


Diagnosis of TB: Radiology

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September 13, 2023

TB Intensive
September 13 – 15, 2023
Richmond, TX


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Megan Devine, MD has the following disclosures to make:

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

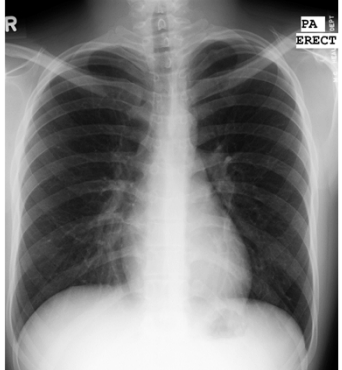
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An Introduction to TB Radiology

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PA
ERECT

EXCELLENCE EXPERTISE INNOVATION

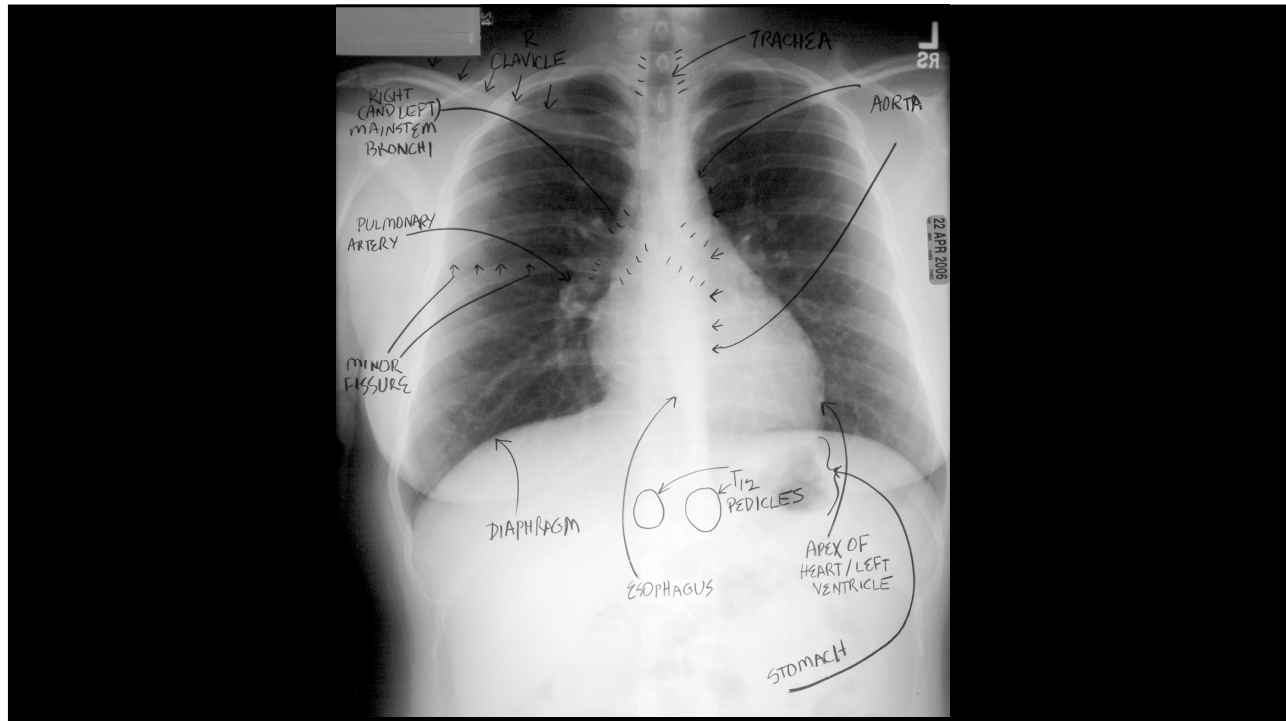
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Chest Radiology in TB

- 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
- Interpretation of a chest radiograph is pattern recognition that requires clinical correlation for diagnosis



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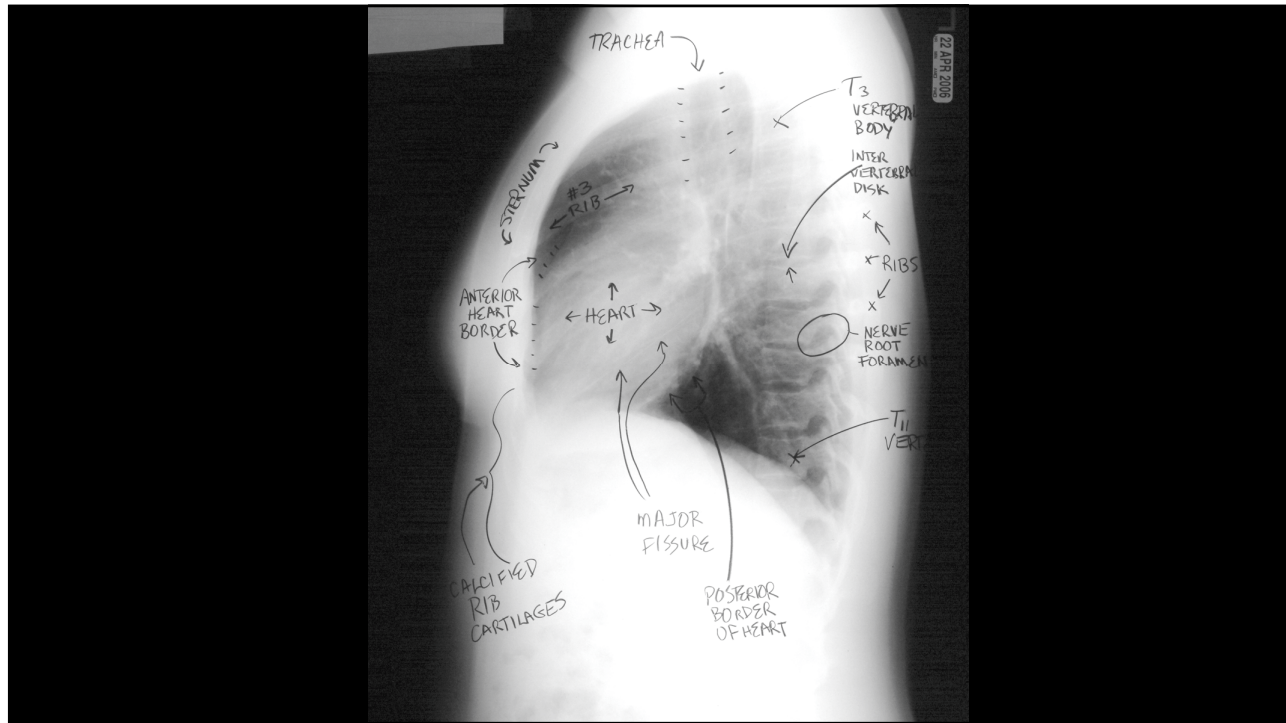


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Thoracic Lymph Nodes



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Normal CXR Child



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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



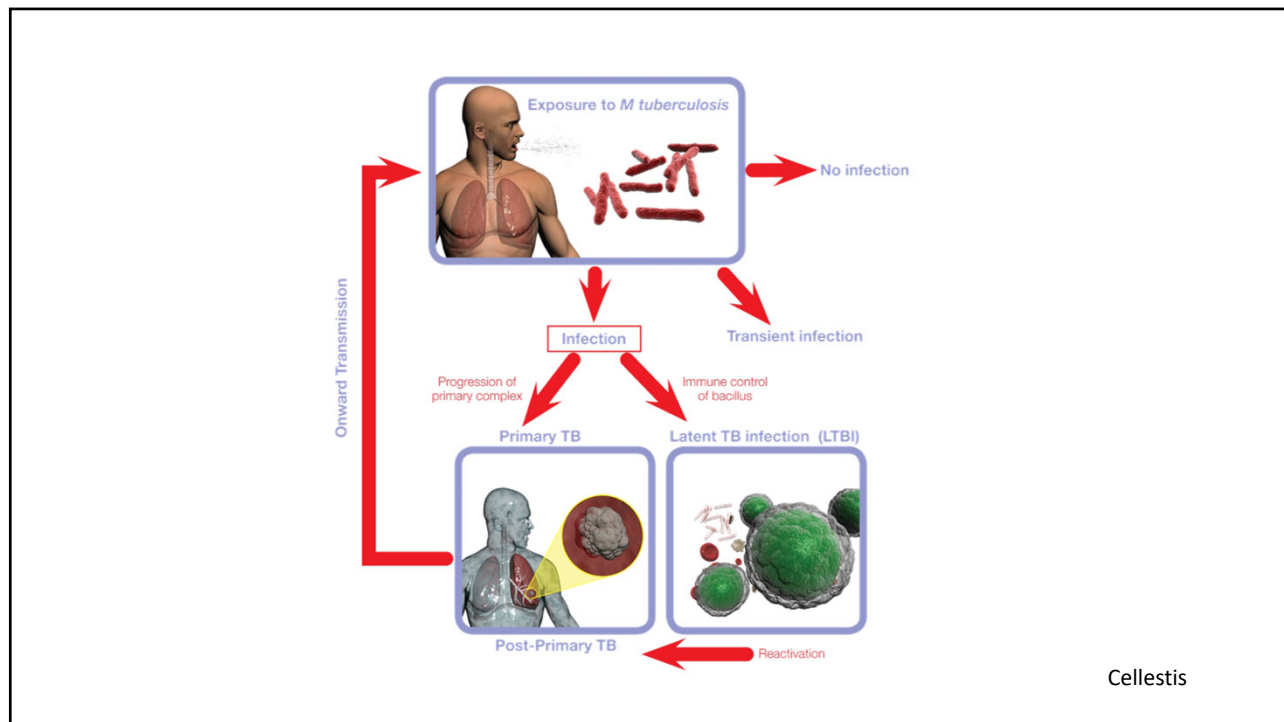
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Role of CT in the Diagnosis of TB

- Reveals occult lung disease in patients with pleural effusion, pericarditis, etc.
- Reveals intra-thoracic lymphadenopathy (children, HIV co-infected)
- Can suggest miliary disease
- Can suggest alternative diagnoses (lung cancer)



