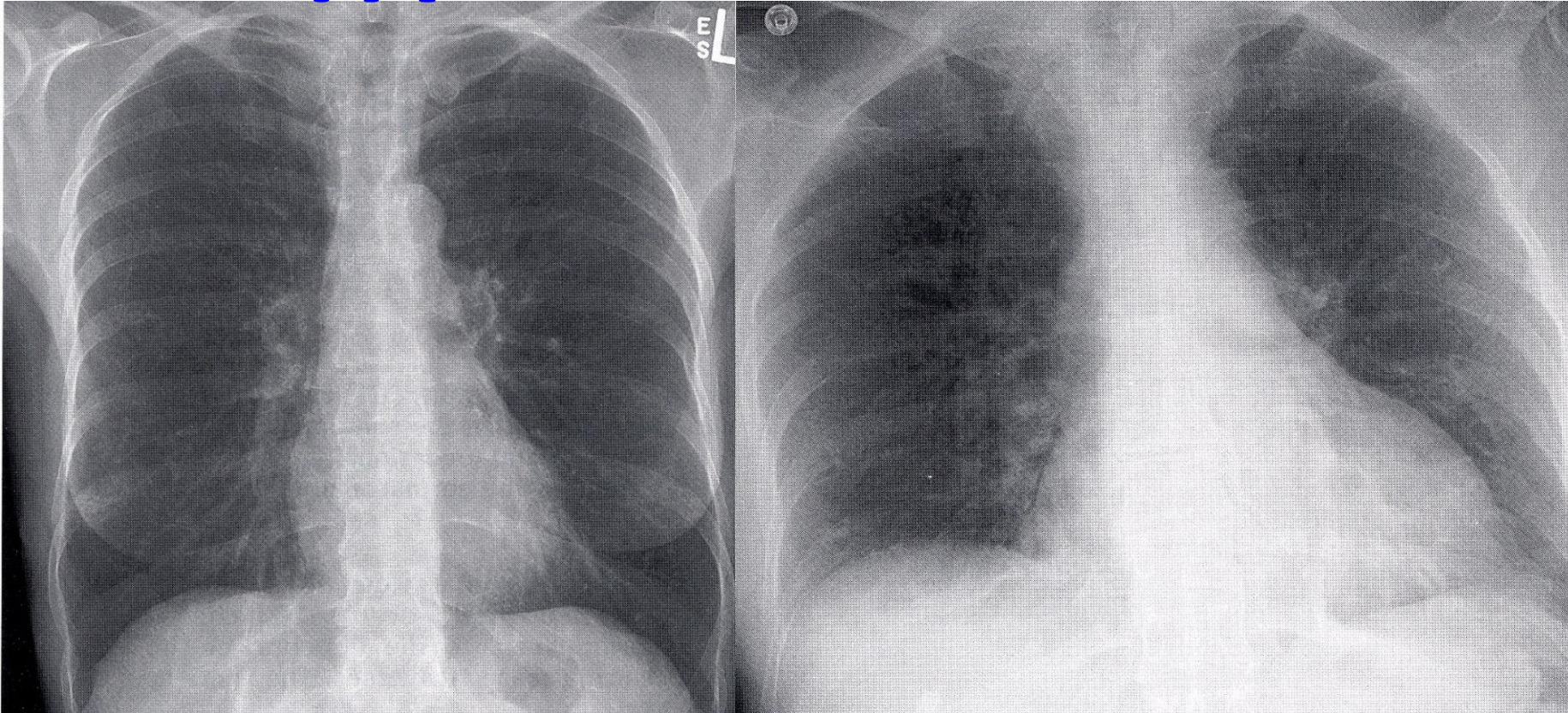


Normal CXR- distance 6 feet from X ray tube to cassette
to reduce magnification and enhance sharpness.

Same Patient, Two Views

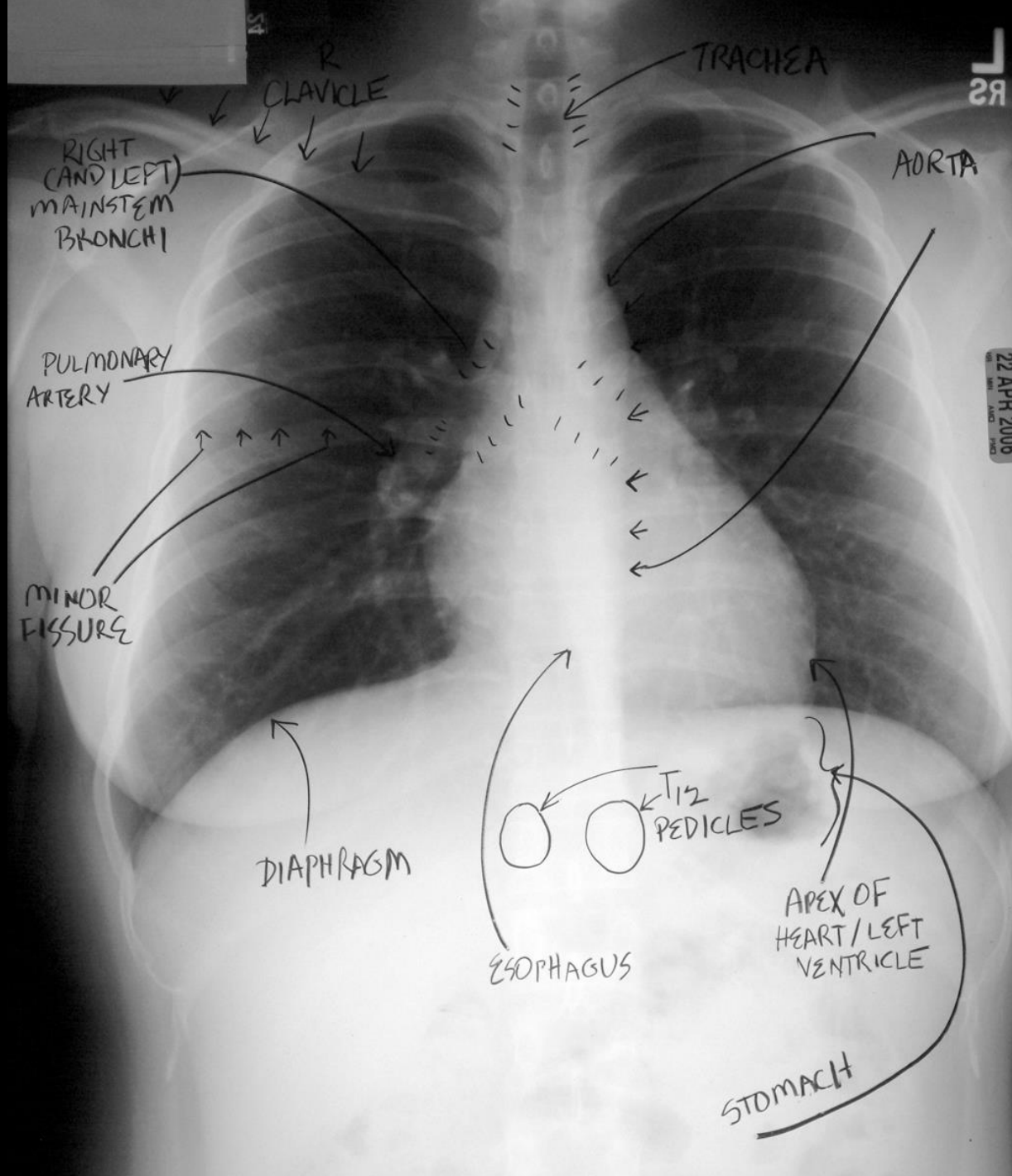
PA

AP

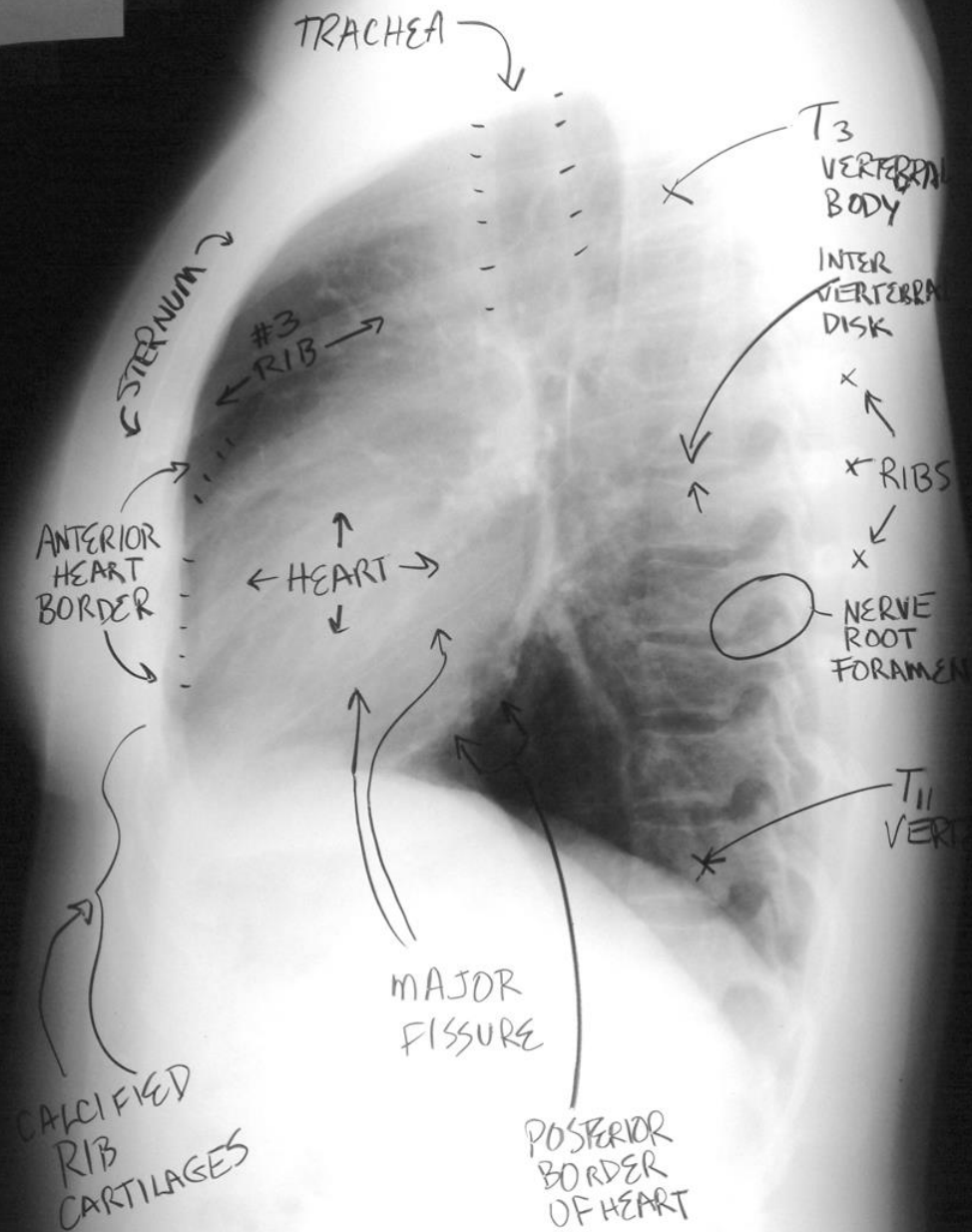


AP is taken at a shorter X-ray tube to receptor distance.
Compared with the PA CXR, the AP has a greater magnification, and the anatomy appears less sharp.

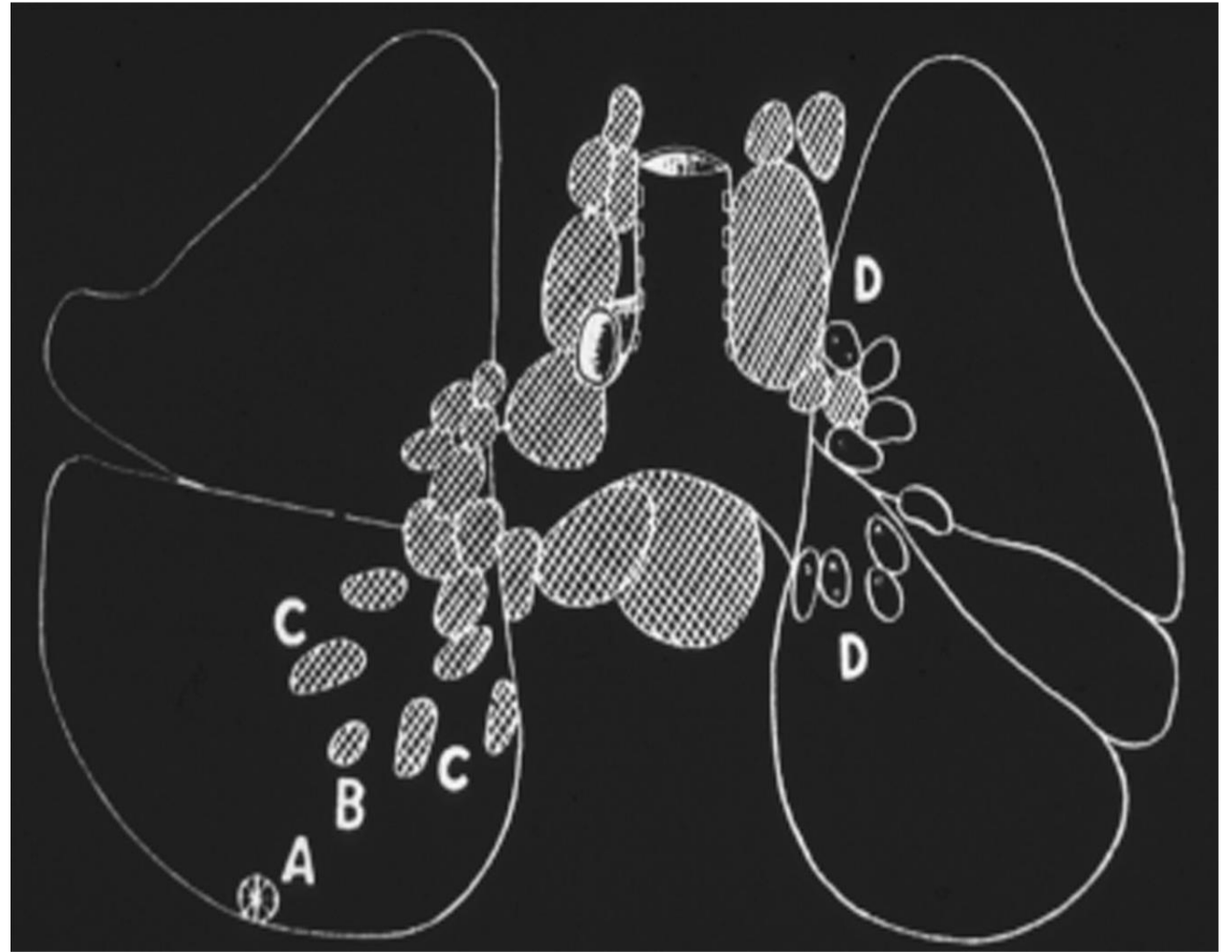
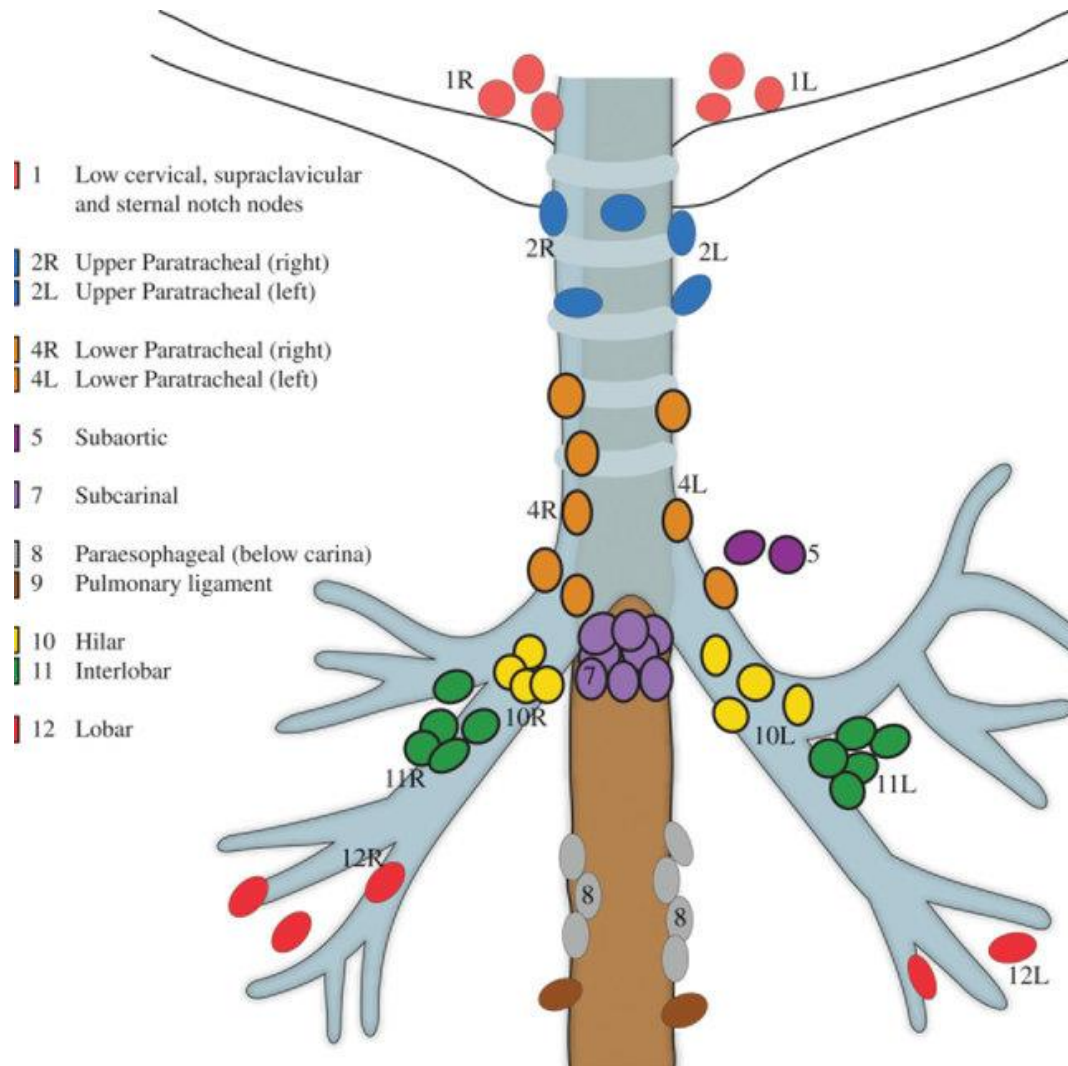




