Diagnosis and Medical Management of TB Infection

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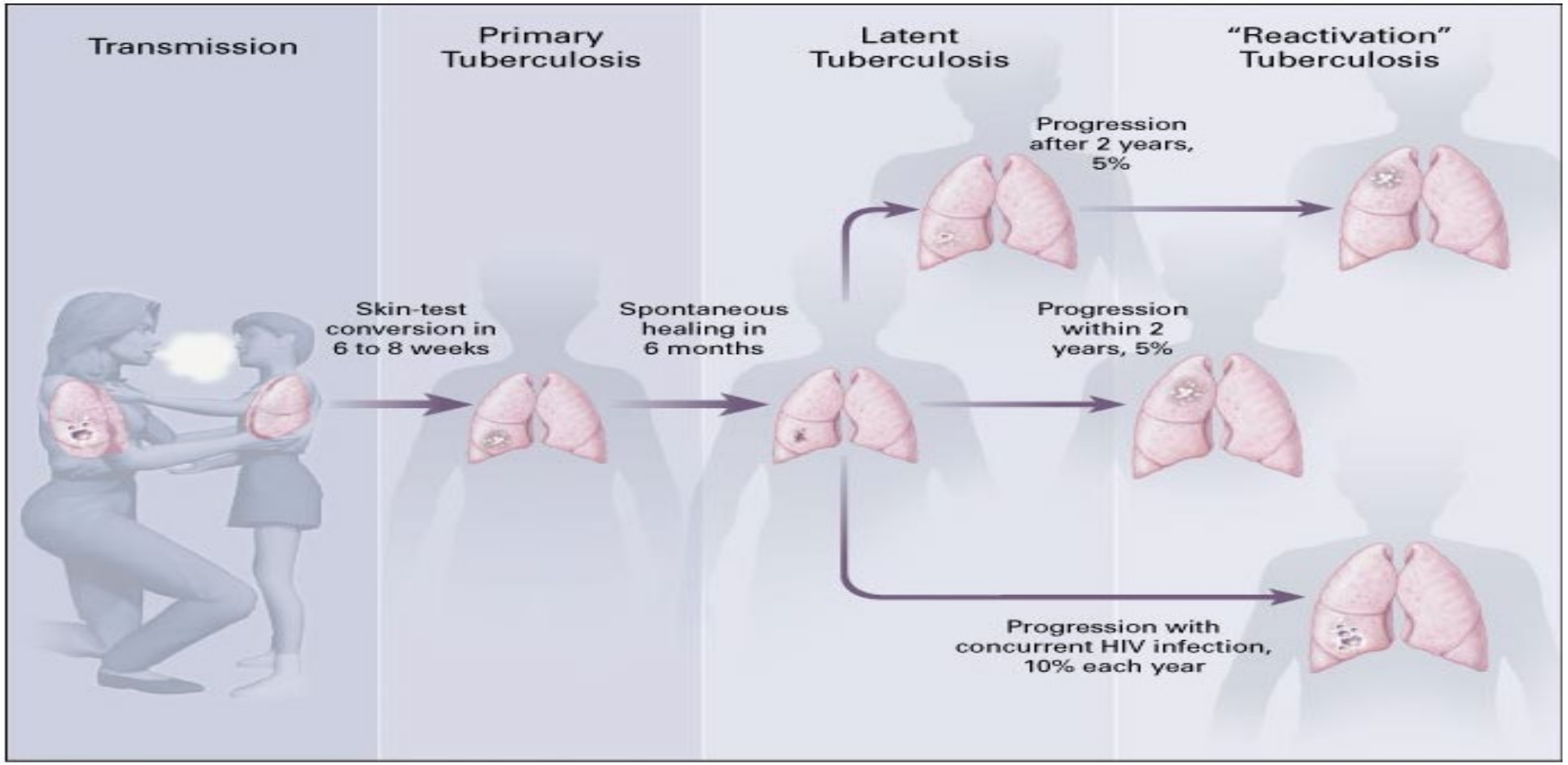
WHAT DOES TB INFECTION MEAN?