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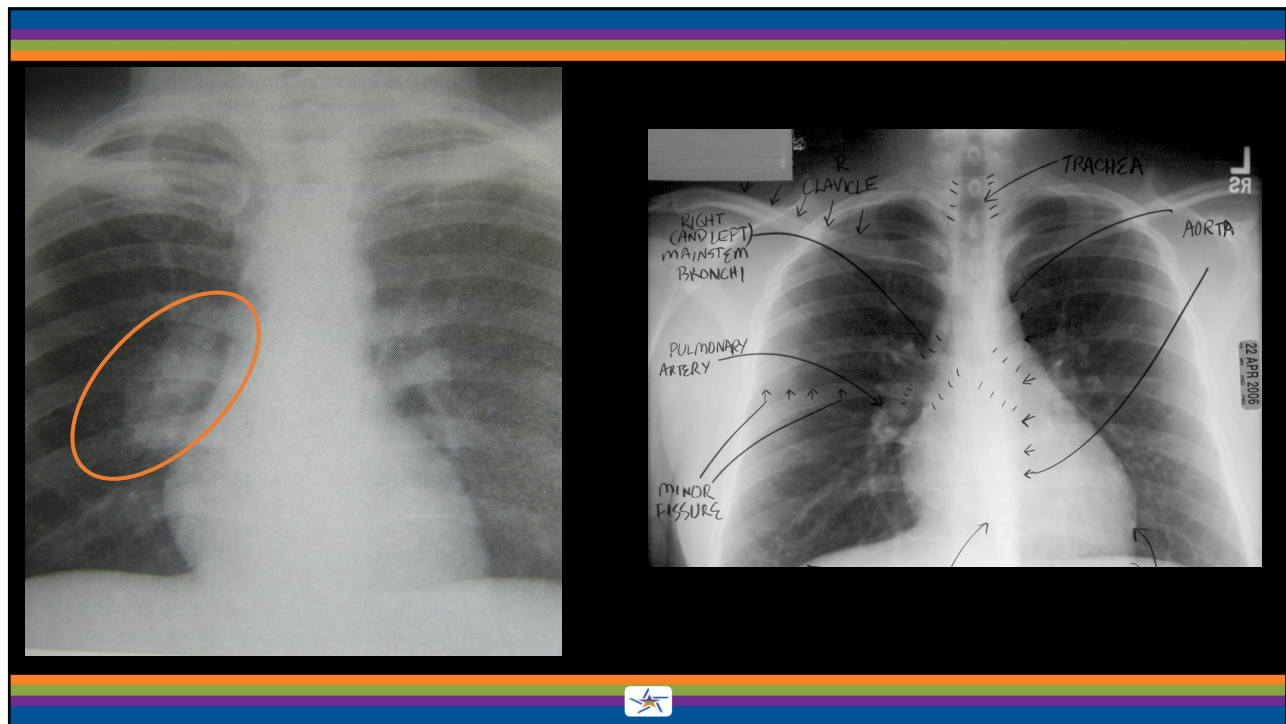
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Primary Tuberculosis

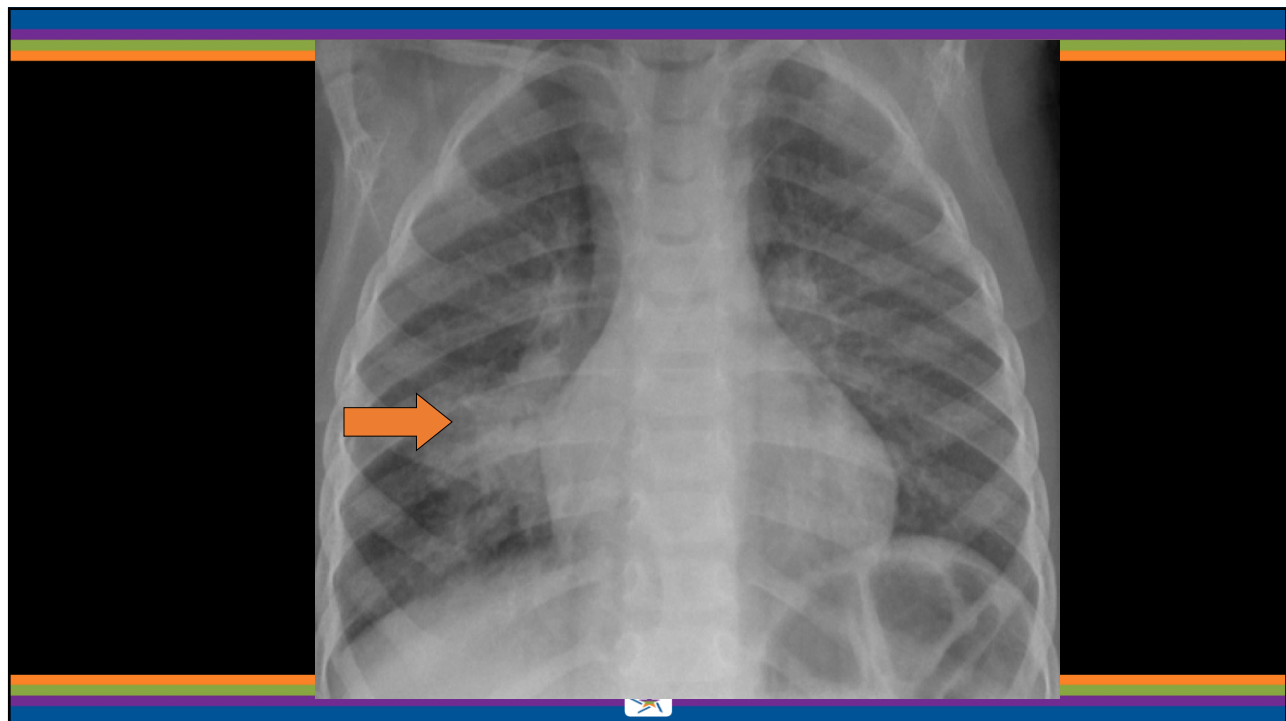
- Most commonly in children and immune compromised patients
- Opacities are seen the in middle and lower lungs
- Commonly unilateral, bilateral 15%
- Lymph node enlargement often occurs, and may cause bronchial compression
- Hilar or paratracheal lymphadenopathy with or without infiltrates is characteristic.