22 APR 2006



Thoracic Lymph Nodes



Role of CT in the Diagnosis of TB

- CT is not the primary radiologic diagnostic test for TB (CT is overused in the US)
- Usually don't need CT for cavitary consolidation
- If TB is a possible diagnosis, sputum for AFB should be obtained prior to CT
- In most instances, CT should be reserved for patients in whom the diagnosis is unclear



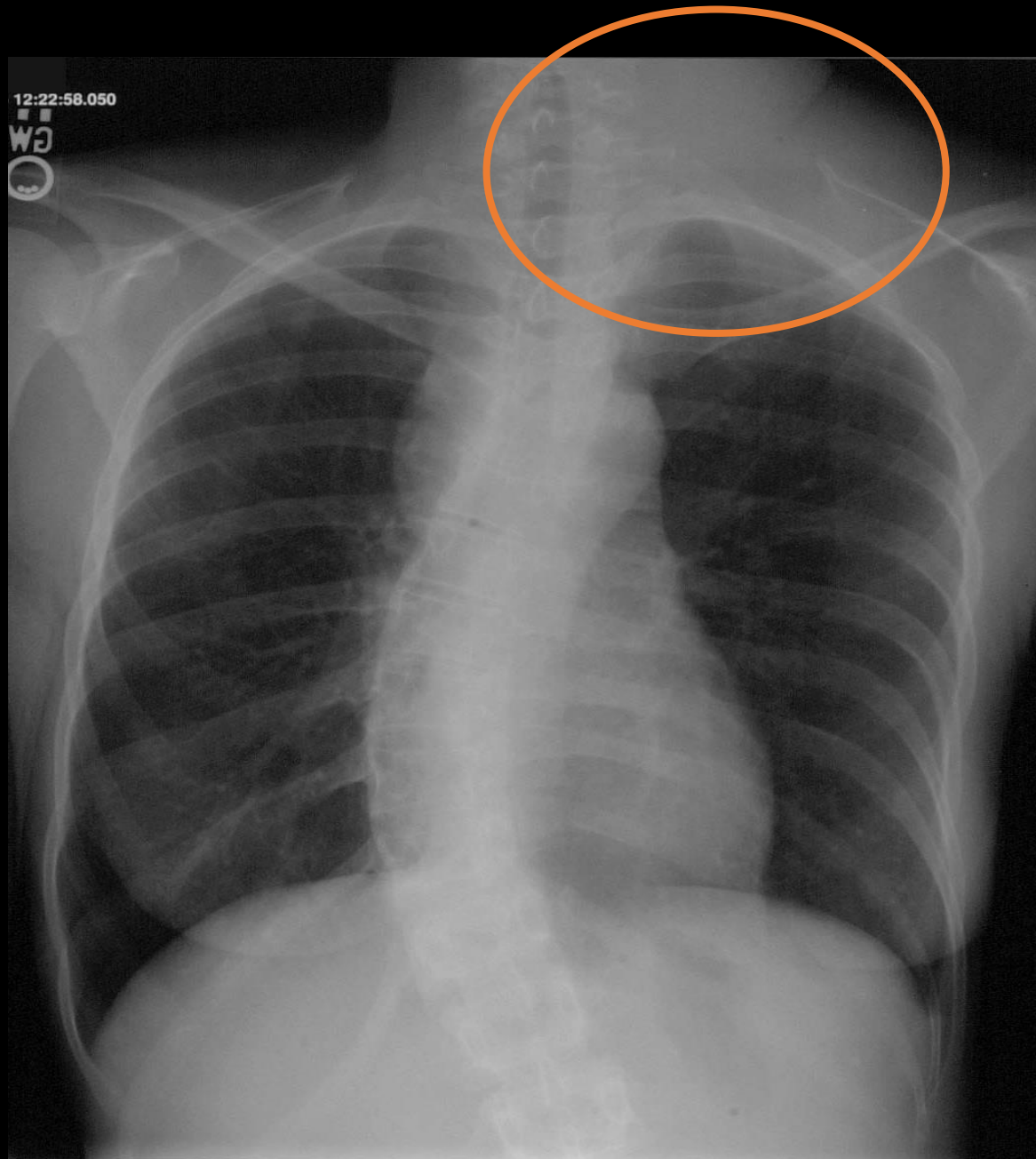
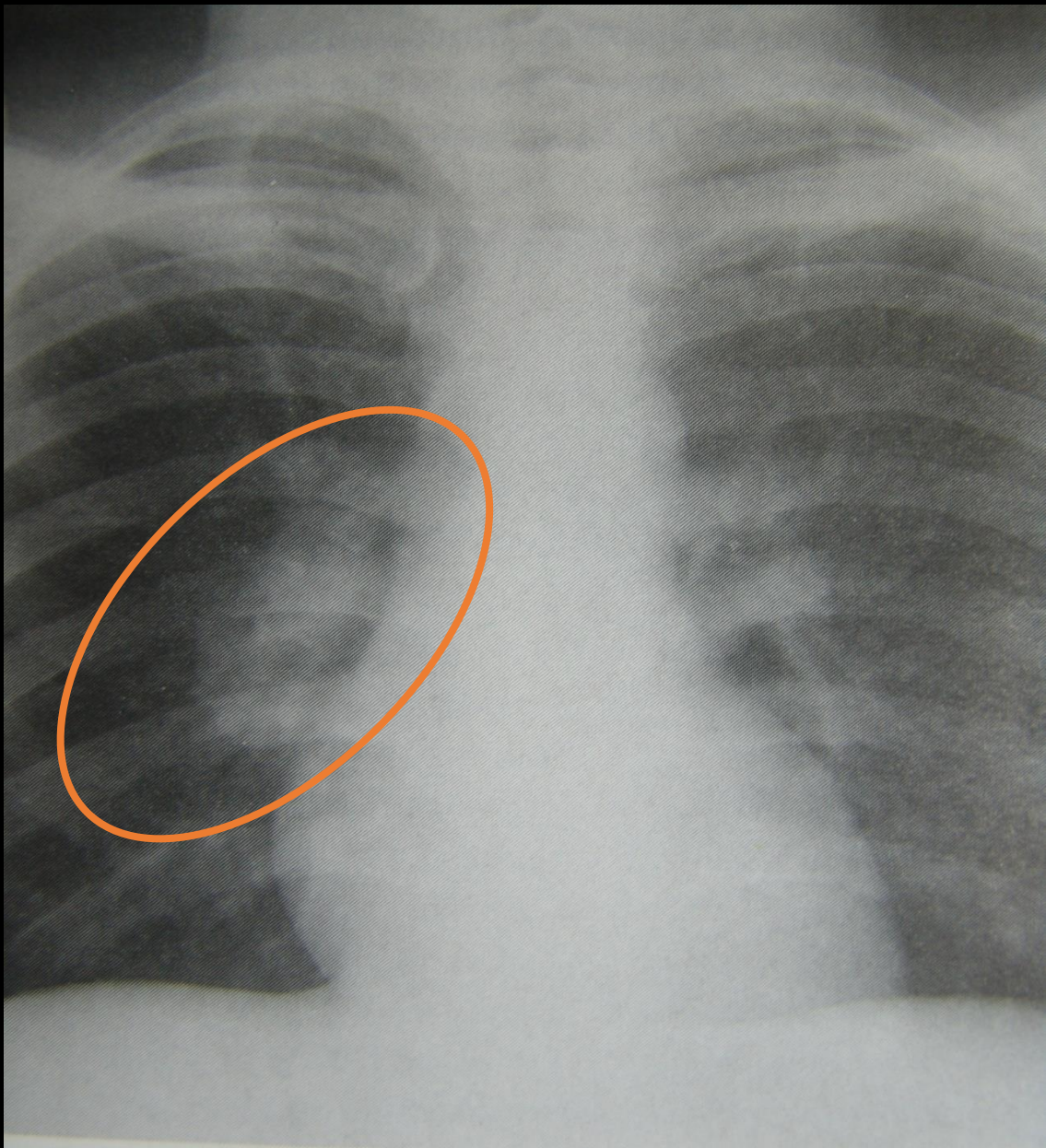
Radiographic Patterns in Pulmonary TB Disease