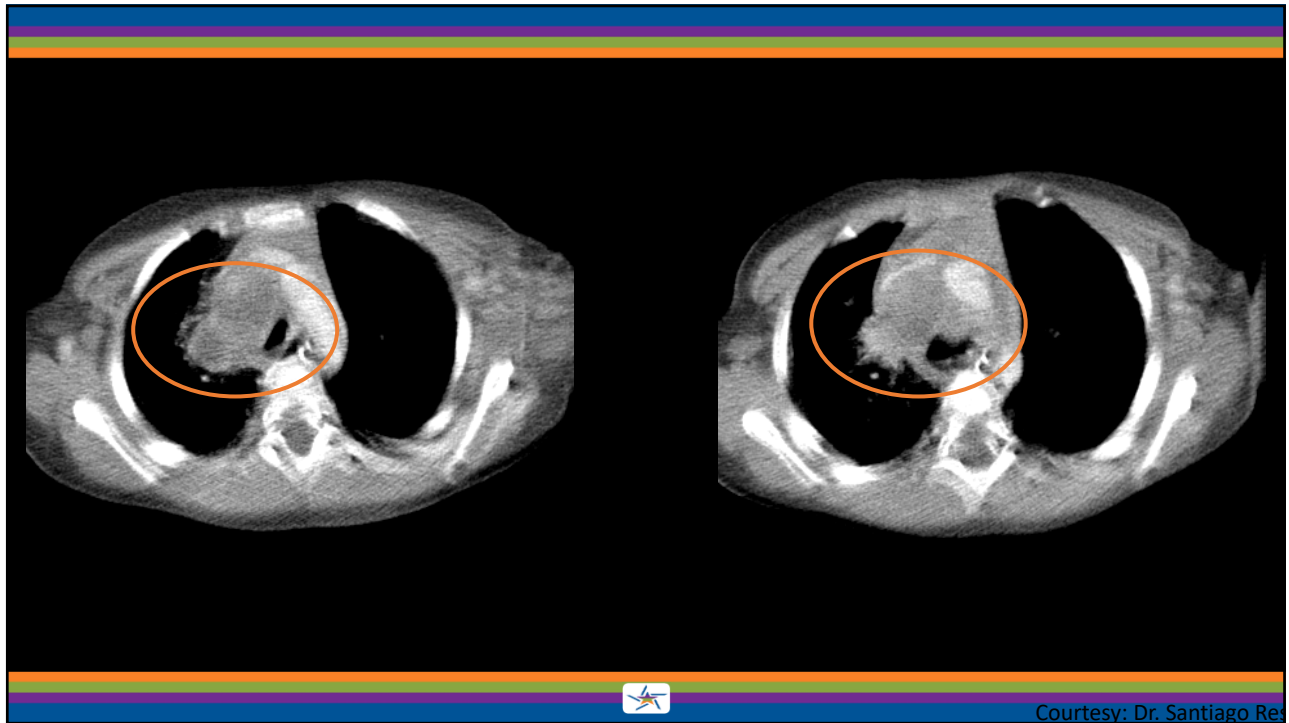
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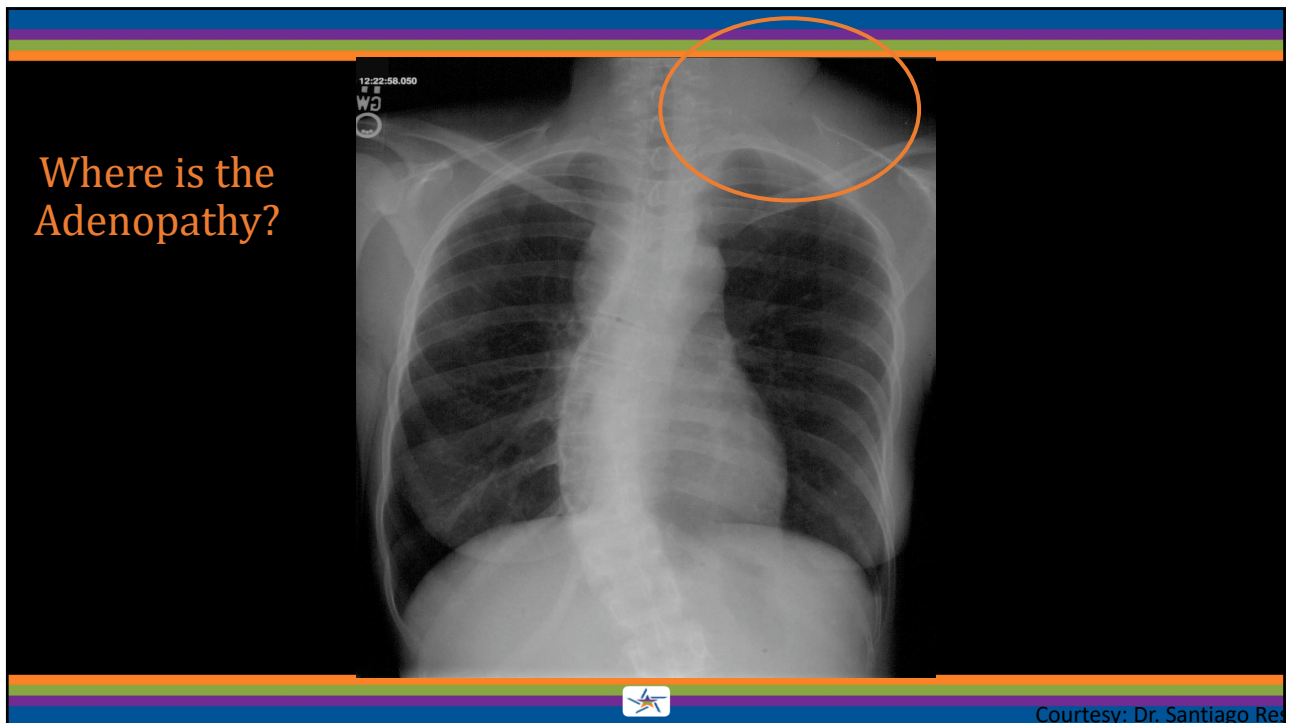
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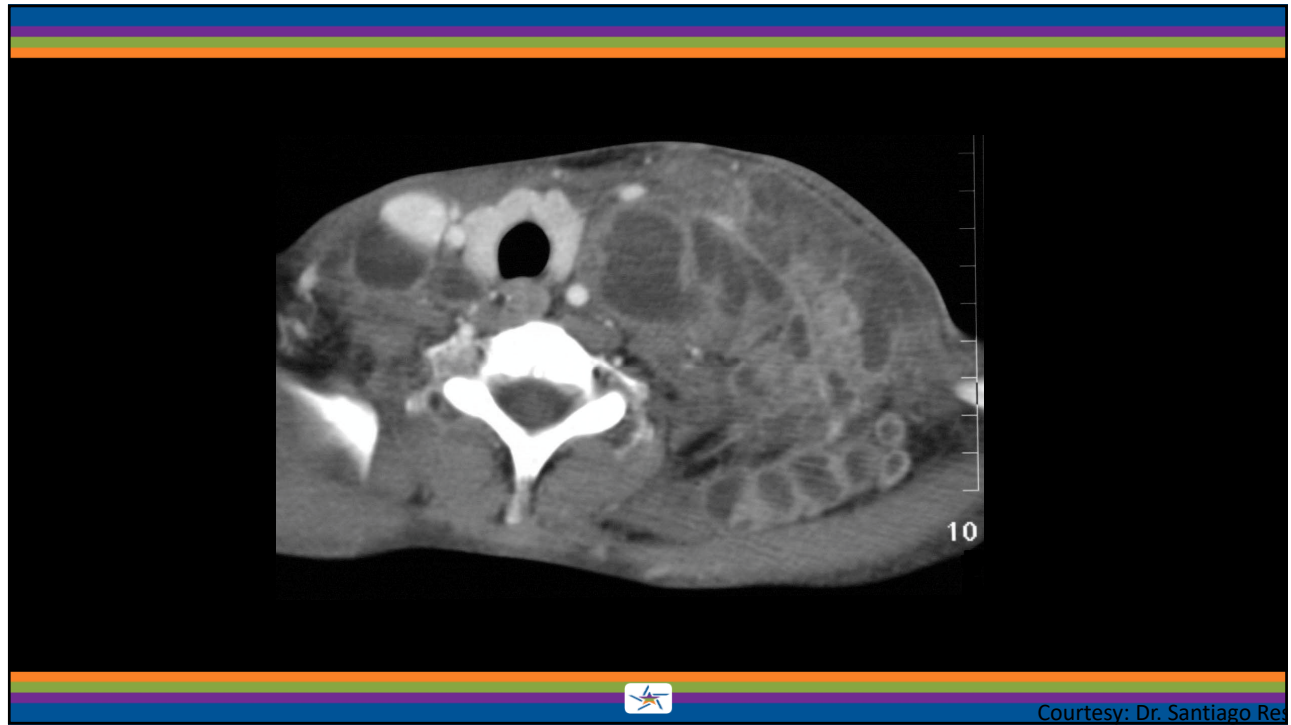
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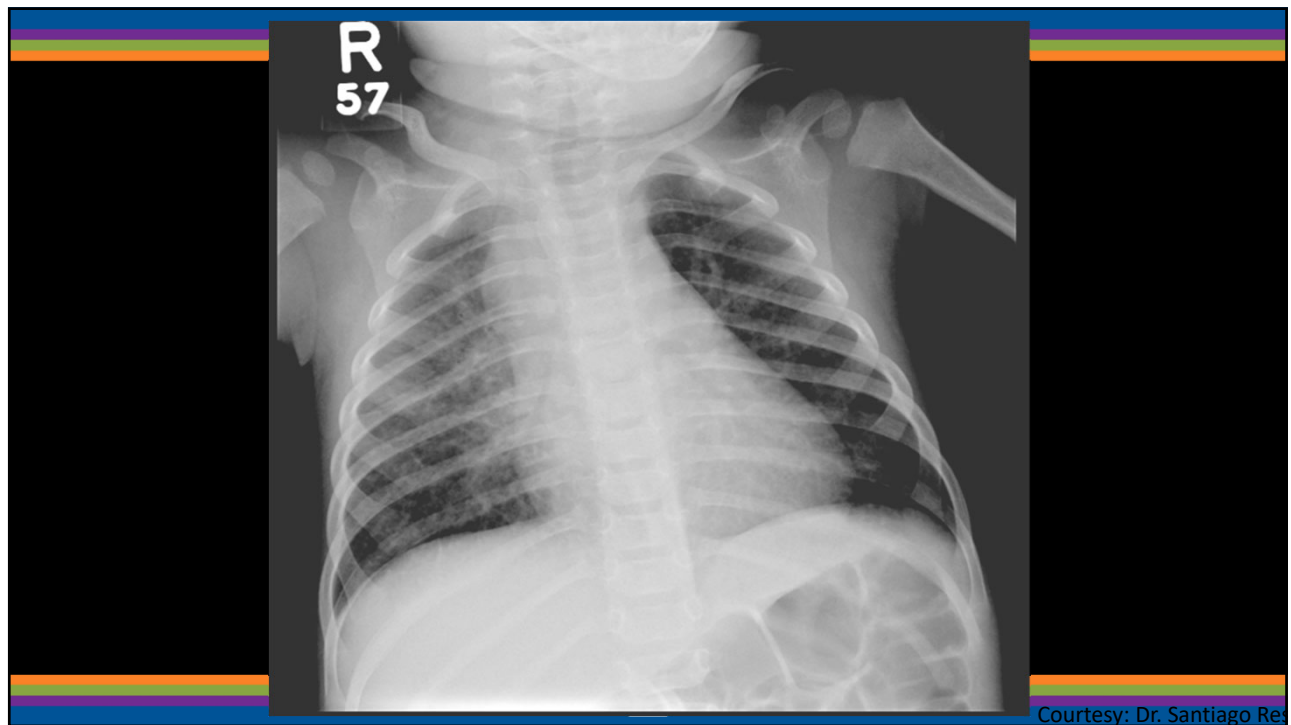
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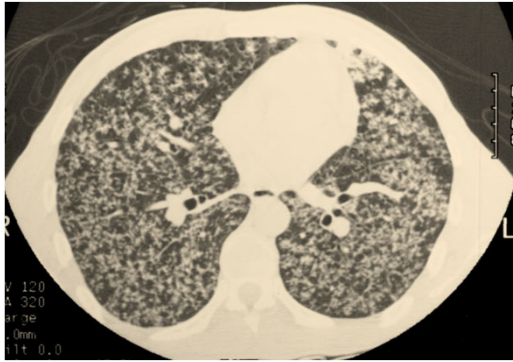
Millet Seeds

Slender plant, 1-15 feet
 Seeds ~ 2 mm in diameter
 1/3 of grain for 3rd world
 Africa and India
 Producer: India

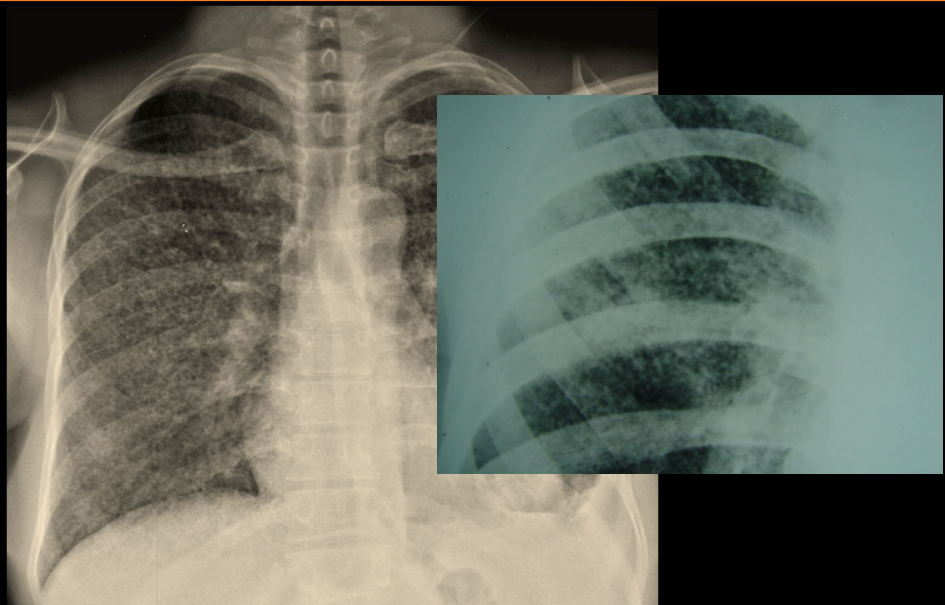


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Miliary Tuberculosis



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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.



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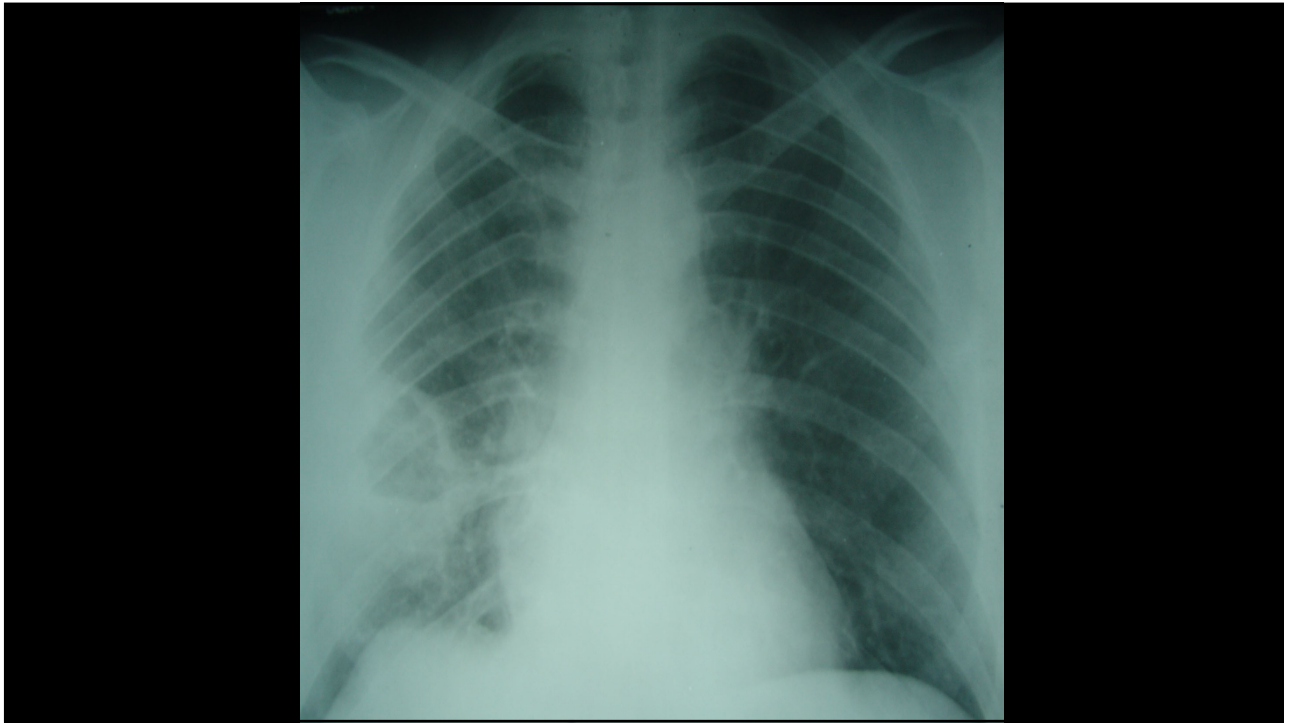
Tuberculous Cavities