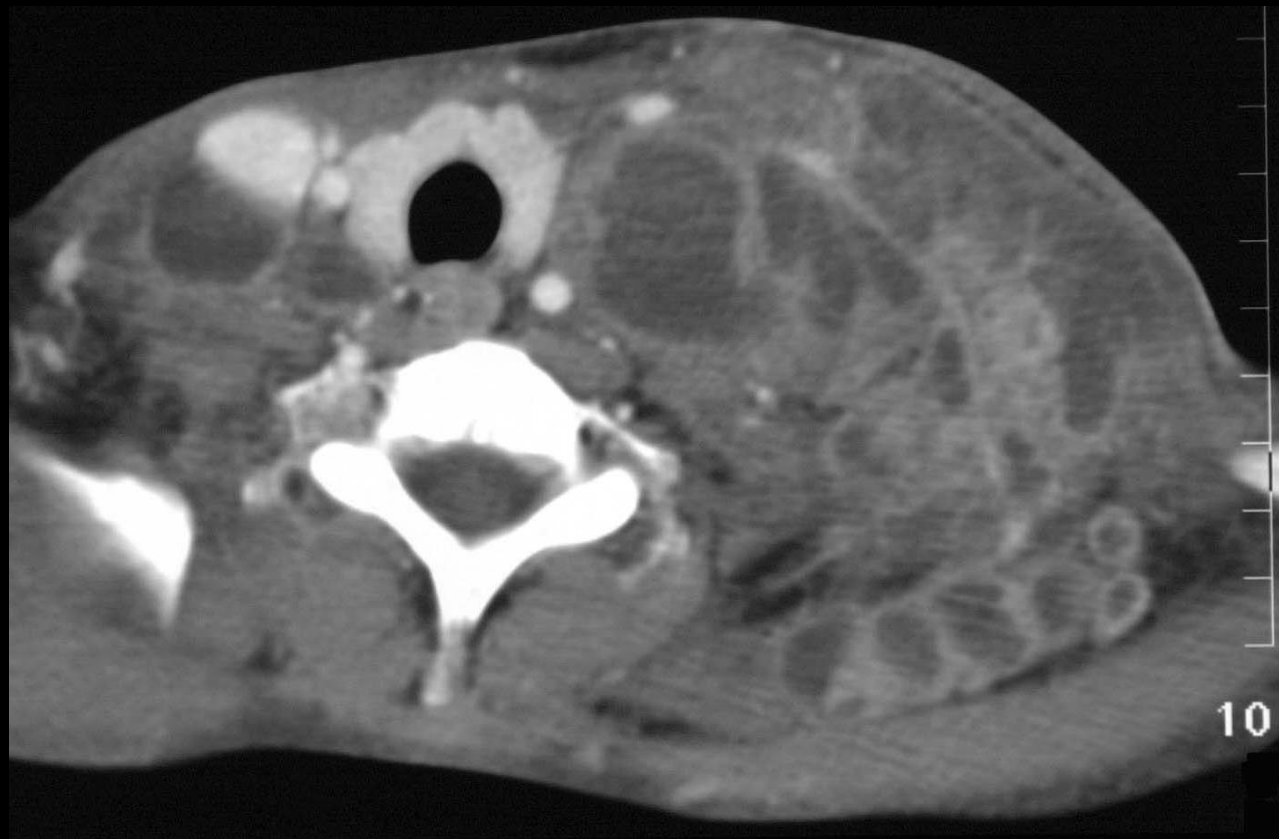


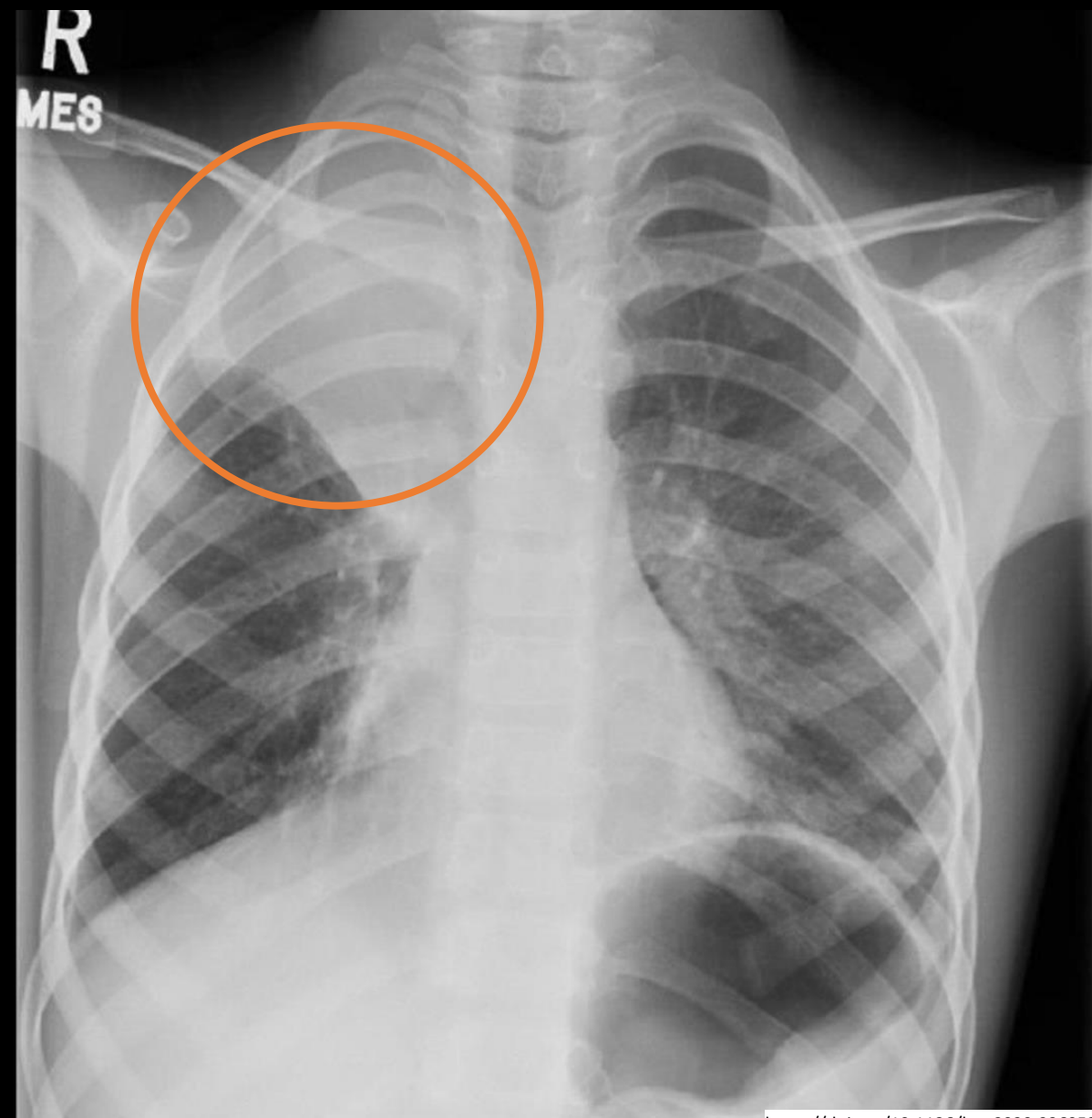
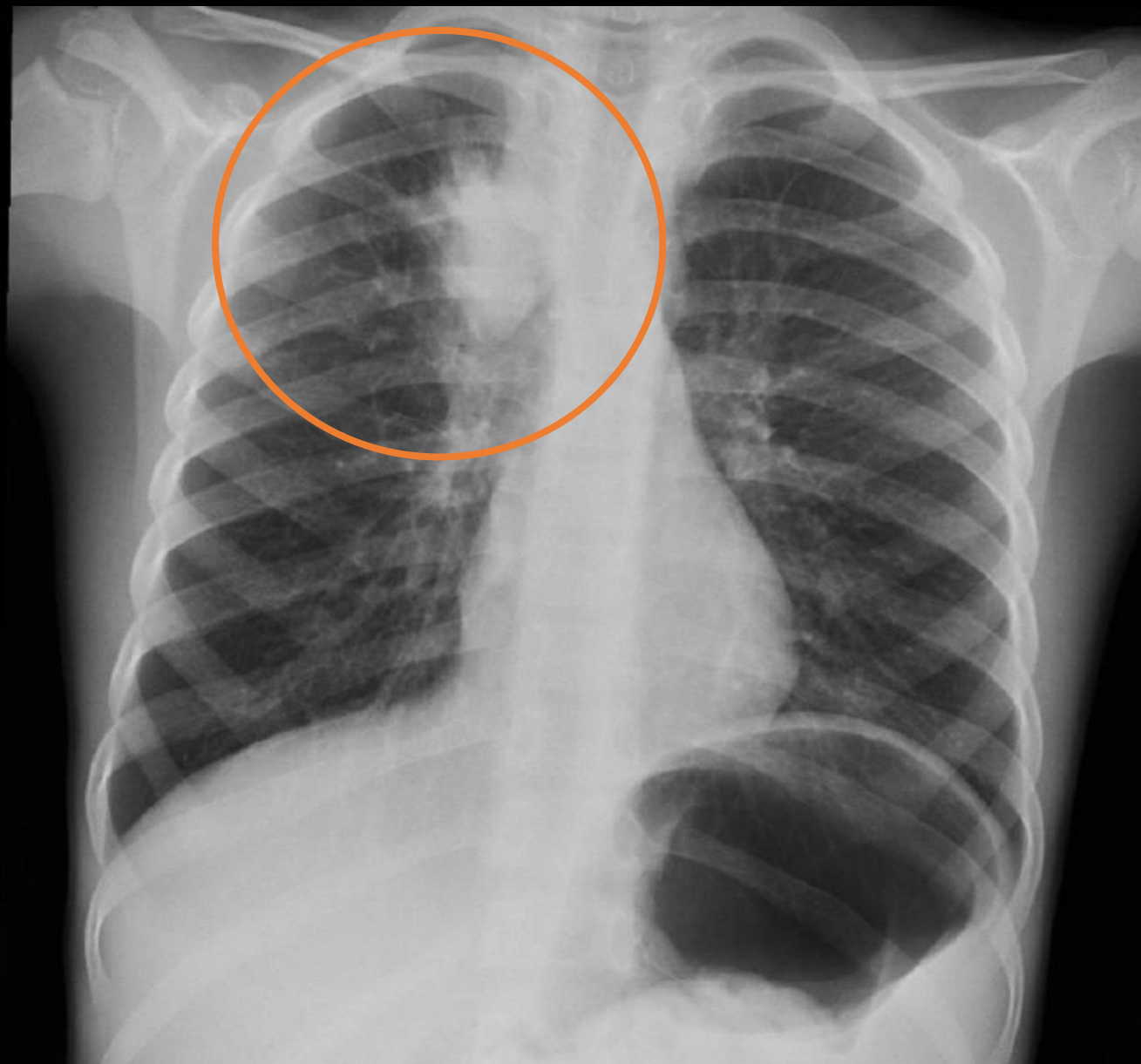
Primary Tuberculosis

- Most commonly in children and immune compromised patients
- Hilar or paratracheal lymphadenopathy with or without infiltrates is characteristic.
- Lymph node enlargement often occurs, and may cause bronchial compression
- Opacities are seen the in middle and lower lungs
- Commonly unilateral, bilateral 15%









Post Primary, Reactivation Tuberculosis

- Characterized by upper lobe predilection, cavitation and absence of lymphadenopathy.
- Cavitation is the hallmark; can also see parenchymal disease (consolidation), hematogenous dissemination (miliary), bronchogenic spread (tree-in-bud) and pleural disease.
- Fibrosis and calcification are seen after healing.

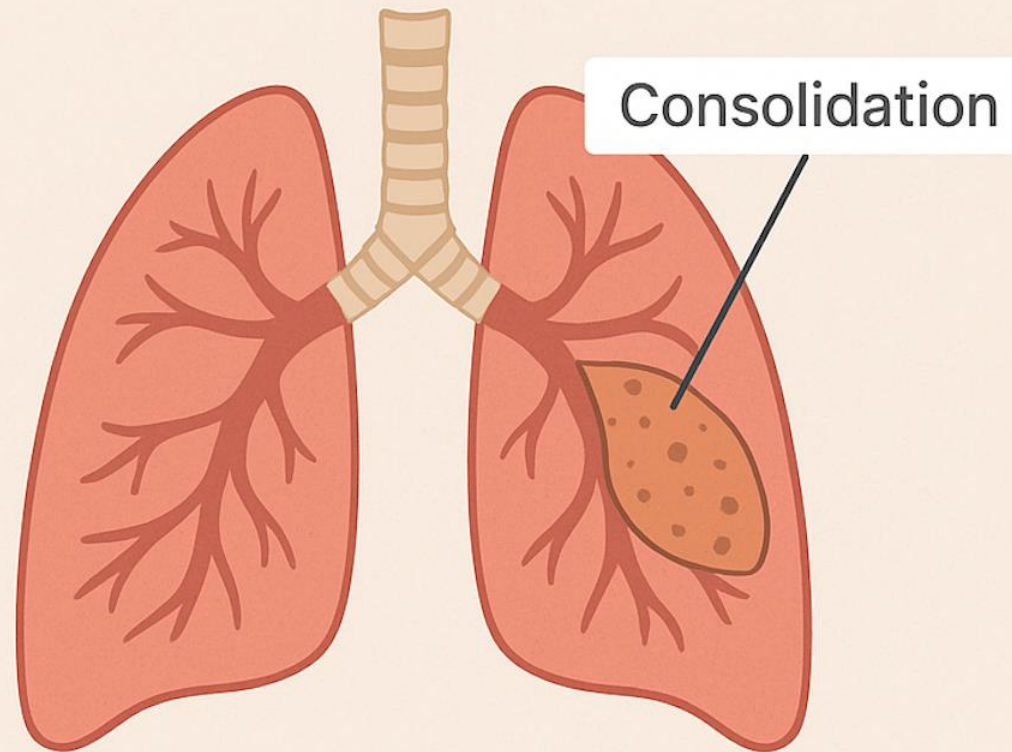


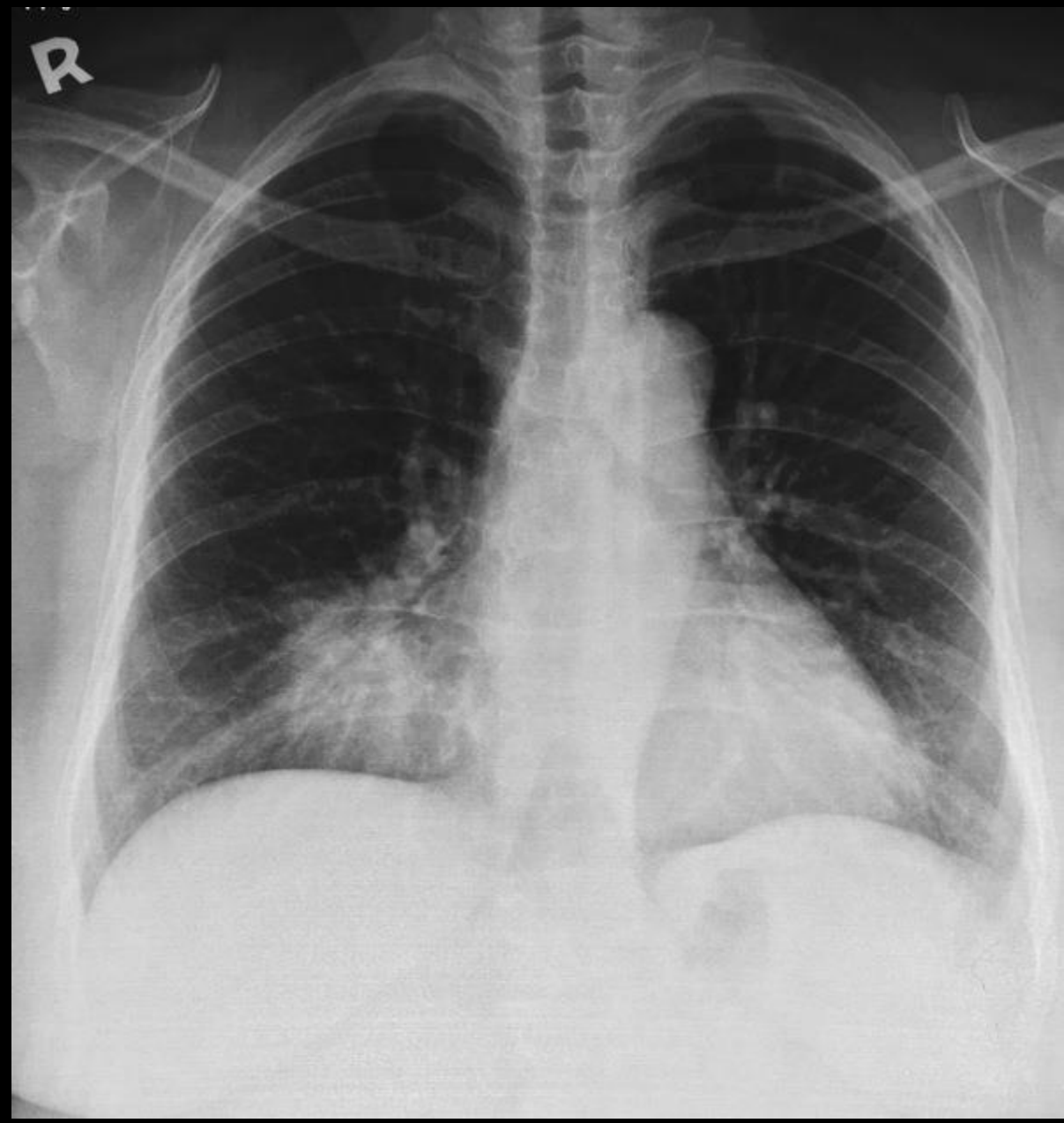
Upper lobe
Thick-walled
Irregular



LUNG CONSOLIDATION

Lung consolidation is a condition in which normally air-filled lung tissue becomes filled with fluid, pus, blood, or other material, making it appear solid or "consolidated" on imaging studies like chest X-rays or CT scans.



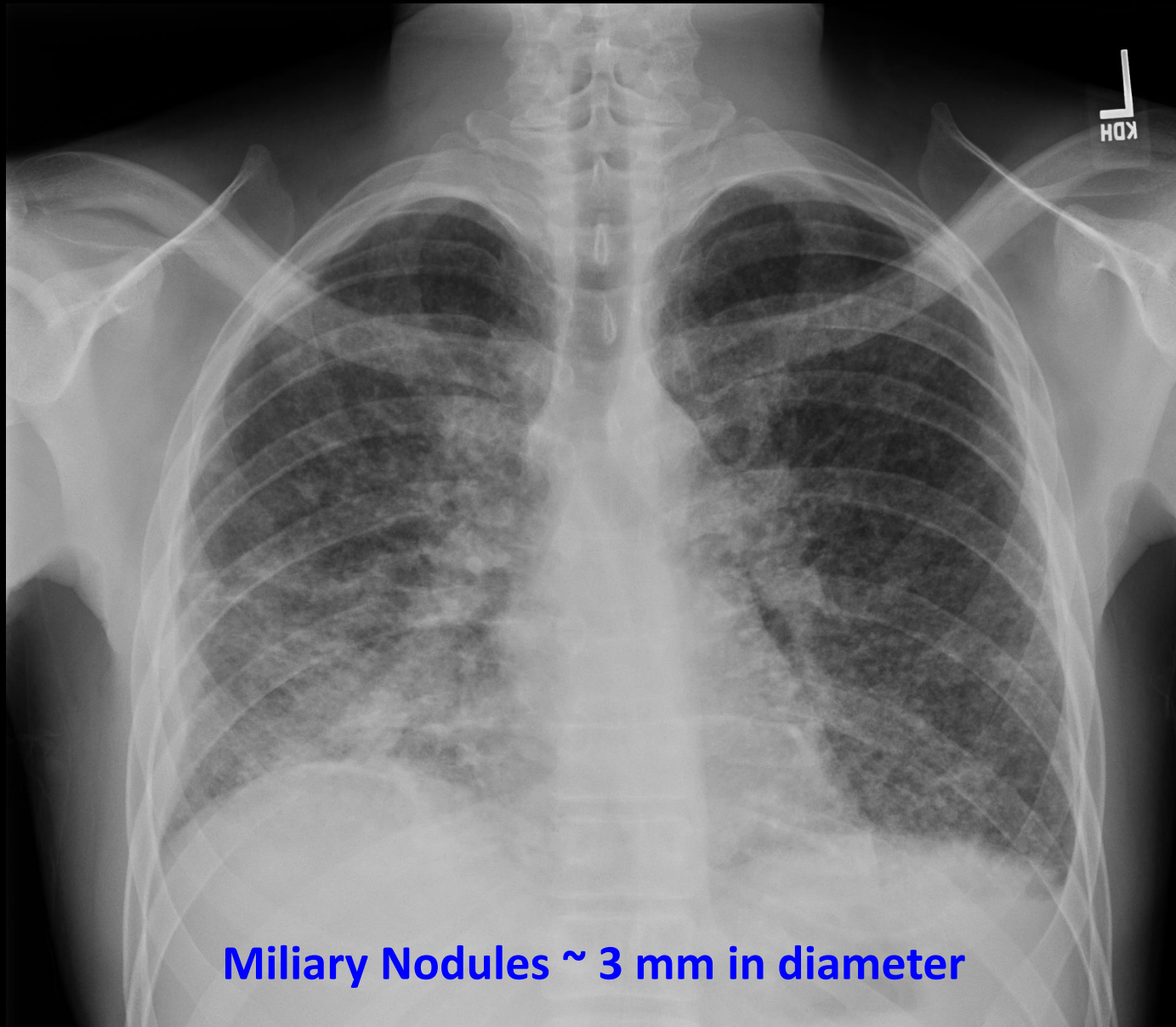


Nodules

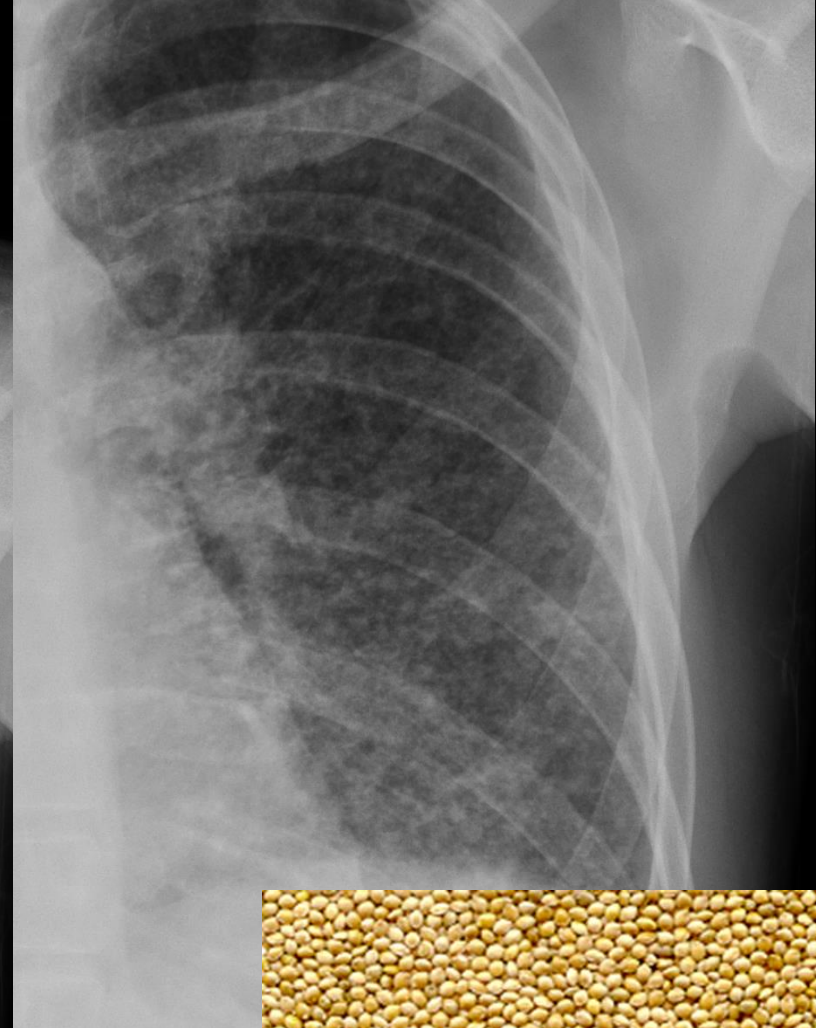


Miliary Nodules

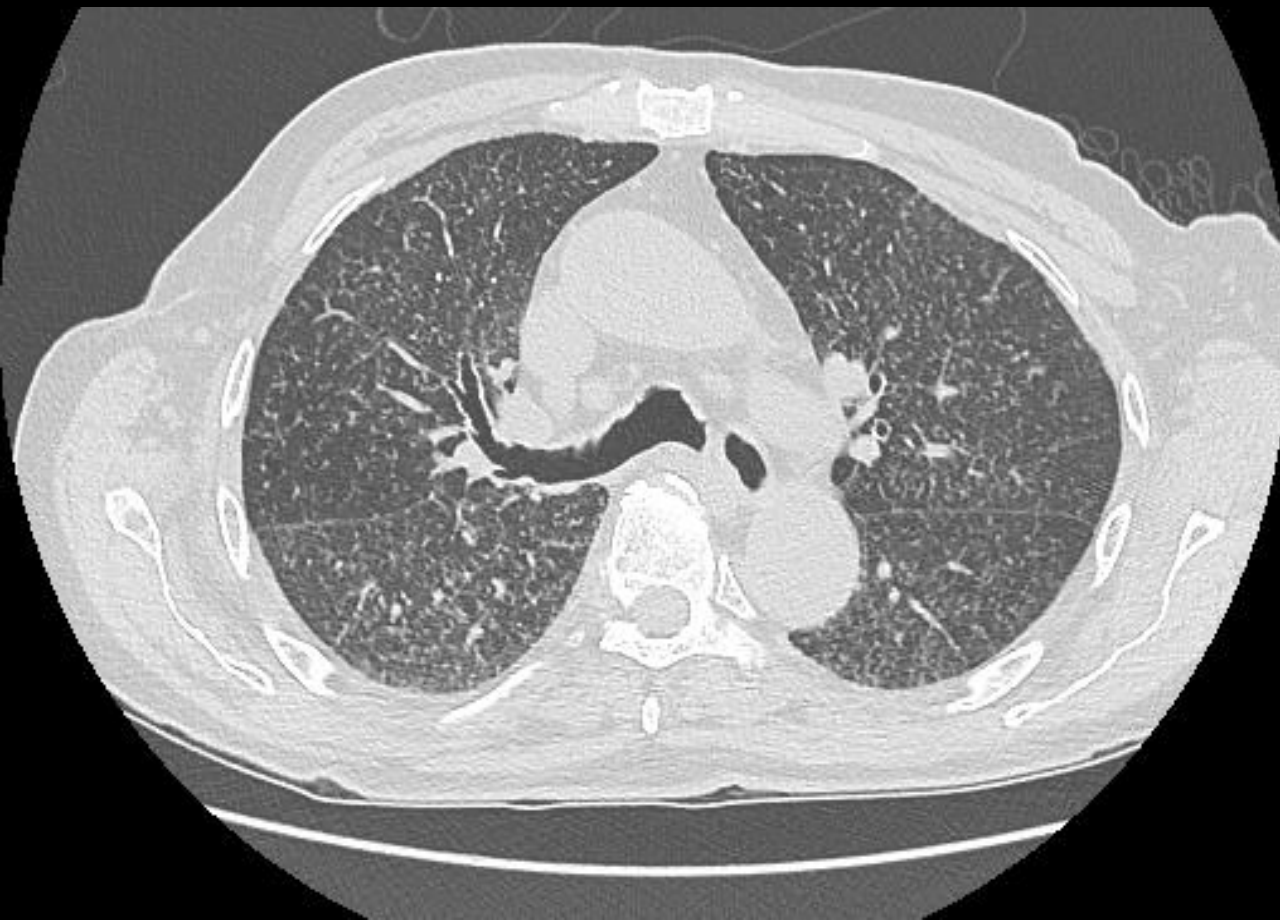




Miliary Nodules ~ 3 mm in diameter

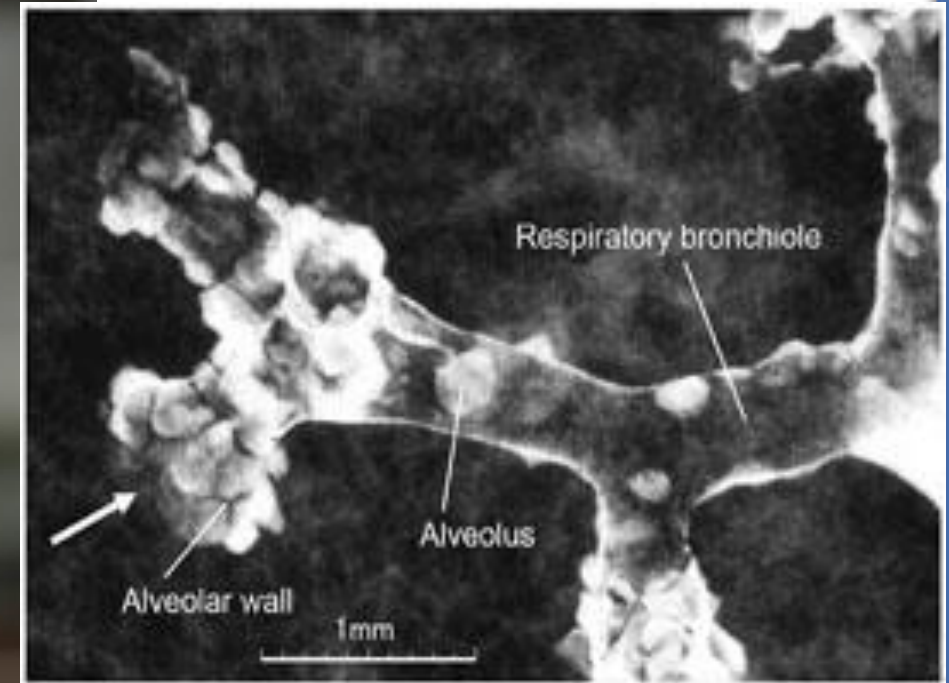


Miliary TB



Hematogenous Spread

Tree in Bud Nodules



Tree in Bud Nodules



Endobronchial Spread

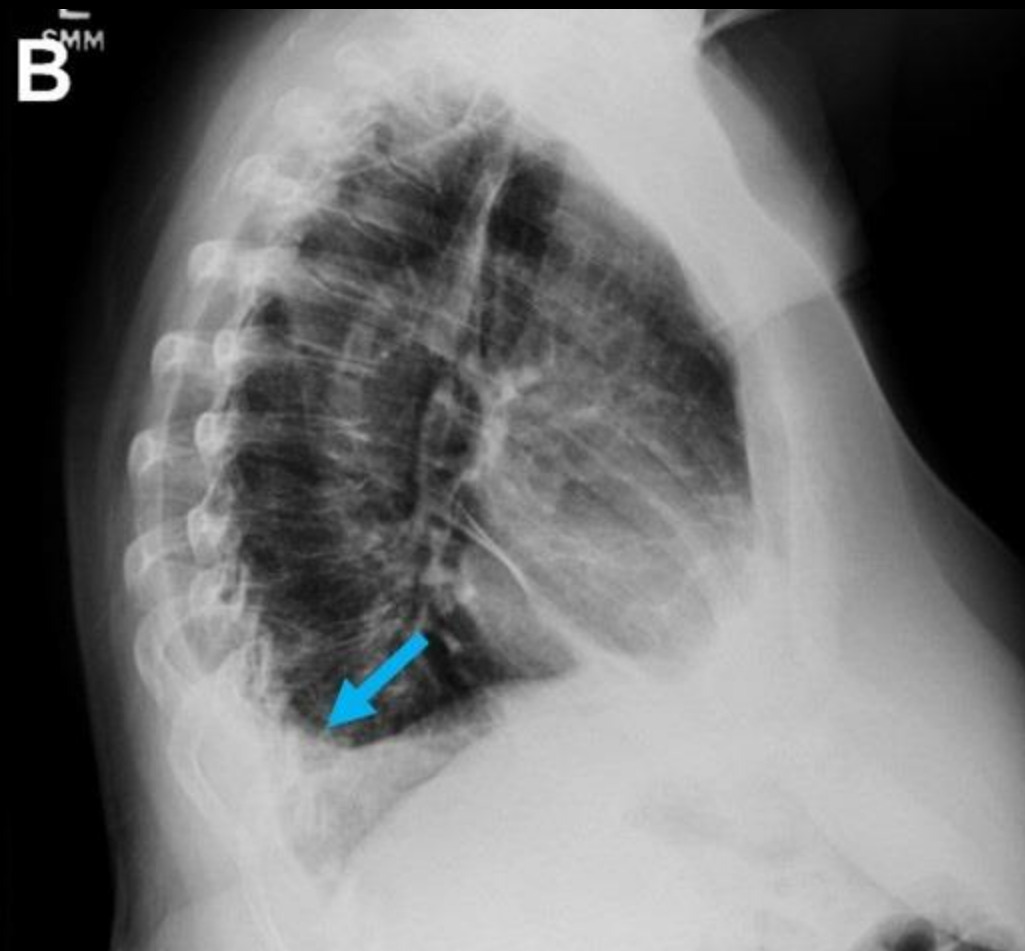
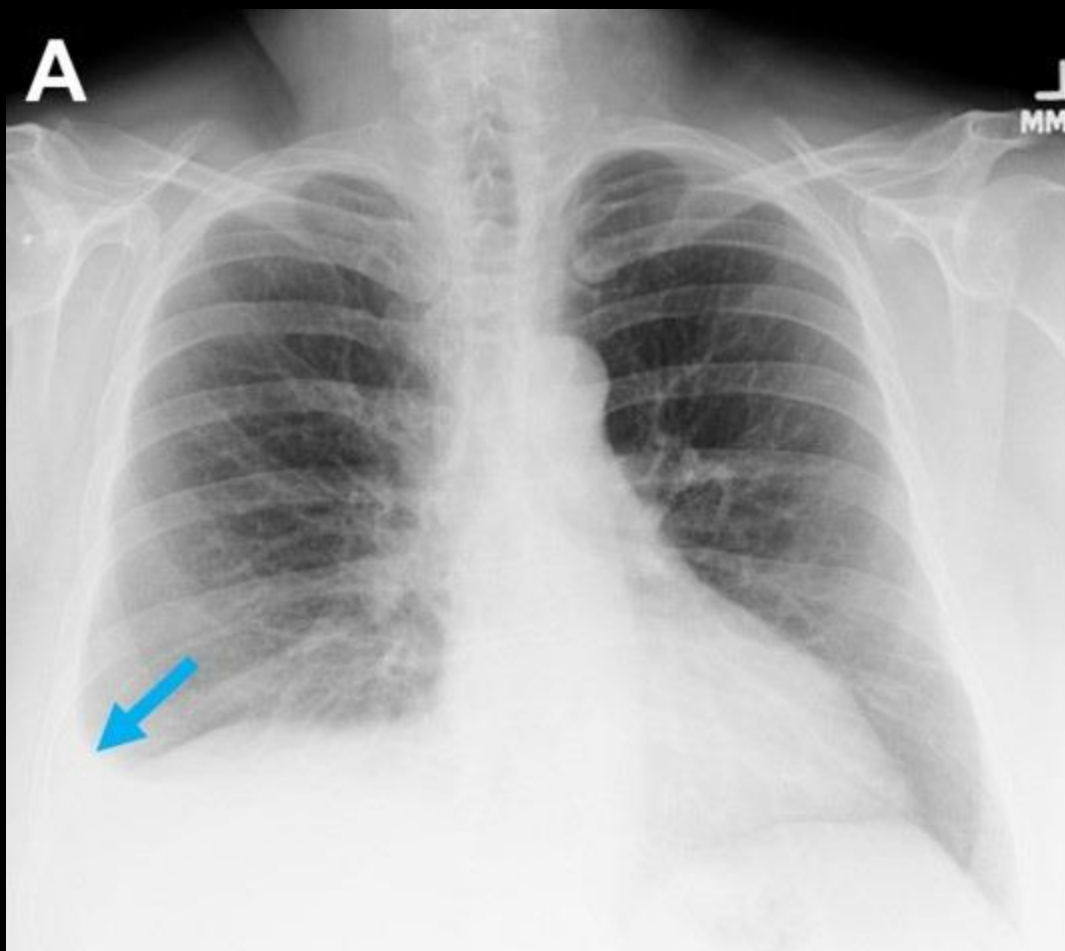
Pleural Effusions