- Usually have thick, irregular walls
- With treatment, walls thin and cavity shrinks and usually collapses

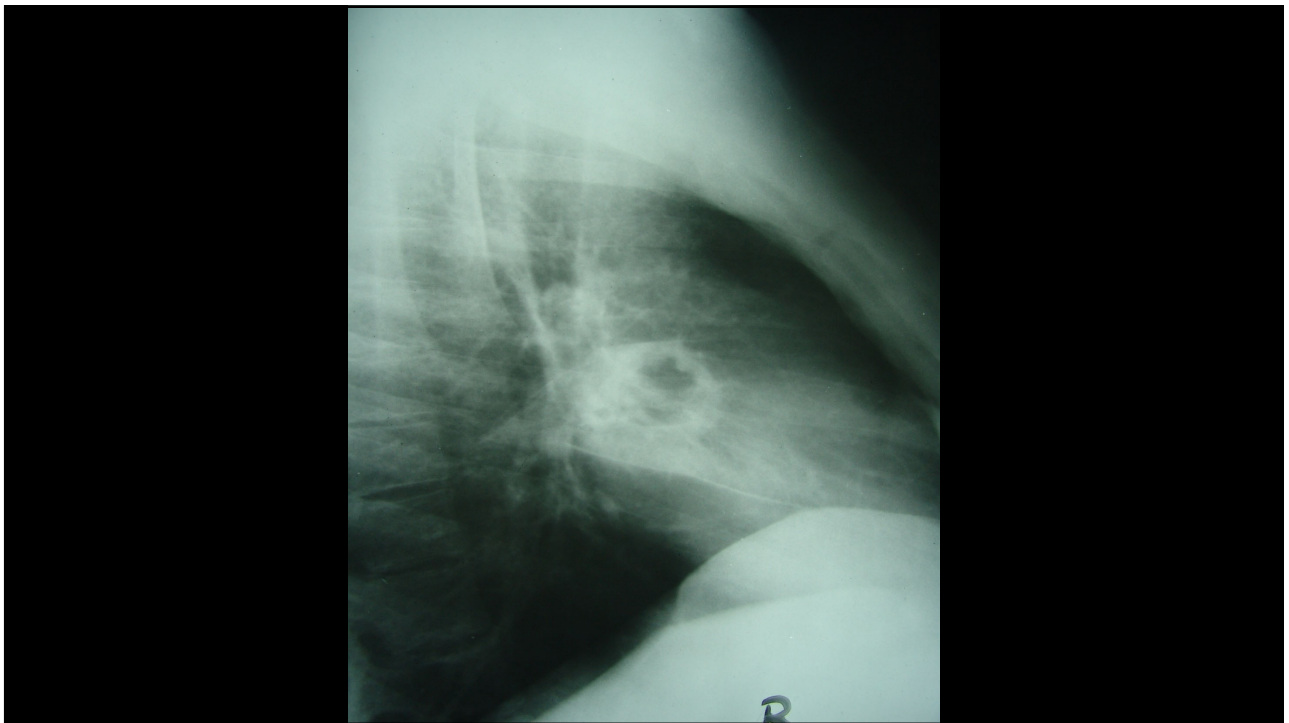


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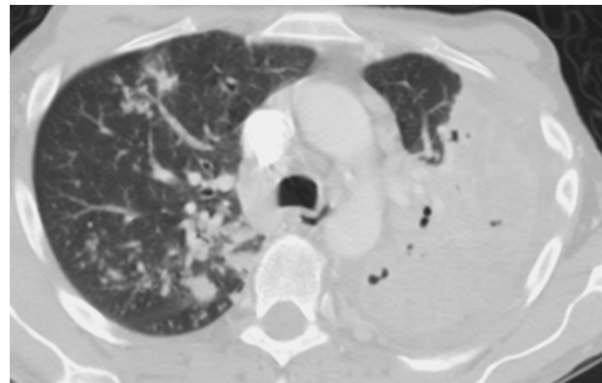
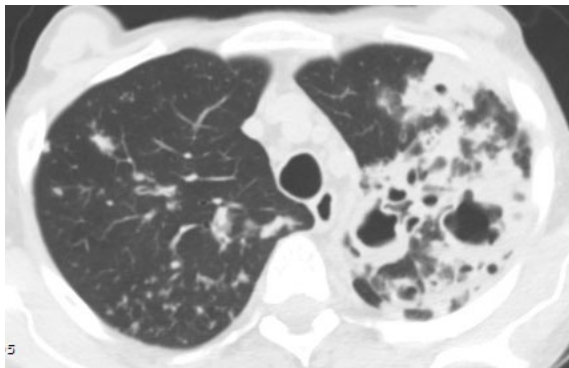


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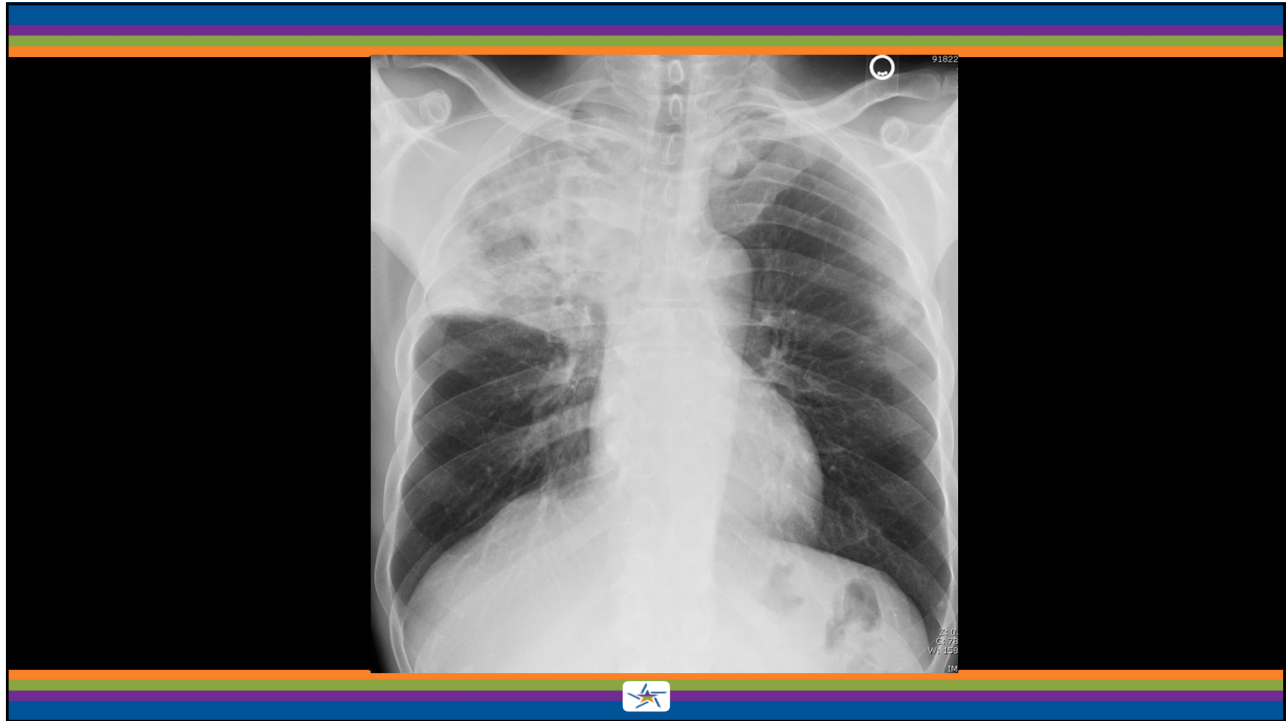
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Reactivation TB Cavitary Consolidation

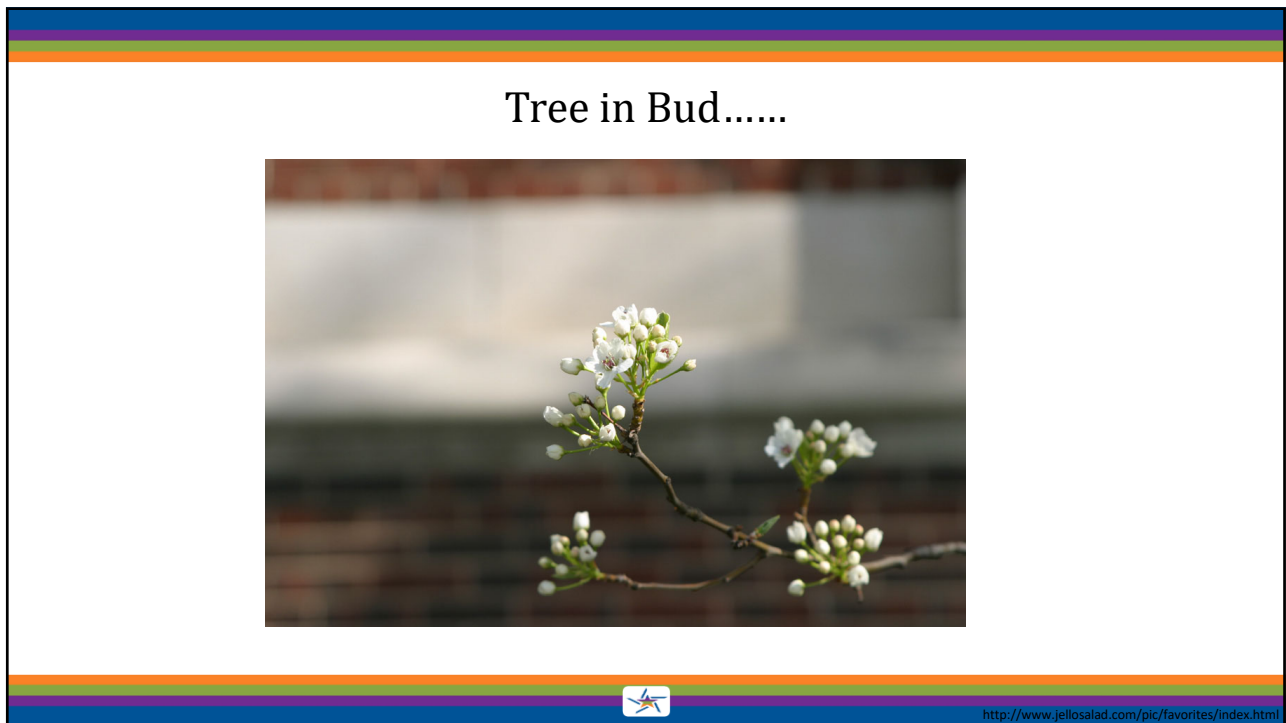


Courtesy: Dr. Santiago Res

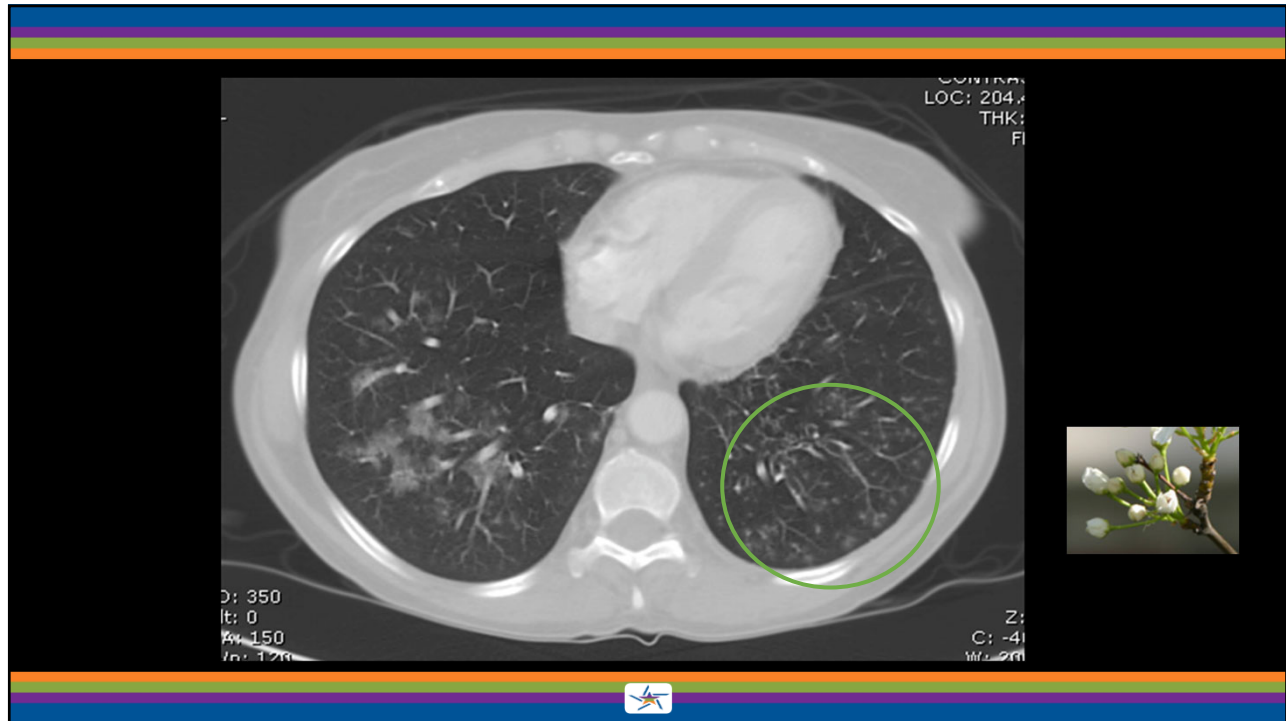
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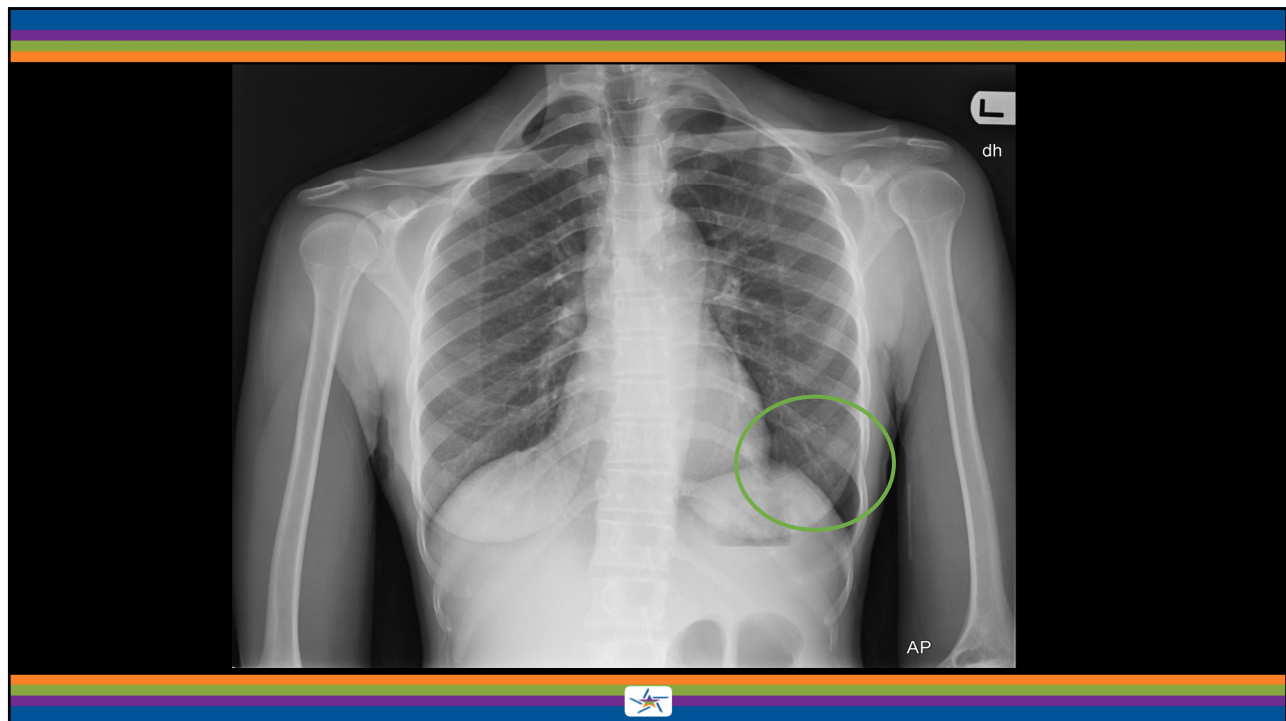
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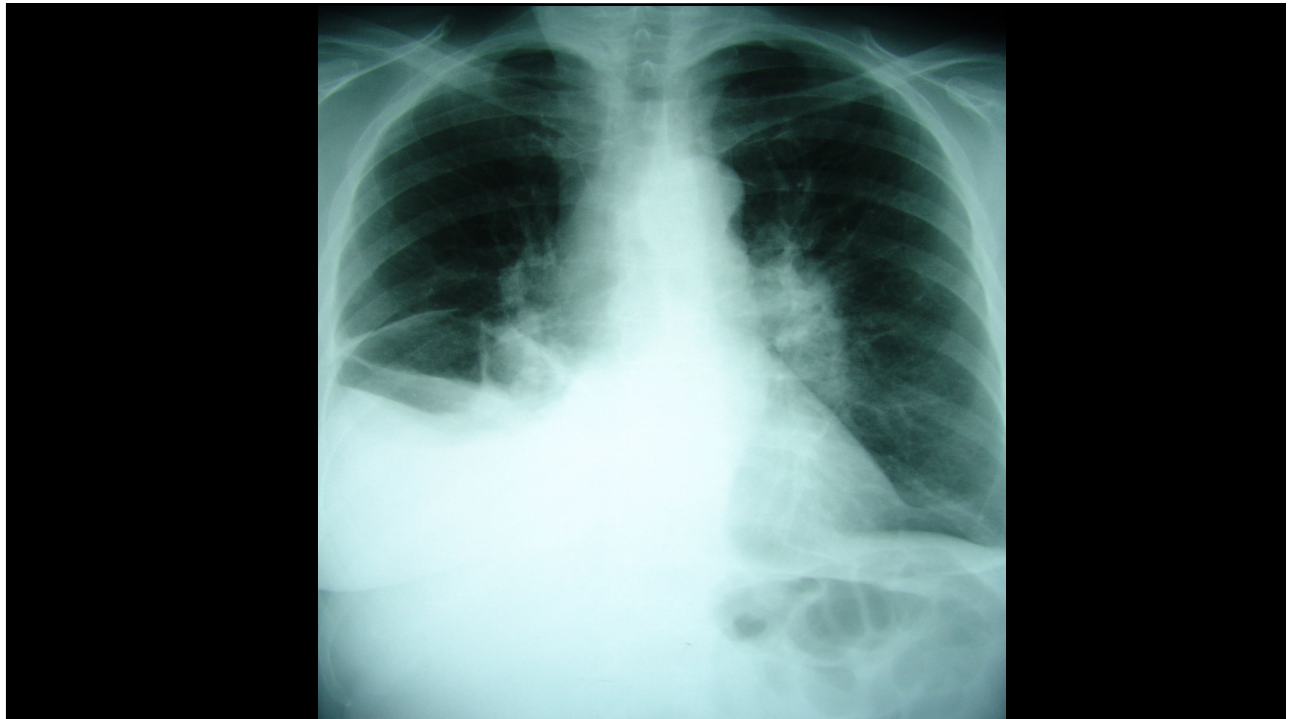
Pleural Effusions

- Primary TB (25%)
- Hypersensitivity reaction to TB proteins
- Organisms uncommonly isolated from fluid
- May not be associated with obvious parenchymal disease on CXR



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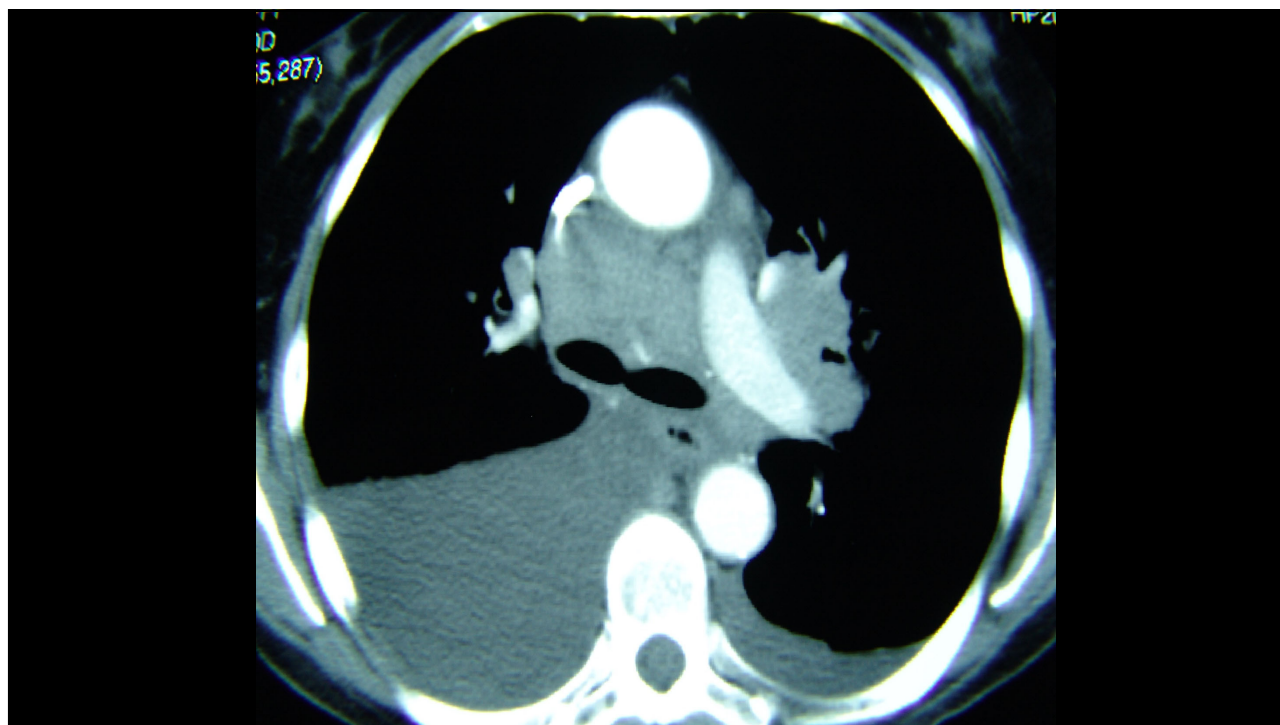
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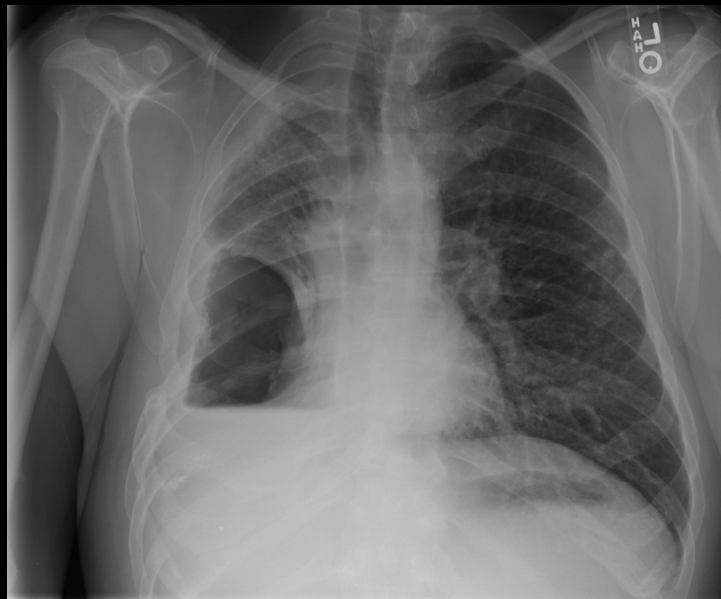
Pleural Effusions