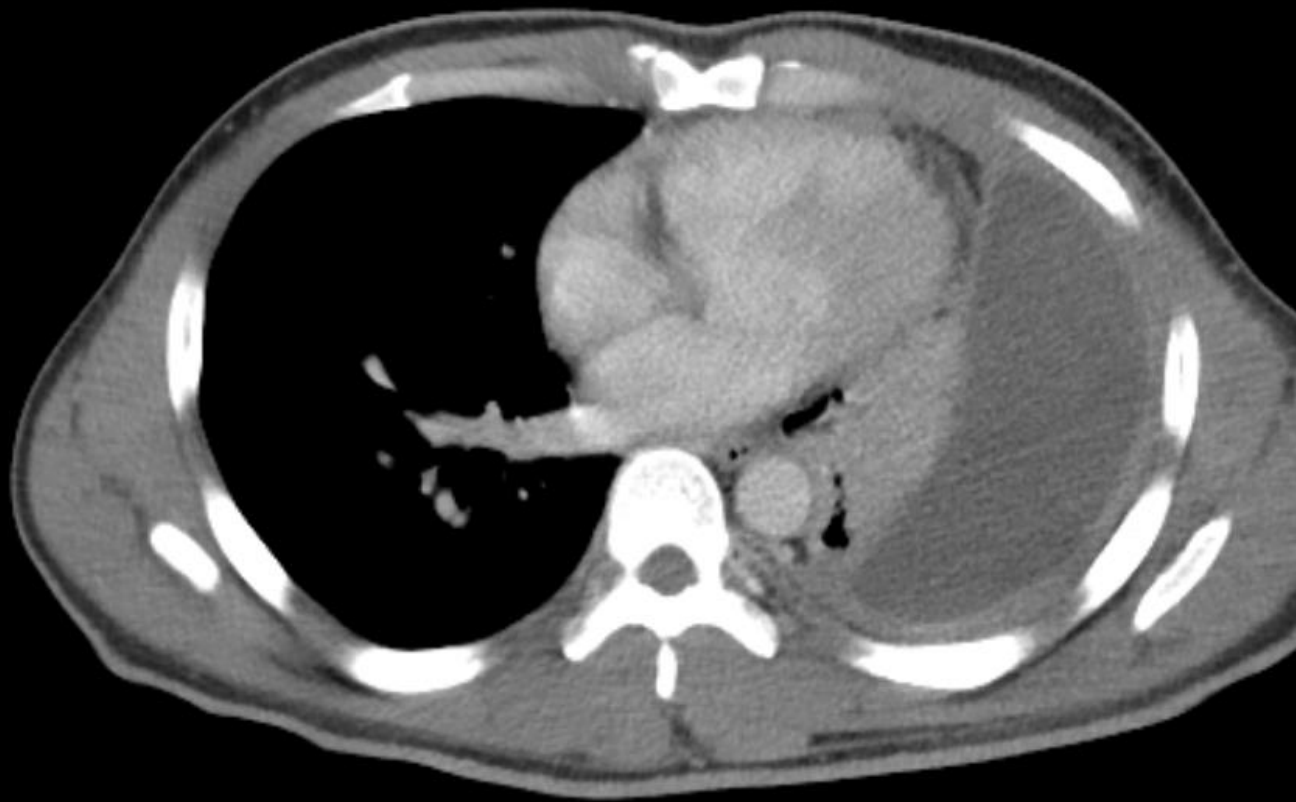


Pleural Effusions

- 3-25% of people will have pleural effusion
- Most commonly, this is a hypersensitivity reaction to TB proteins
 - May not be associated with obvious parenchymal disease on CXR
 - Low bacillary burden, organisms uncommonly isolated from fluid
 - Usually lymphocytic, exudative; may have elevated eosinophils
 - Adenosine deaminase variable sensitivity and specificity
 - PCR Xpert ~ 50% sensitivity



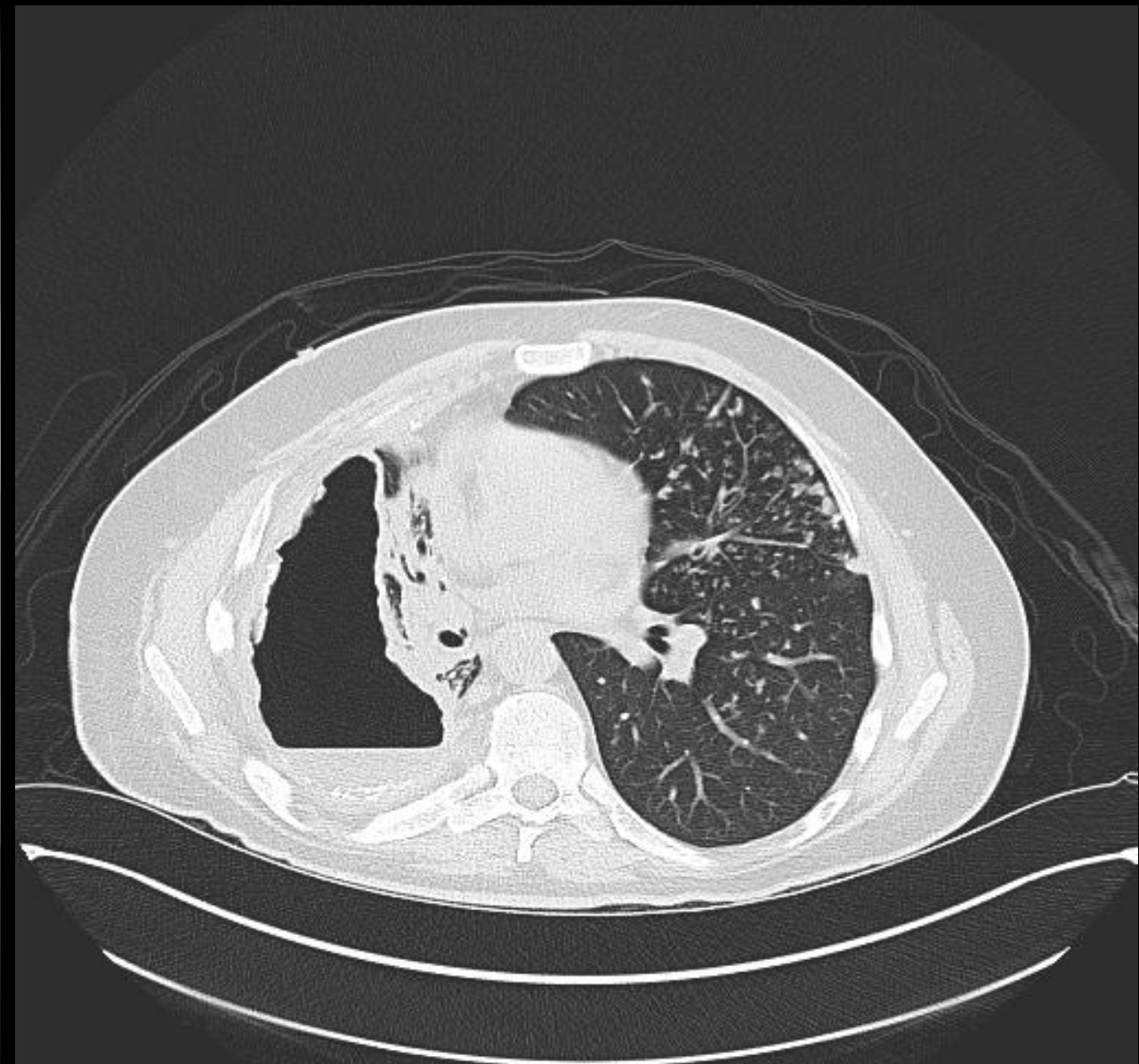
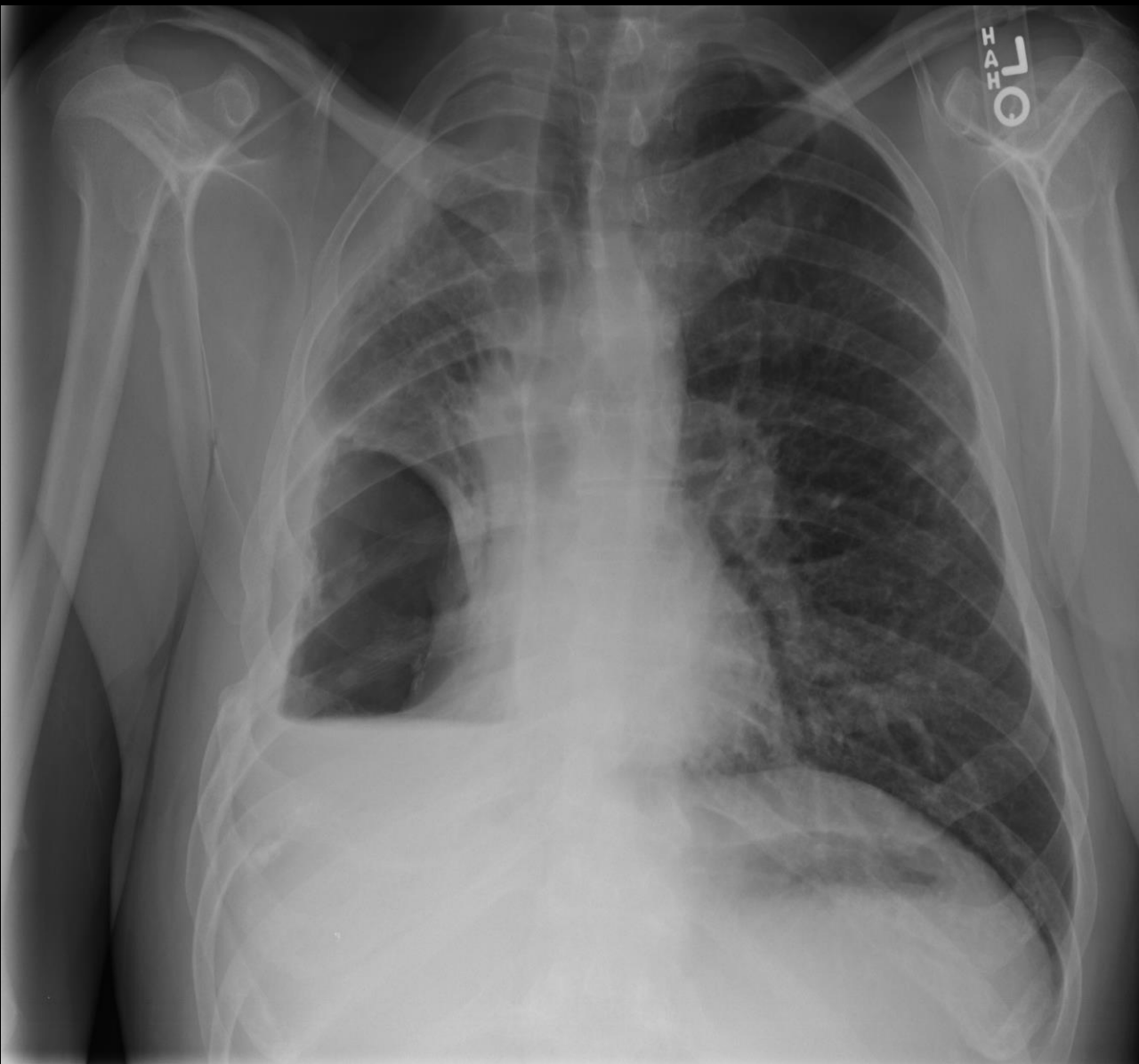




Pleural Effusions

- Tuberculous empyema is rare, less than 5%
- Caused by rupture of a tuberculous cavity into the pleural space
- May cause bronchopleural fistula with air fluid levels
- Often results in irreversible pleural thickening and calcification





Other Patterns Of Pulmonary TB



Tracheobronchial TB

- TB is the most common cause of inflammatory stricture of a bronchus
- 10% - 20% of TB patients
- Circumferential wall thickening
- Luminal narrowing
- Long segment involvement
- Left > Right



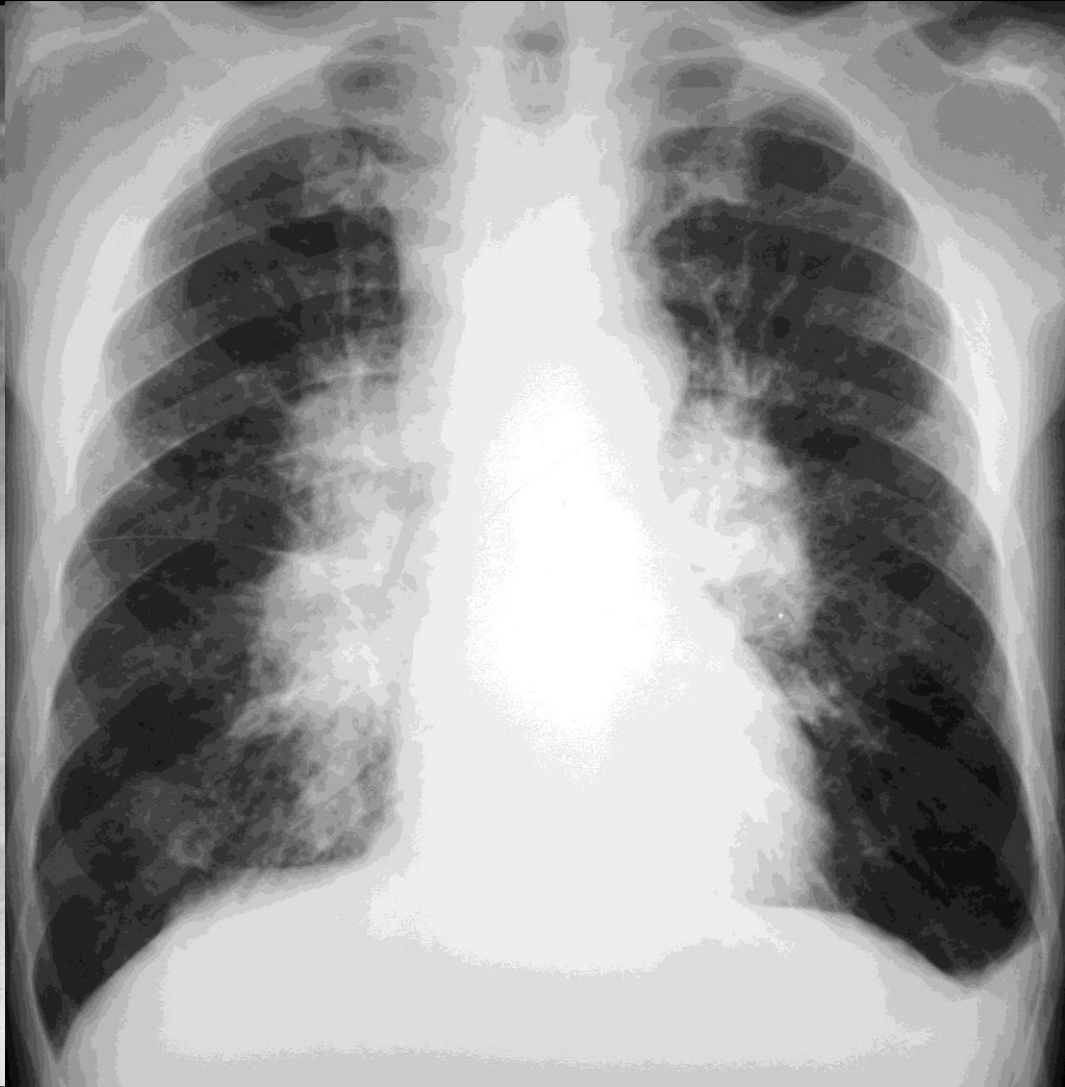
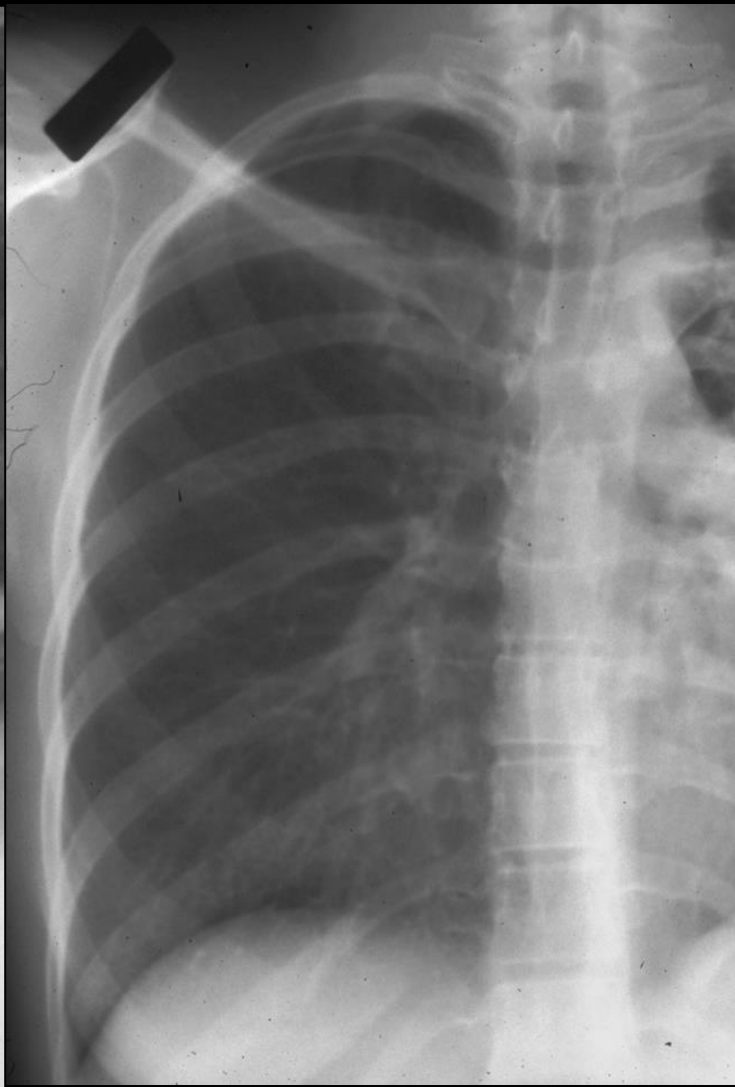
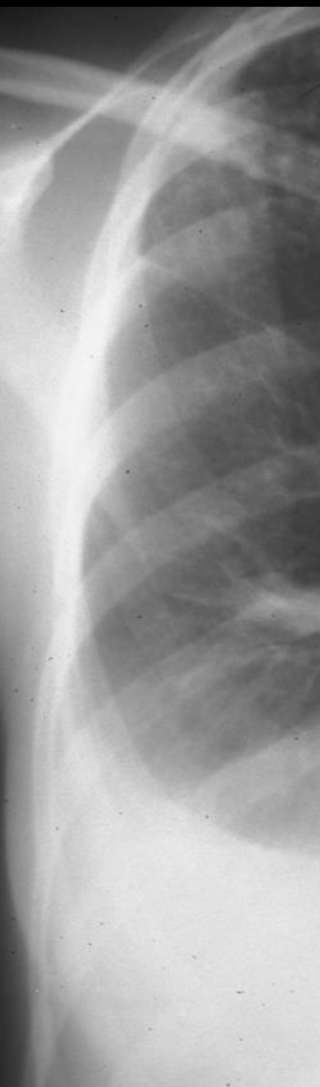


Tuberculosis and Immunocompromised Persons

- Higher prevalence of extra-pulmonary involvement
- 38% of immunocompromised patients with TB have pulmonary involvement only, but up to 30% have only extrapulmonary involvement
- May have a normal chest radiograph due to limited immune response

Any combination of the previously mentioned patterns!