- Post primary TB (20%)
- Caused by rupture of a tuberculous cavity into the pleural space, causing empyema
- May cause bronchopleural fistula with air fluid levels
- Often results in irreversible pleural thickening and calcification



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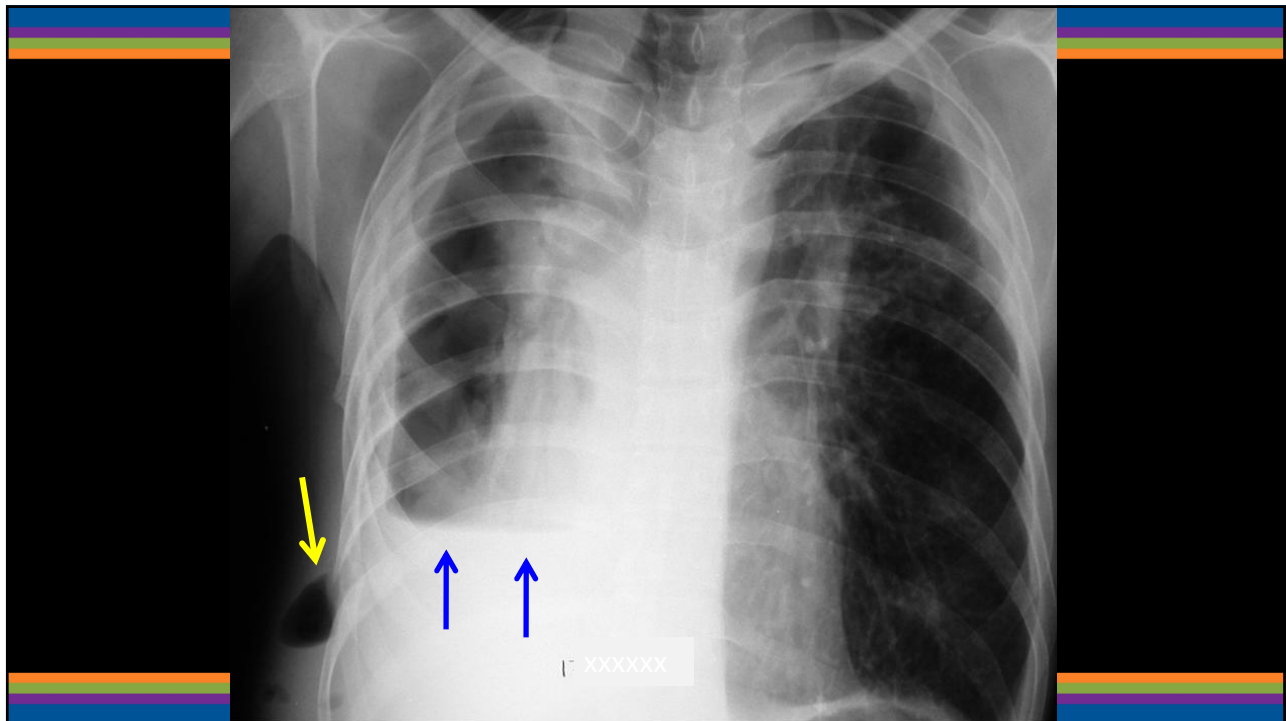
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Tracheobronchial TB

- 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



Moon WK, et al. AJR 1997;16

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Courtesy: Dr. Santiago Res

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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



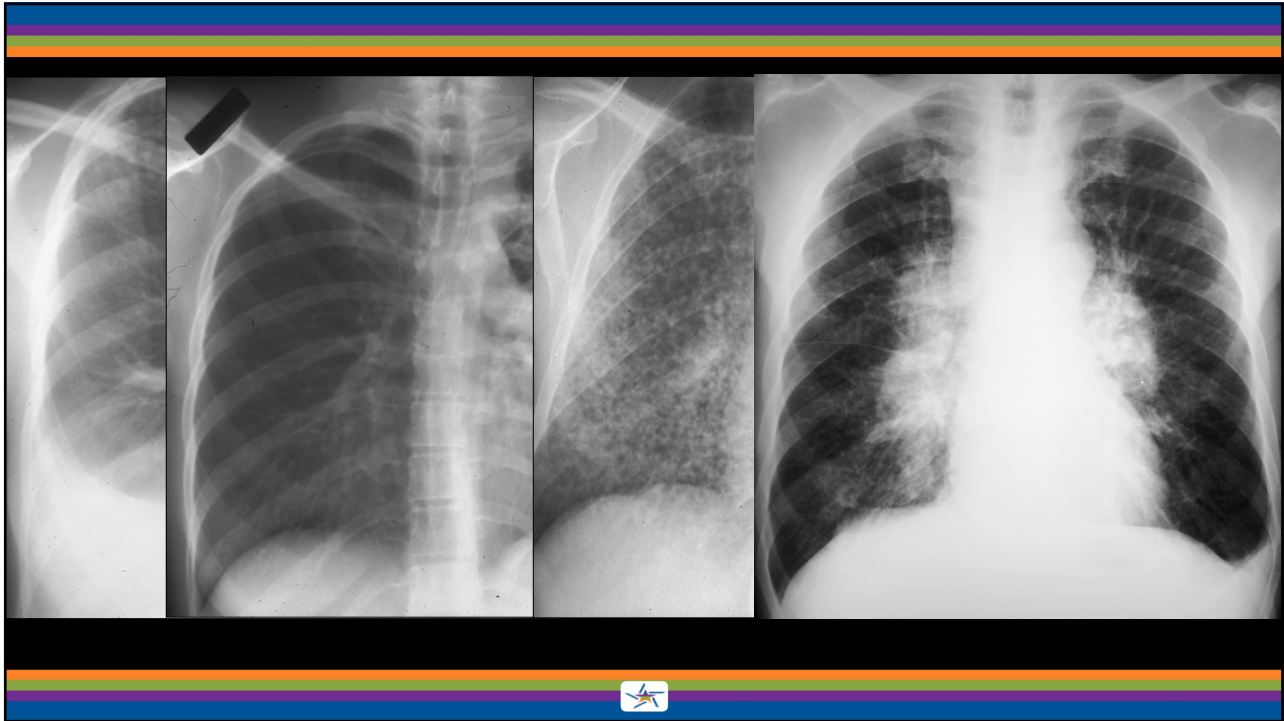
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Tuberculosis and HIV

Any combination of the previously mentioned patterns!



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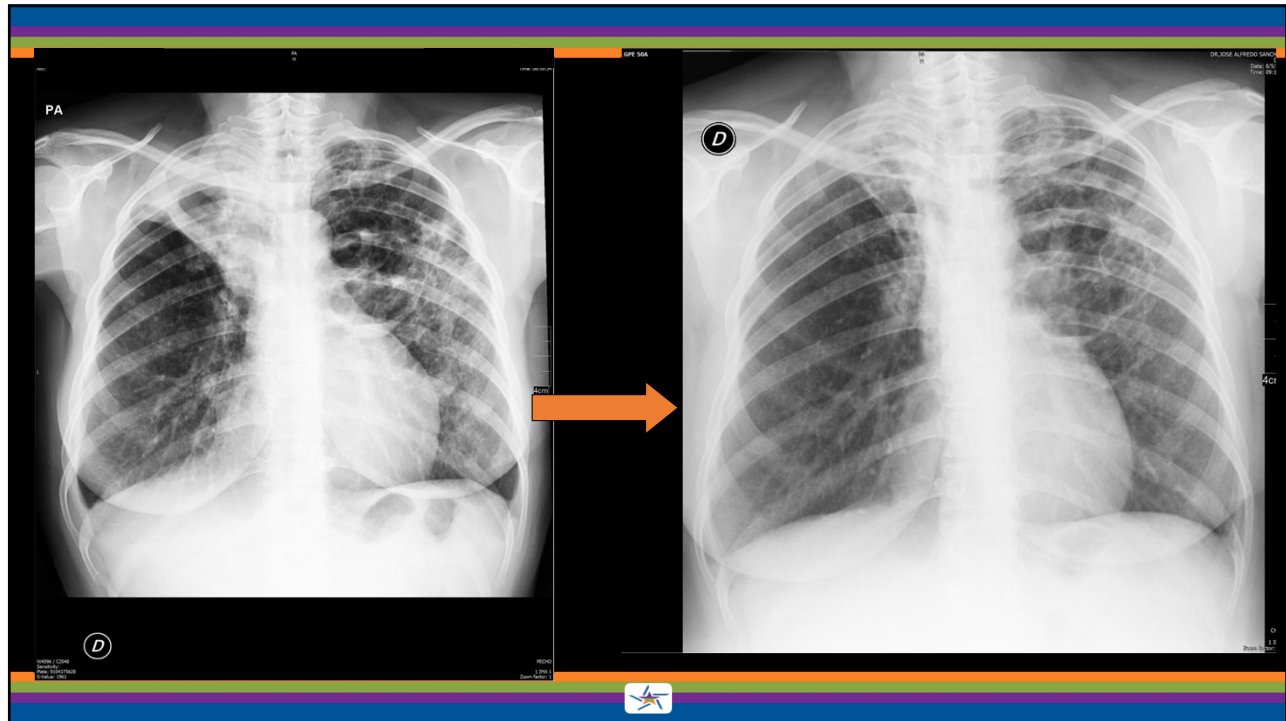