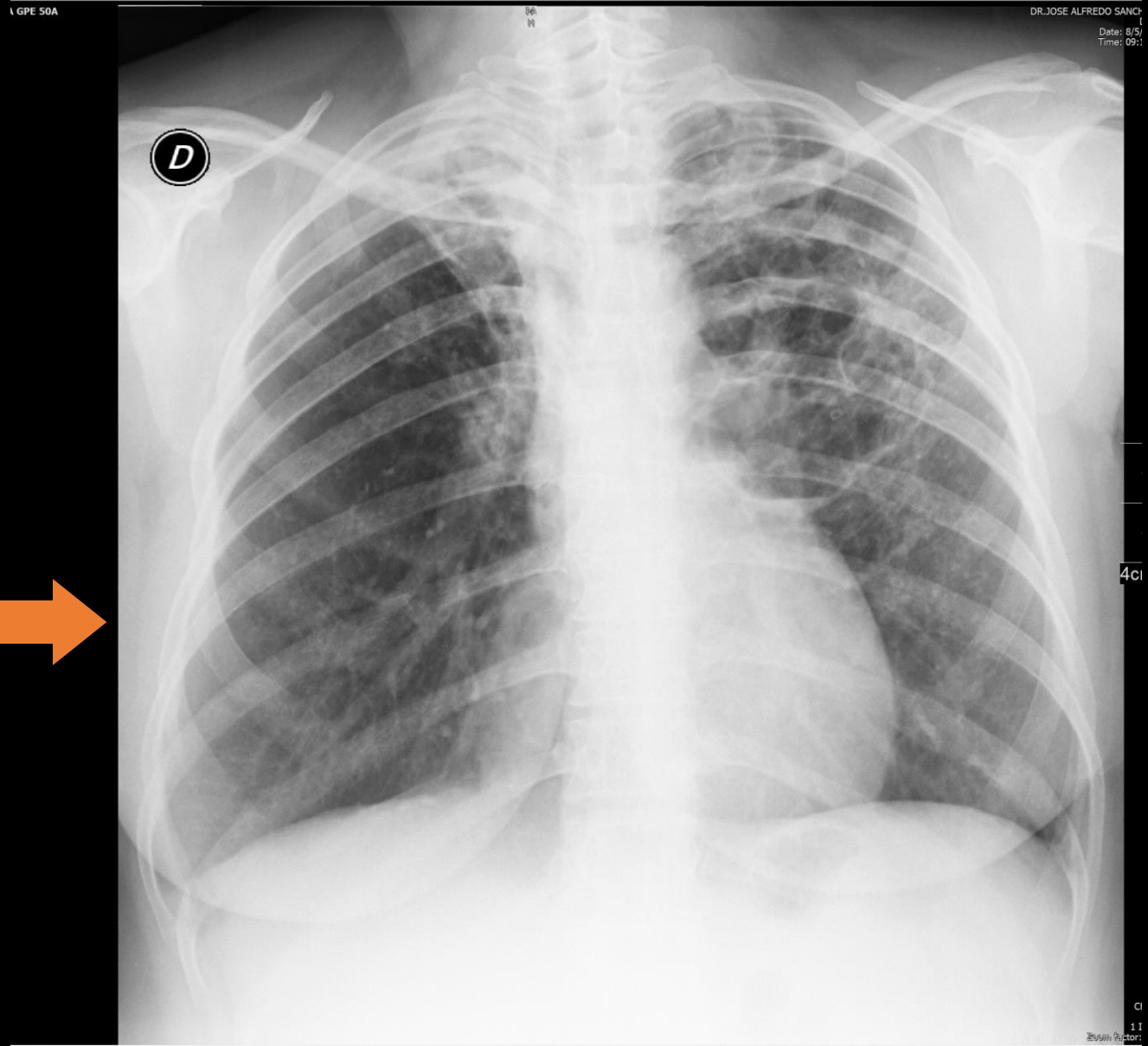
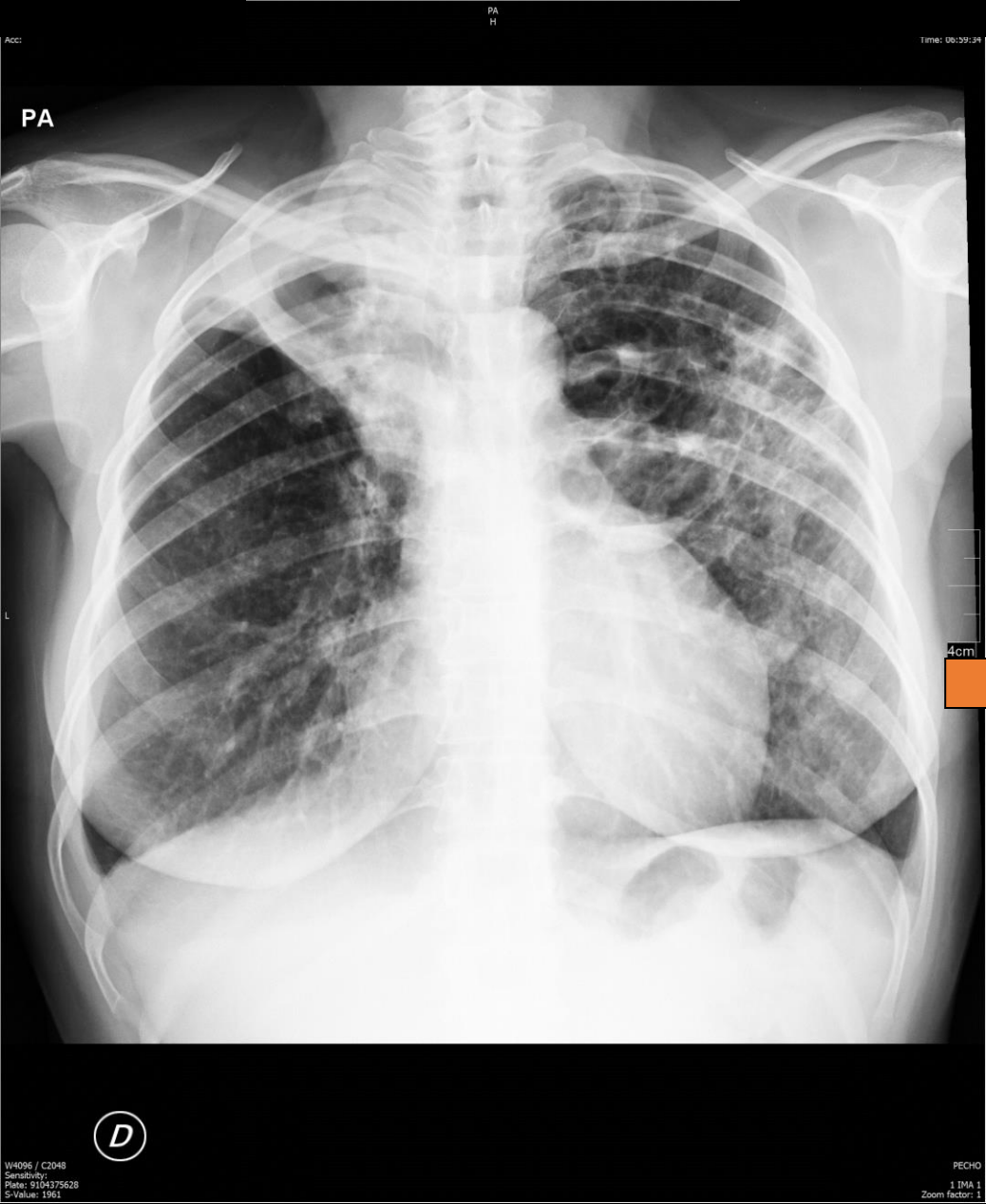


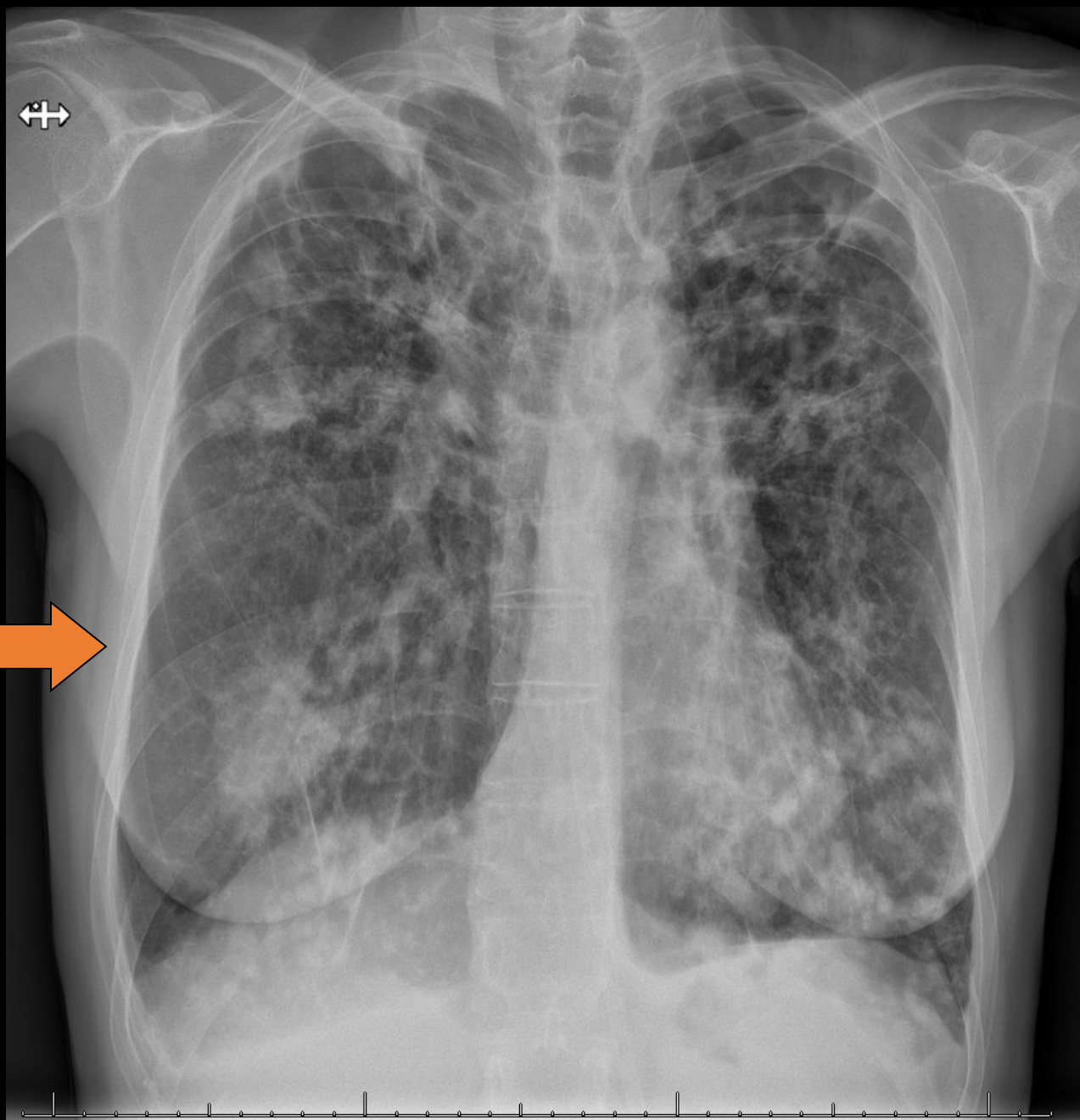
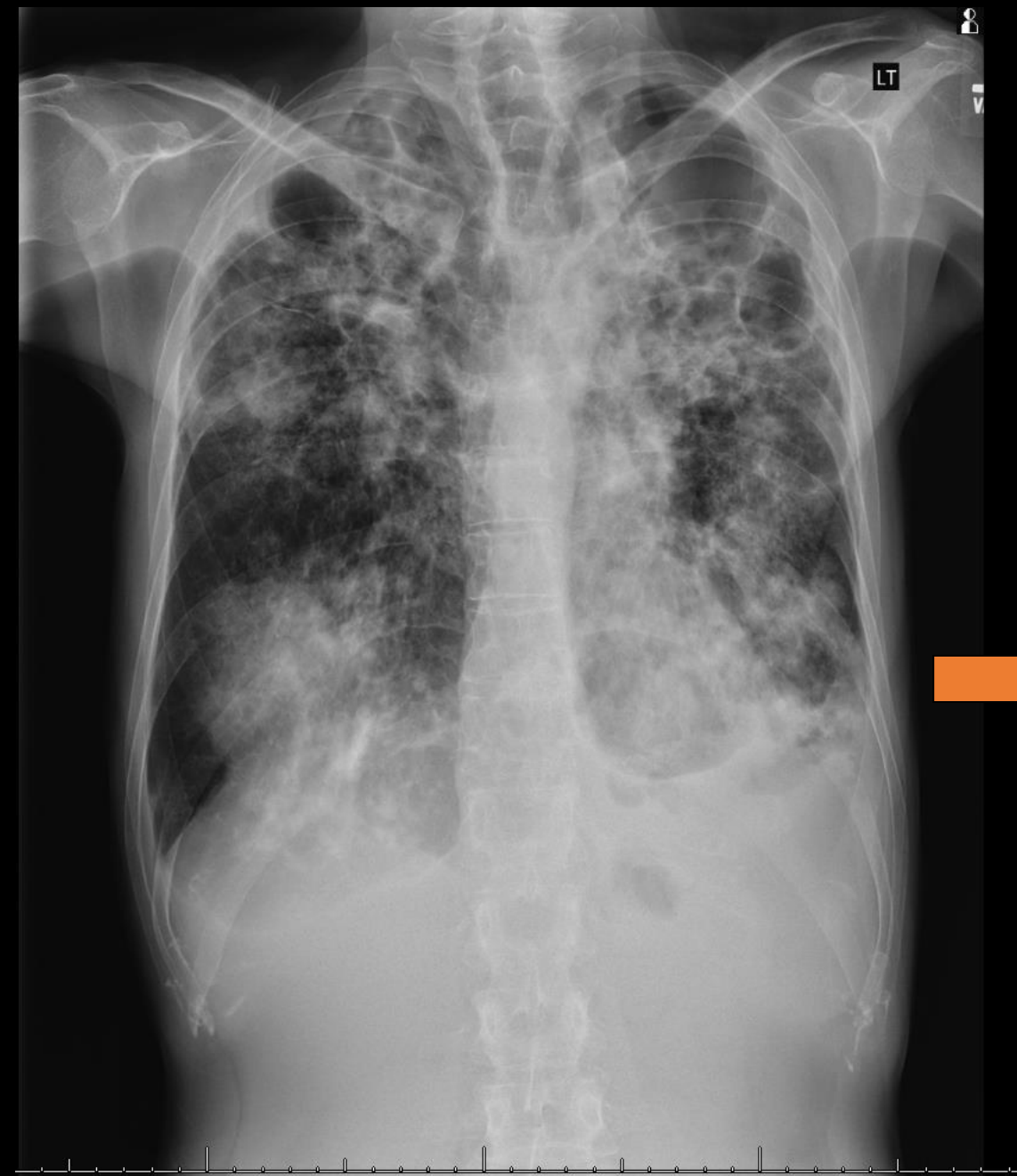