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Complications of Pulmonary Tuberculosis

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

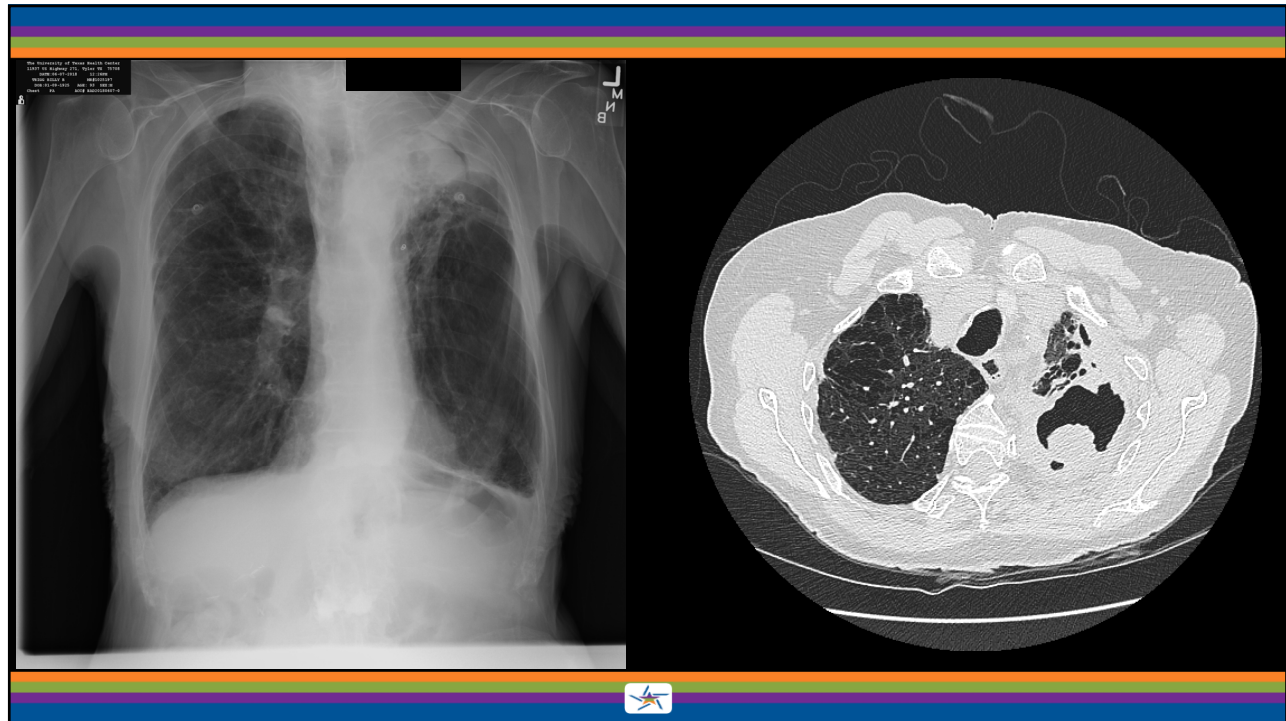
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Extra-pulmonary Tuberculosis can affect ANY ORGAN

- Cardiac: pericarditis, pericardial effusion, myocarditis
- CNS: meningitis, tuberculomas, tuberculous abscesses, cerebritis, and miliary TB
- 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)

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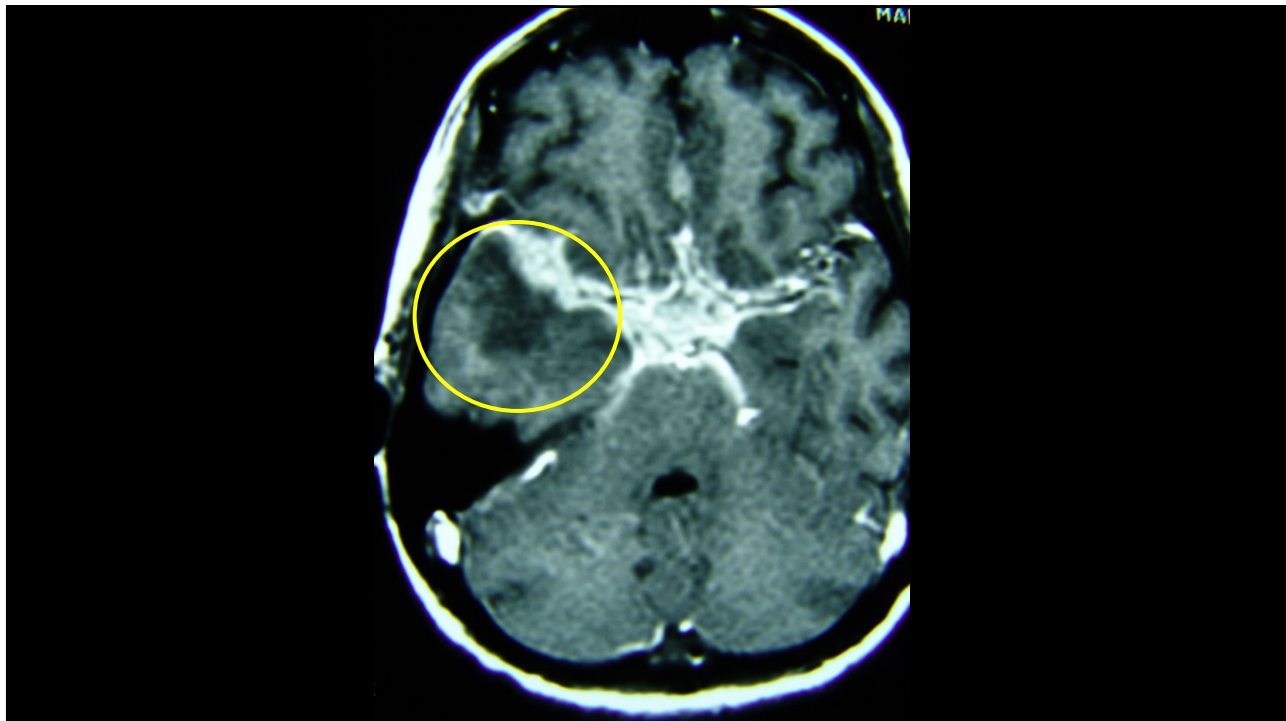
Tuberculous Meningitis

- Hematogenous dissemination
- TB meningitis thought to occur via rupture of a subependymal tubercle into the subarachnoid space
- Basal meninges most commonly involved
- Secondarily results in cortical and lacunar brain infarction and spinal cord infarction

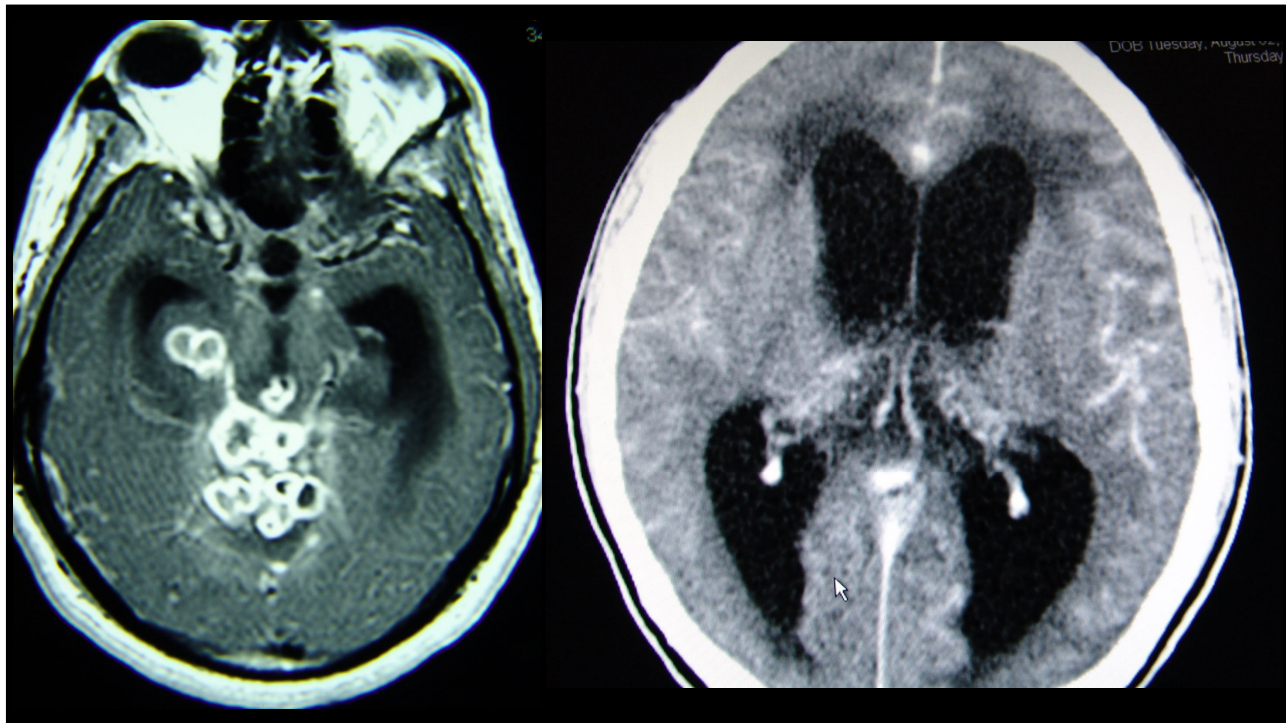


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Bone Involvement

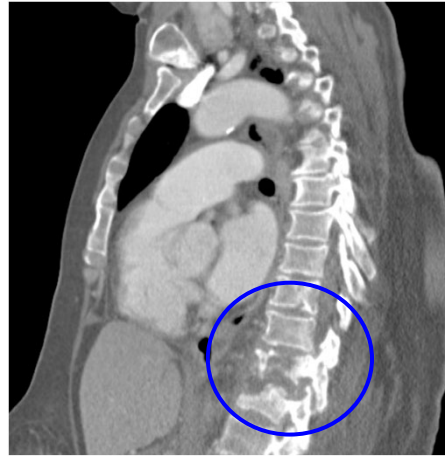
- Potts disease – Tuberculous spondylitis
 - Destructive lesions in the spine primarily centered in vertebral discs and secondarily involving vertebral end plates, resulting in kyphosis.
 - May result in paravertebral abscess.
 - Extends under anterior longitudinal ligament, involving multiple vertebra.
- Can involve other joints – hip, knee, tarsal joints