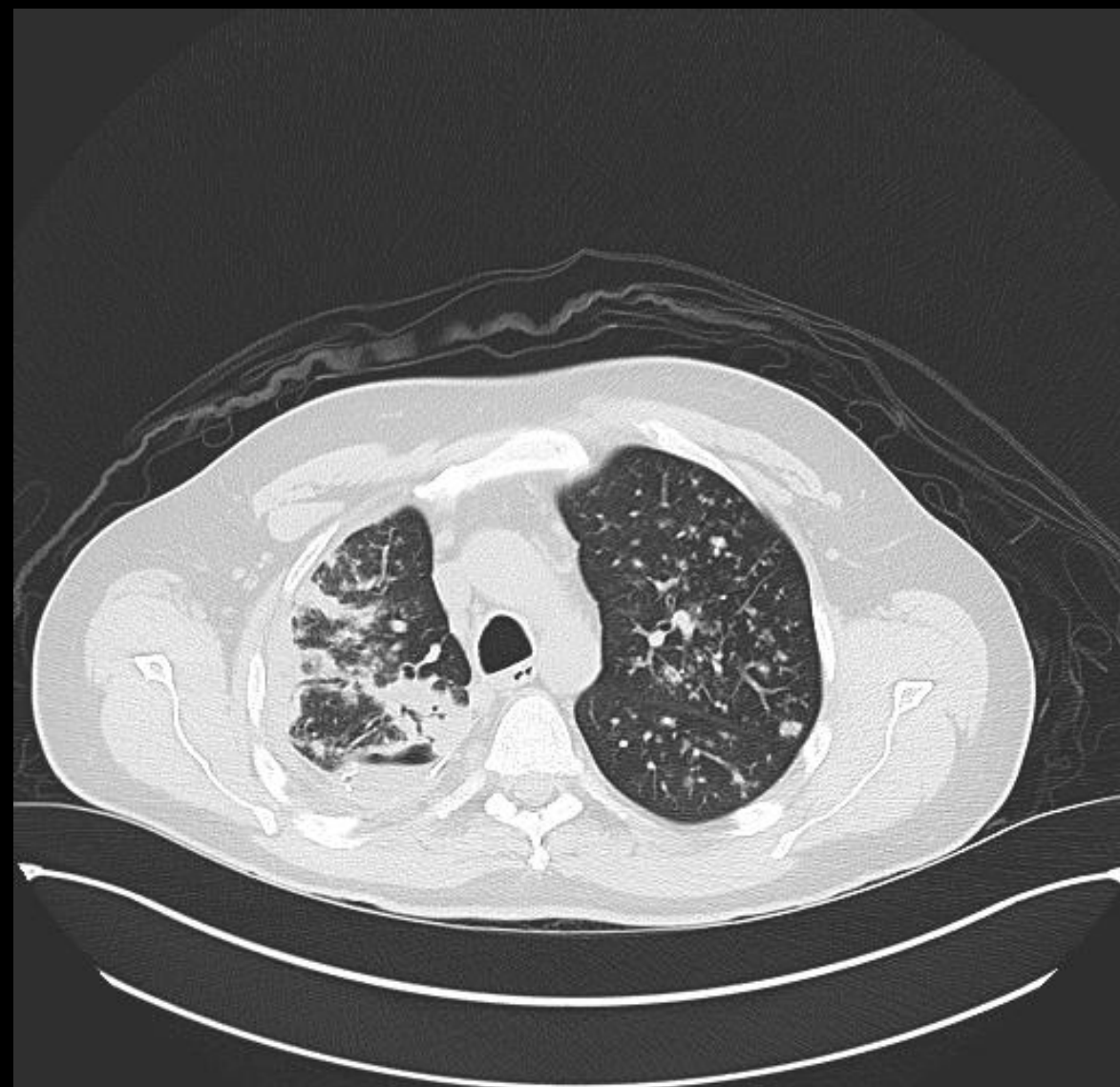
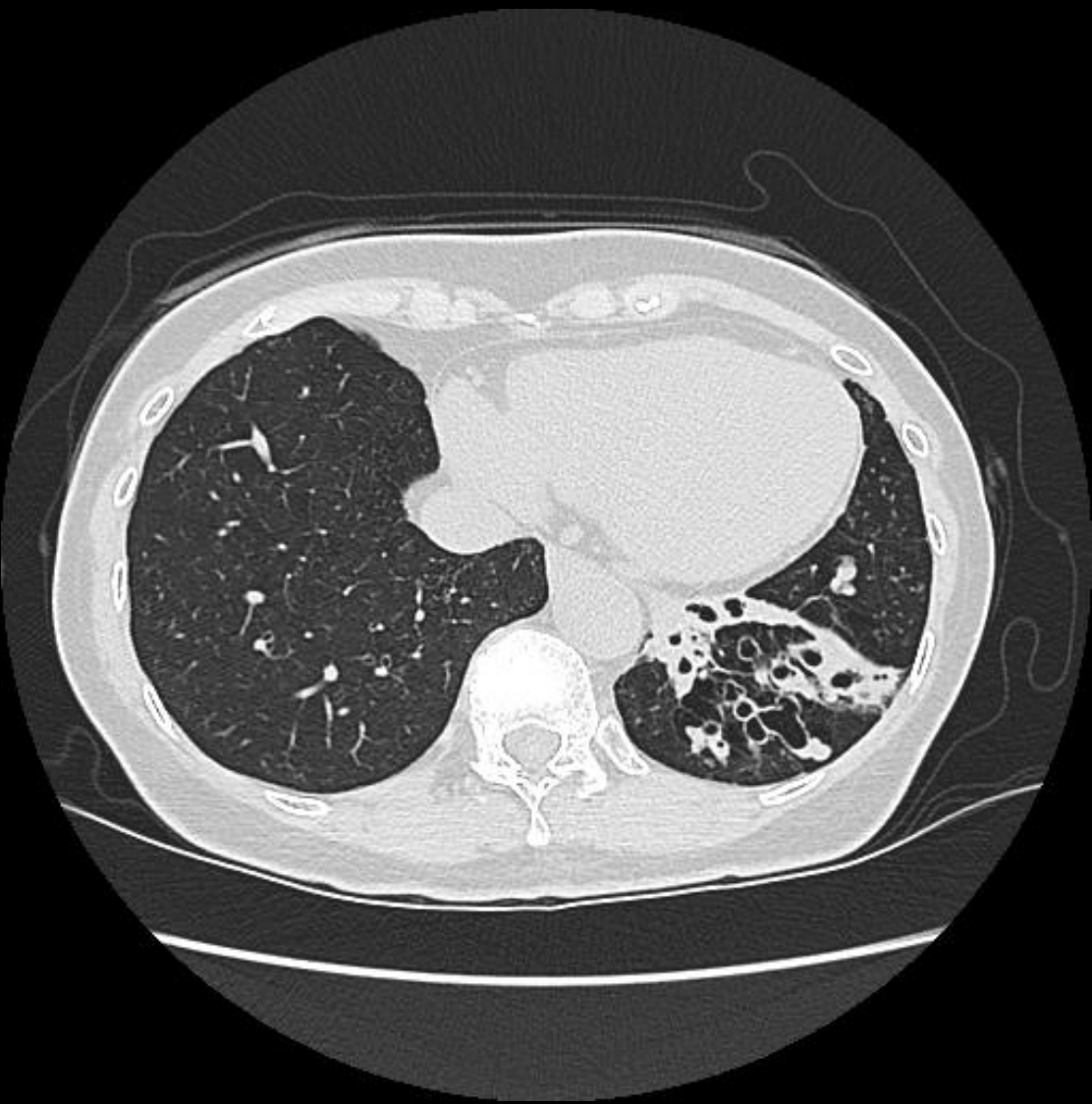
Complications of Pulmonary Tuberculosis

- Bronchiectasis
- Broncholithiasis
- Extensive pulmonary destruction
- Non-tuberculous mycobacterial disease
- Chronic pulmonary aspergillosis
- Venous thromboembolism











Radiology for Extra-Pulmonary TB



Extra-pulmonary Tuberculosis can affect ANY ORGAN

- Cardiac: pericarditis, pericardial effusion, myocarditis
- CNS: meningitis, tuberculomas, tuberculous abscesses, cerebritis
- Head and neck: lymphadenitis (scrofula), less common sinonasal, thyroid, skull base
- Musculoskeletal: spinal column, pelvis, hip, and knee (spondylitis, osteomyelitis, arthritis)
- Abdominal: lymphadenopathy, peritonitis, ileocecal region, hepatosplenic, adrenal glands
- Genitourinary: renal, ureters, bladder, genital (fallopian tubes in women and seminal vesicles or prostate gland in men)



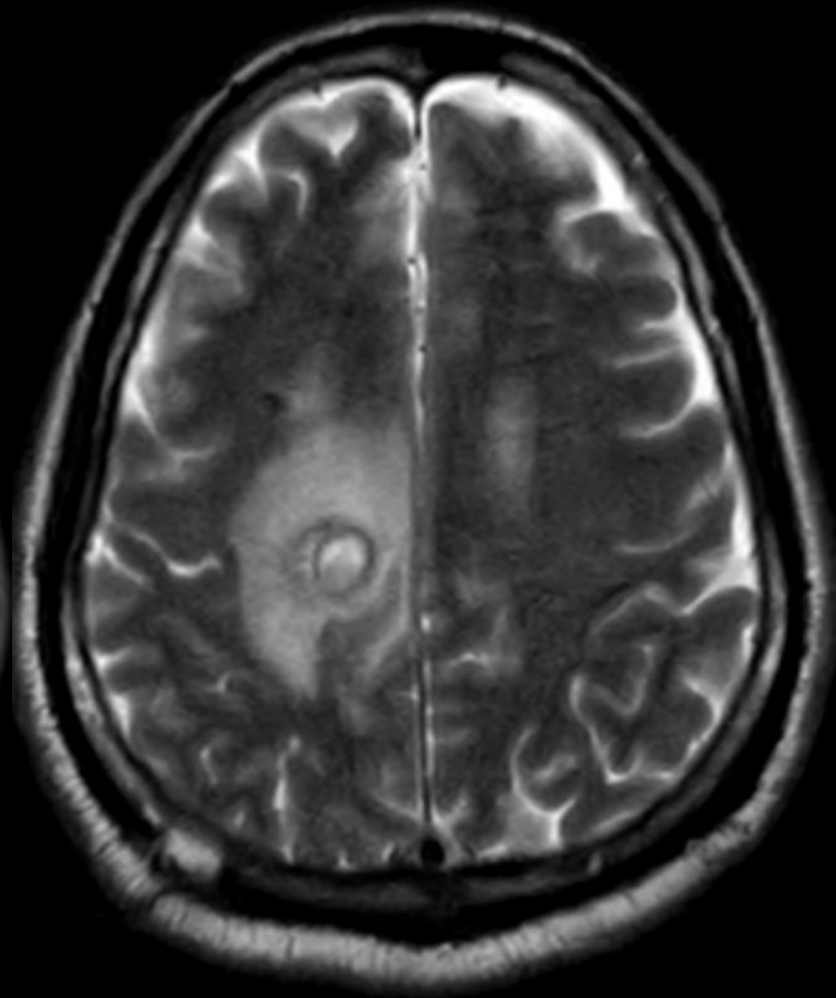
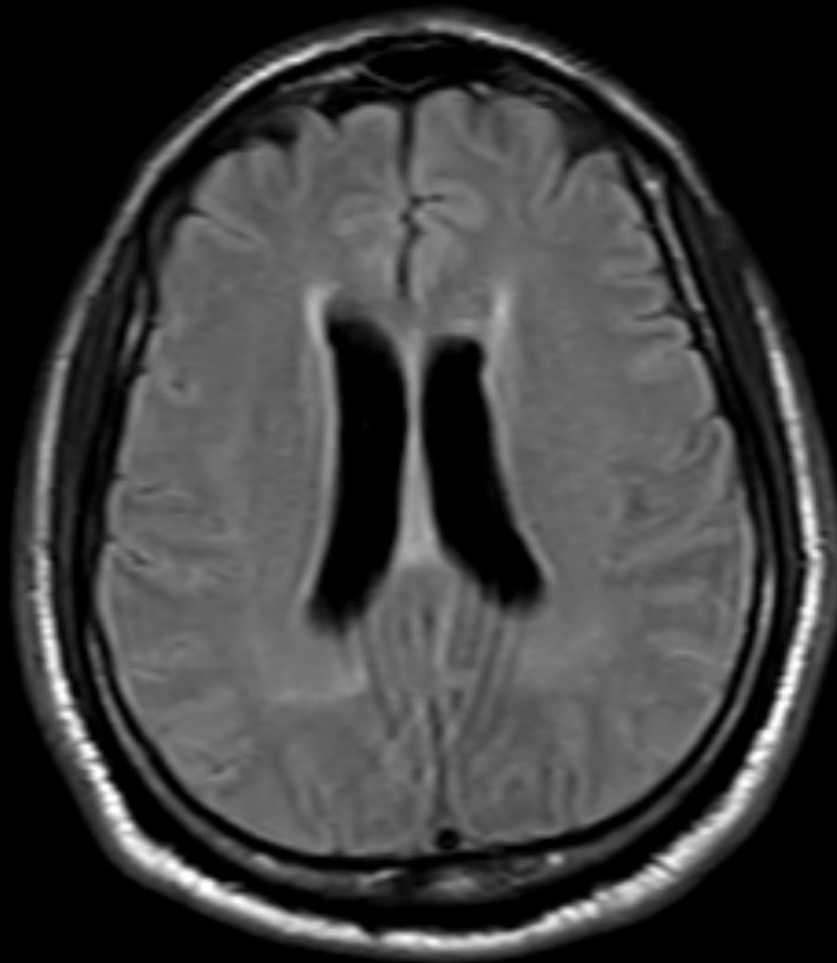
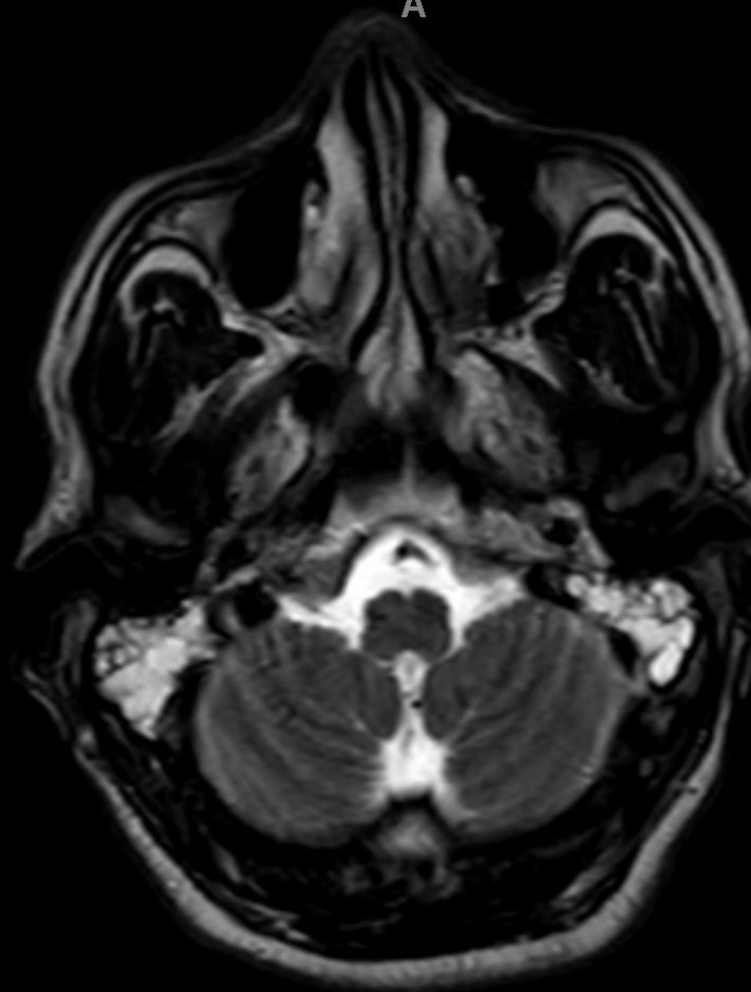
A Word About MRI...