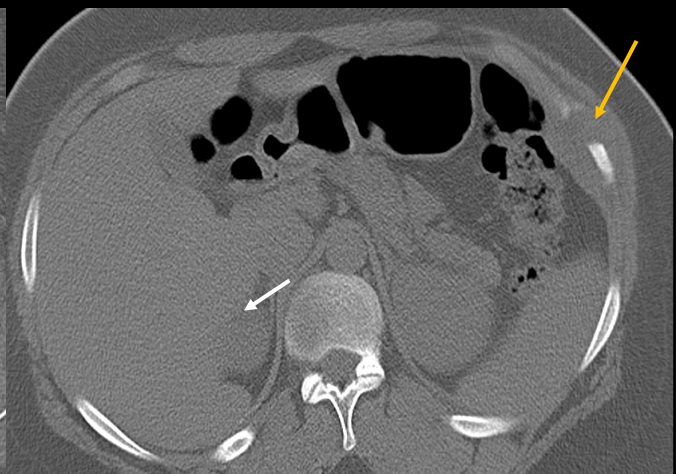
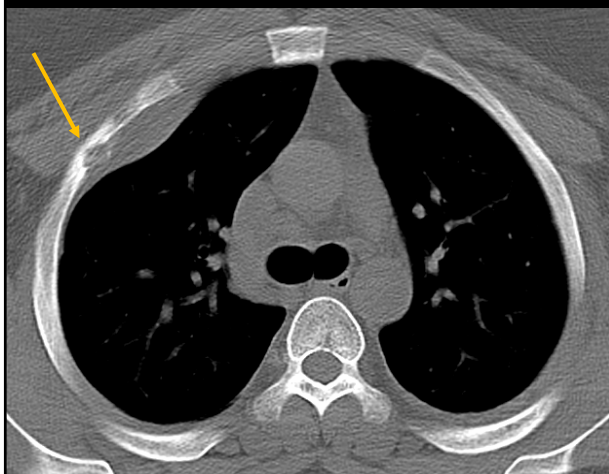
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Extrapulmonary Tuberculosis Pott's Disease



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Urinary Tract Involvement

- Hematogenous spread to the kidney
- Tuberculomas form in renal parenchyma
- Hematuria, “sterile” pyuria
- 75% unilateral
- Auto-nephrectomy – shrunken, calcified, scarred, and nonfunctional
- Ureteral involvement develops from direct spread, resulting in stricture and obstruction



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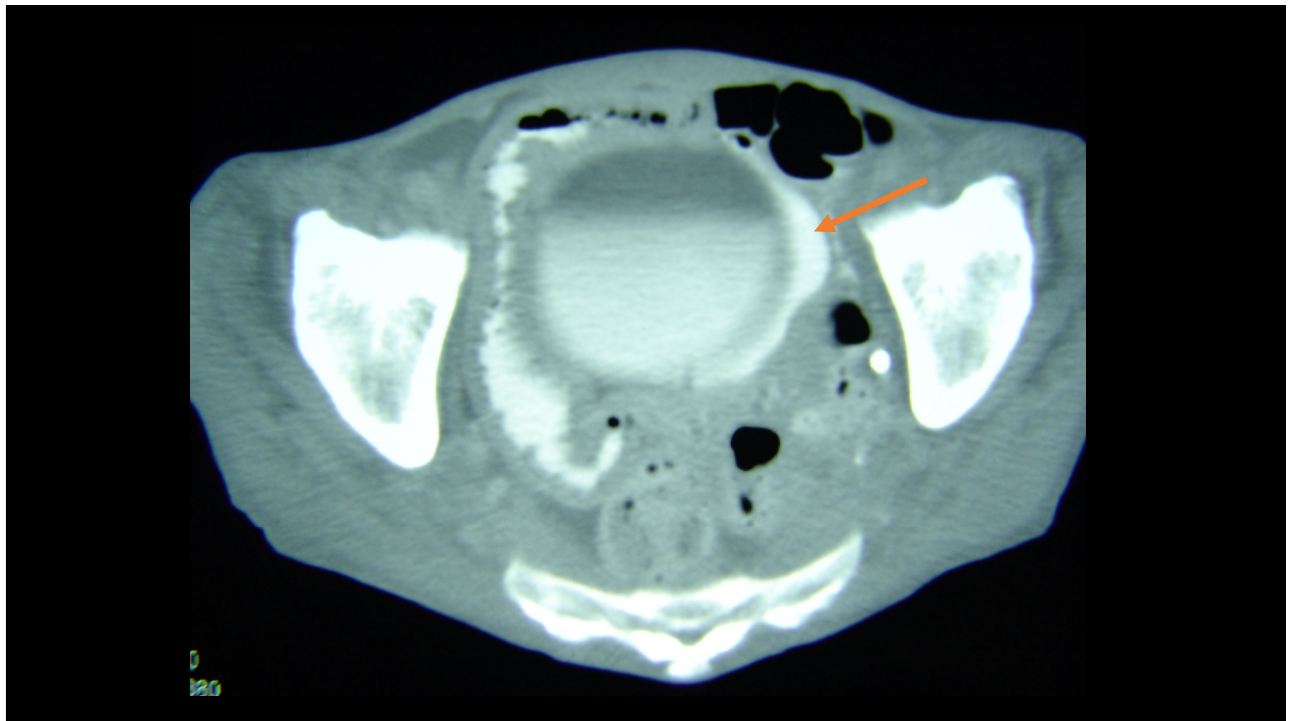
Bladder Involvement

- Direct spread
- Interstitial cystitis with thickened bladder wall
- Ulceration



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Genital Tuberculosis

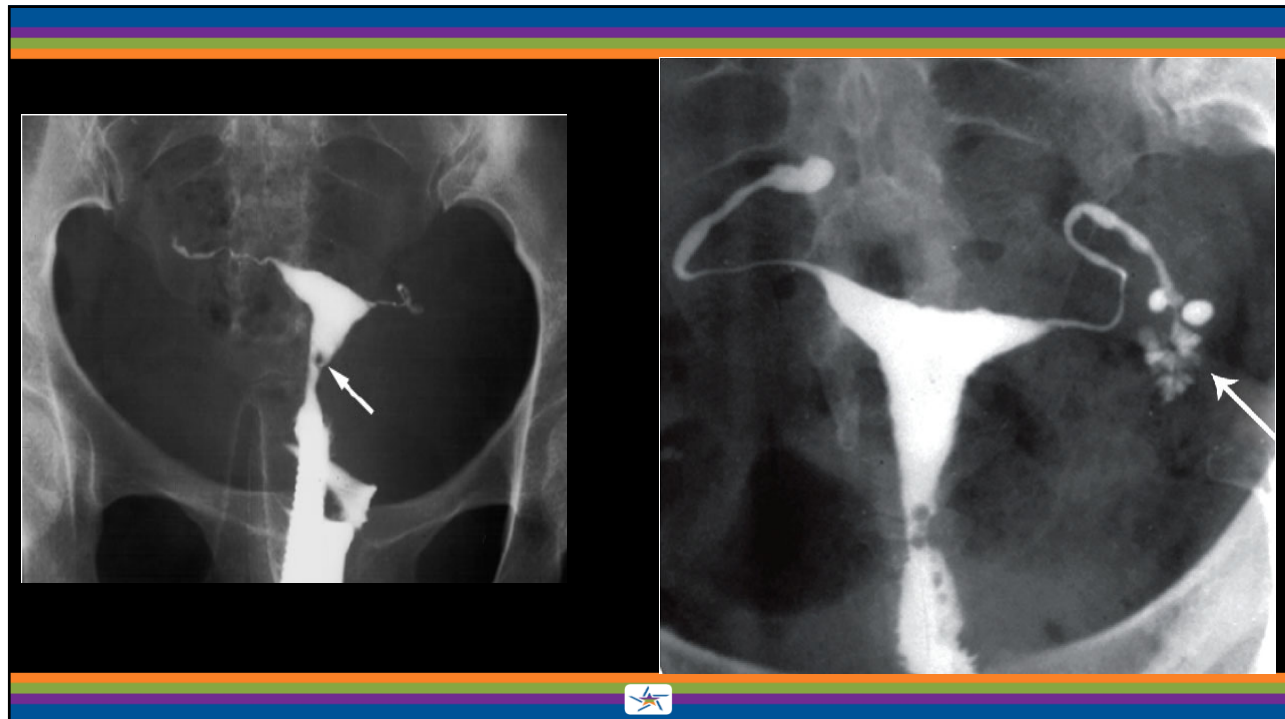
- An important and underrecognized cause of infertility.
- 90% from hematogenous spread but can also spread from local extension.

ORGAN	FREQUENCY
Fallopian tubes	90-100%
Endometrium	50-60%
Ovaries	20-30%
Cervix	5-15%
Vulva and Vagina	1%

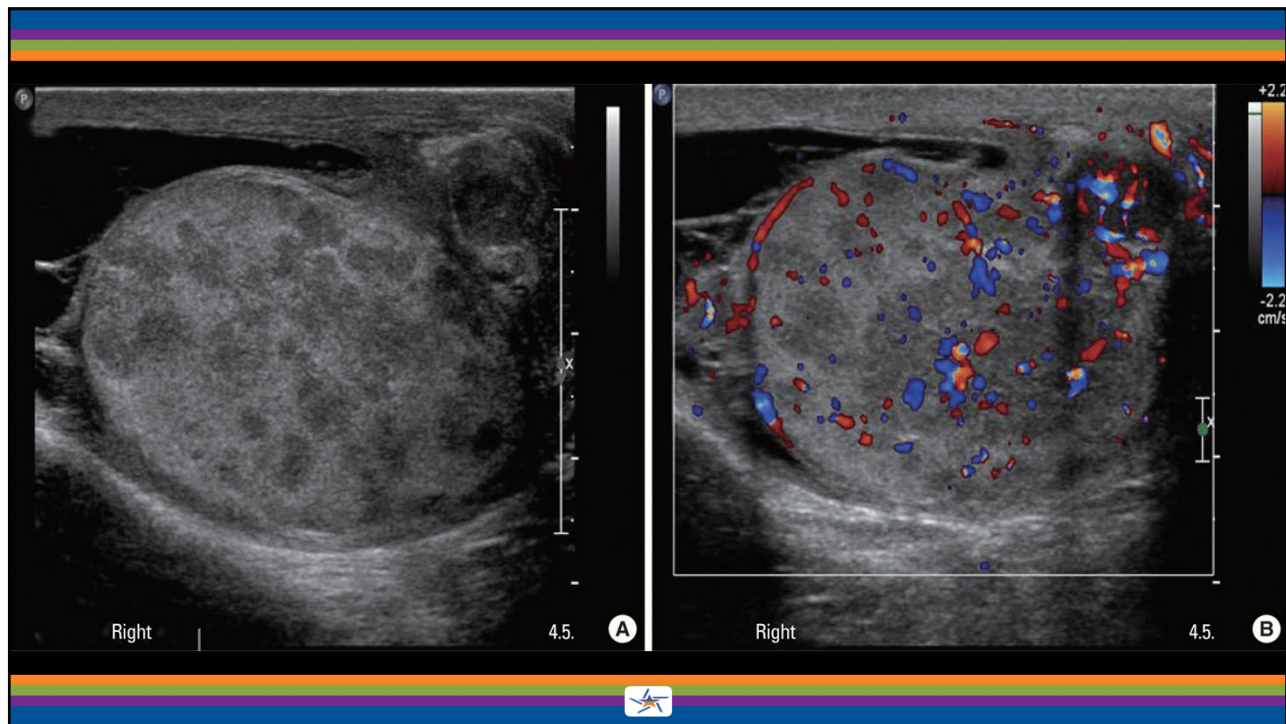
Schaefer G: Female genital tuberculosis. Clin Obstet Gynecol 19:23, 1976)



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Questions ?

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