- Uses non-ionizing radiofrequency radiation inside a strong magnetic field to detect the location and chemical environment of protons.
- Achieves greater tissue contrast than CT imaging.
- Particularly helpful in neurologic, bone and soft-tissue imaging.
- Limitations

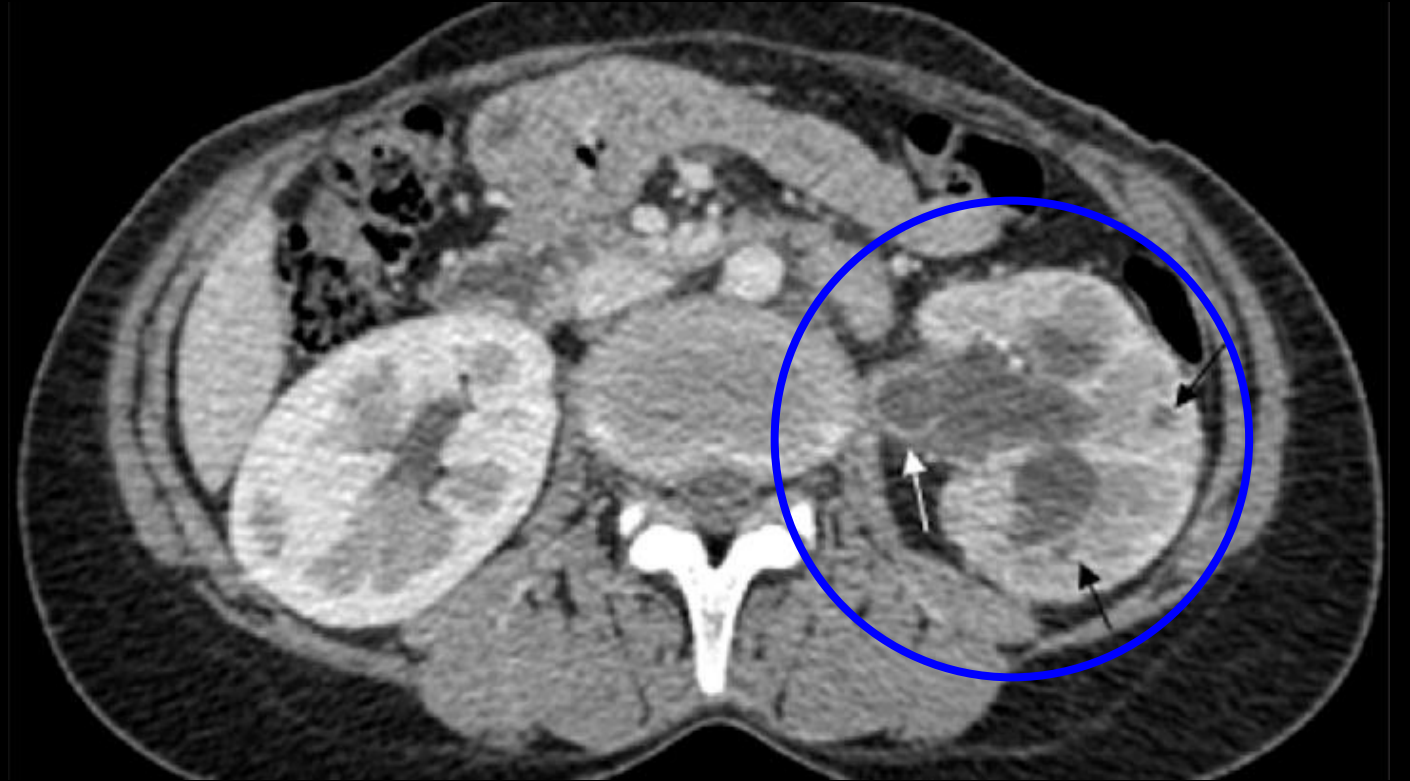
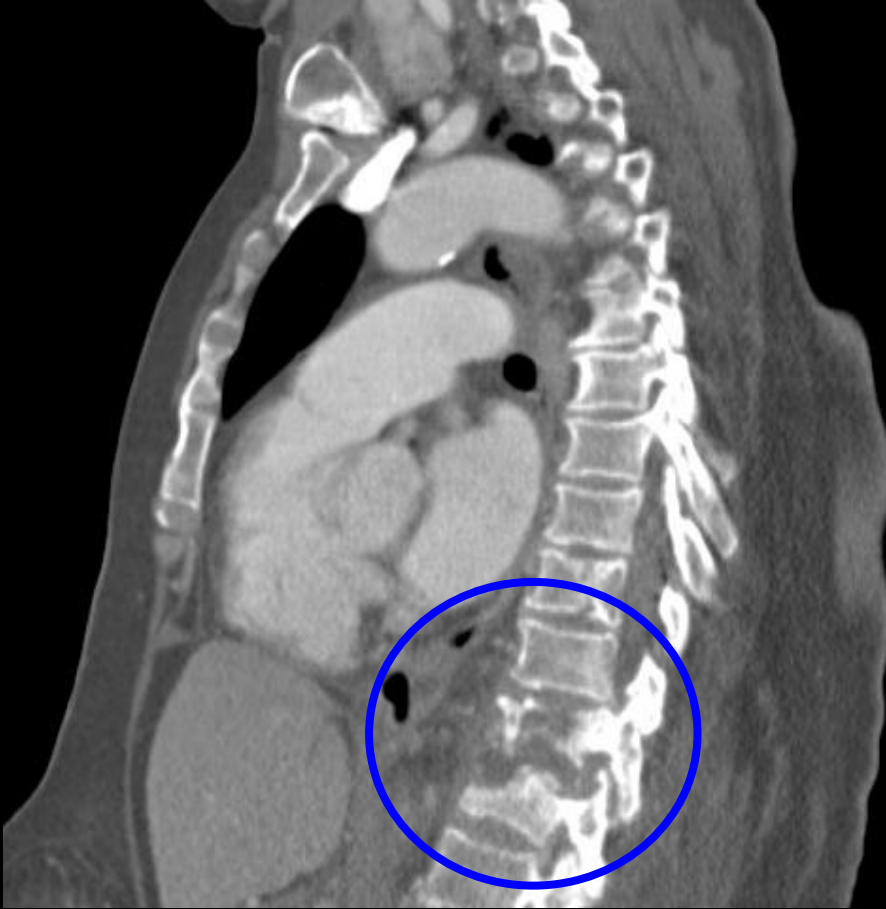


A

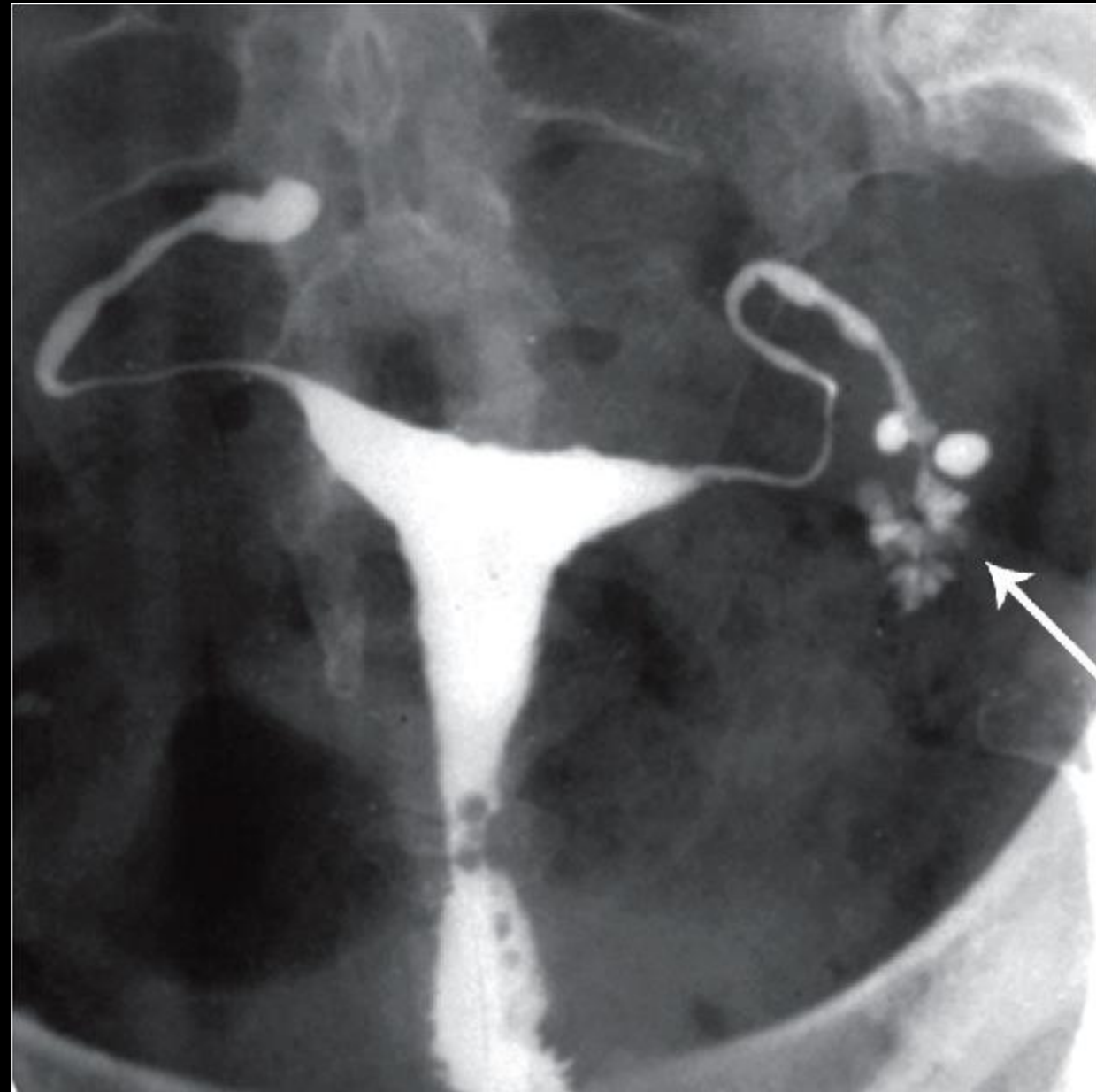
A







Hysterosalpingography



Ultrasound

Testicular TB

Right

4.5.

A

Right

4.5.

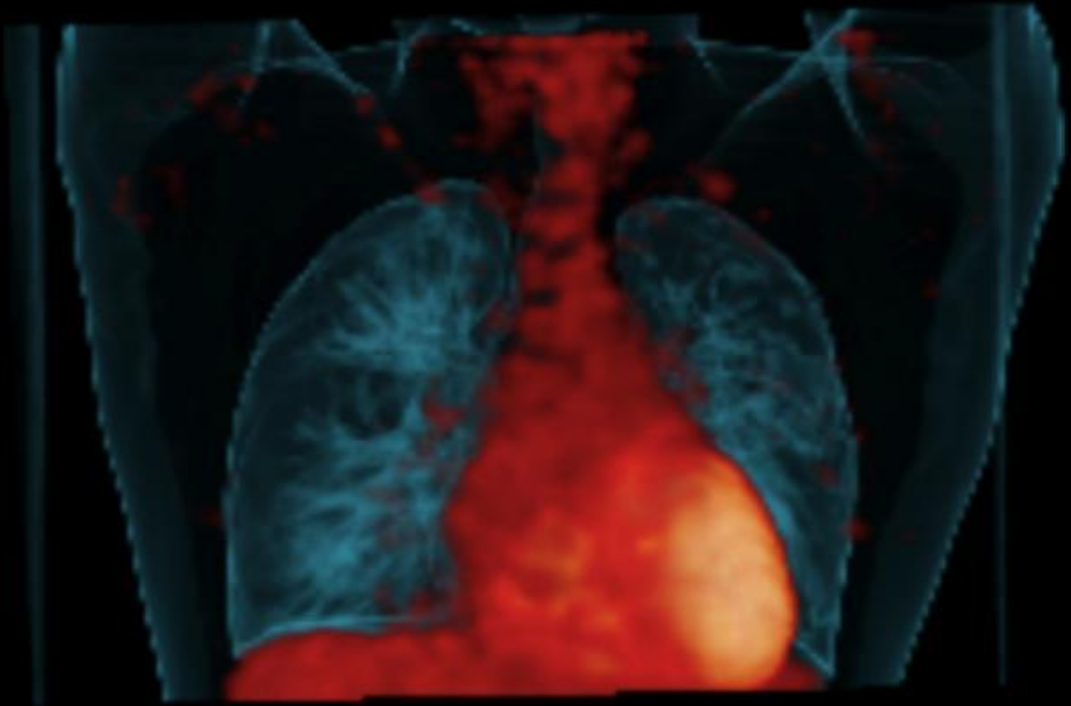
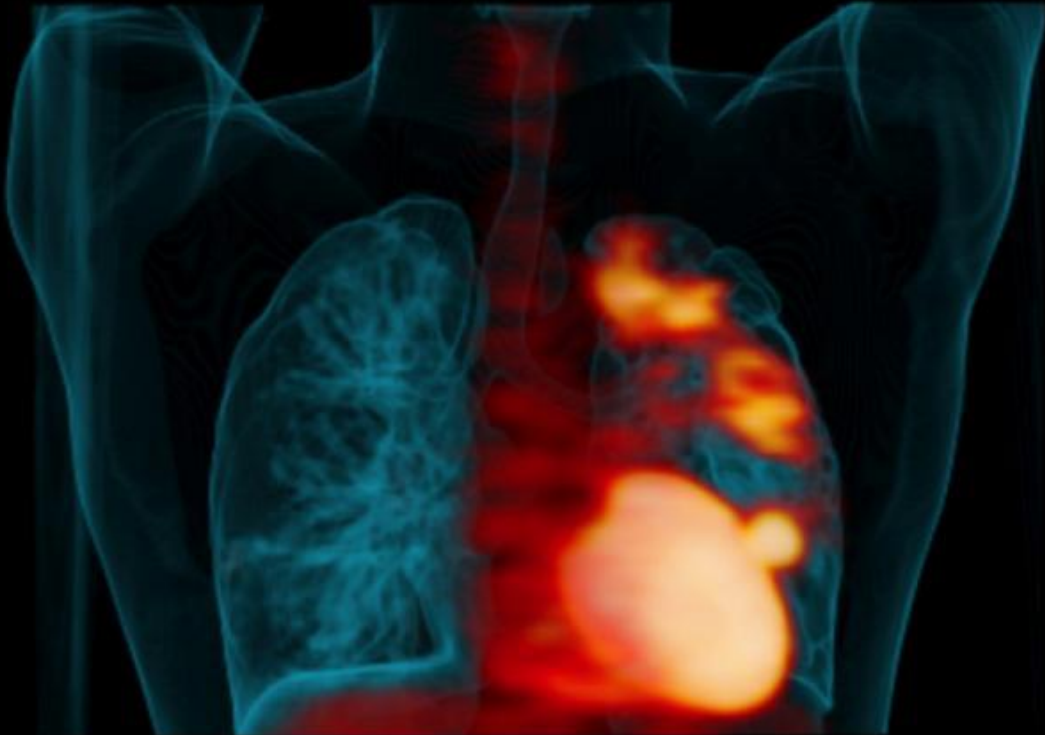
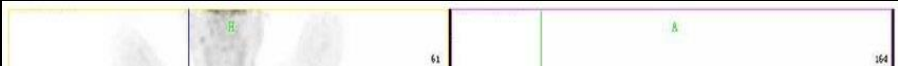
B

+2
-2
cm

A Word About PET_CT...

- It happens.
- It may be useful in determining if activity is present in old lesions or after treatment.
- Who will pay for it?





Thank you

Heartland TB Center