TB infection ("latent" TB) occurs when an individual is exposed to another individual with infectious pulmonary tuberculosis and becomes infected themselves with the bacteria.

- The immune system "fights" the bacteria to keep them from multiplying.
- Individual has a positive TST (Tuberculin Skin Test) or IGRA (Interferon Gamma Release Assay).
- Does not feel sick and is not infectious.
- May or may not develop TB disease ("active" TB) in the future.

Transmission of M. tuberculosis



NEJM - Small and Fujiwara 345 (3): 189

TREATING TB INFECTION

- Crucial to preventing progression from infection to disease.
- Interrupt future transmission.

ESSENTIAL to rule out TB disease before treating with a single medication.

EVALUATING CONTACTS

- Close contacts of active pulmonary TB disease have a statistically higher chance of becoming infected with TB bacteria.

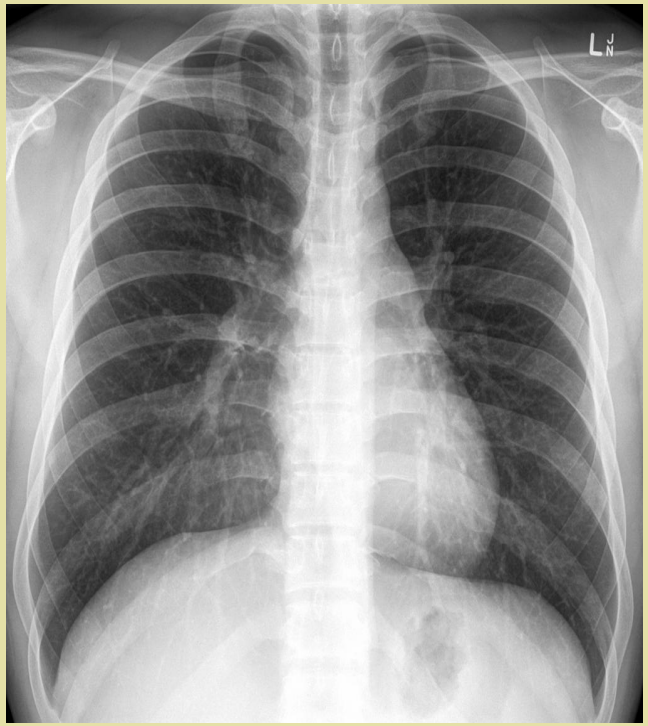
- Examination of these contacts is one of the most important activities for identifying individuals with both TB disease and TB infection.

- <u>Evaluation of contacts include</u>:
  - **History and physical**
    - Make note of any current medical conditions like HIV, diabetes, conditions that are treated with immunosuppressive medications like psoriasis.
    - Any prior TB exposure, testing, or treatment.
    - Symptoms
  - **TST or IGRA**
  - **Chest X-Ray (if indicated)**

ALWAYS RULE OUT ACTIVE TUBERCULOSIS BEFORE TREATING FOR INFECTION!

Asymptomatic

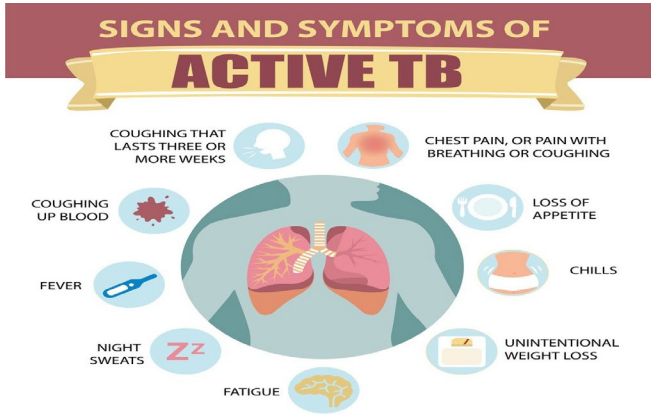
Normal chest x-ray



Cleared medical examination

Sputum

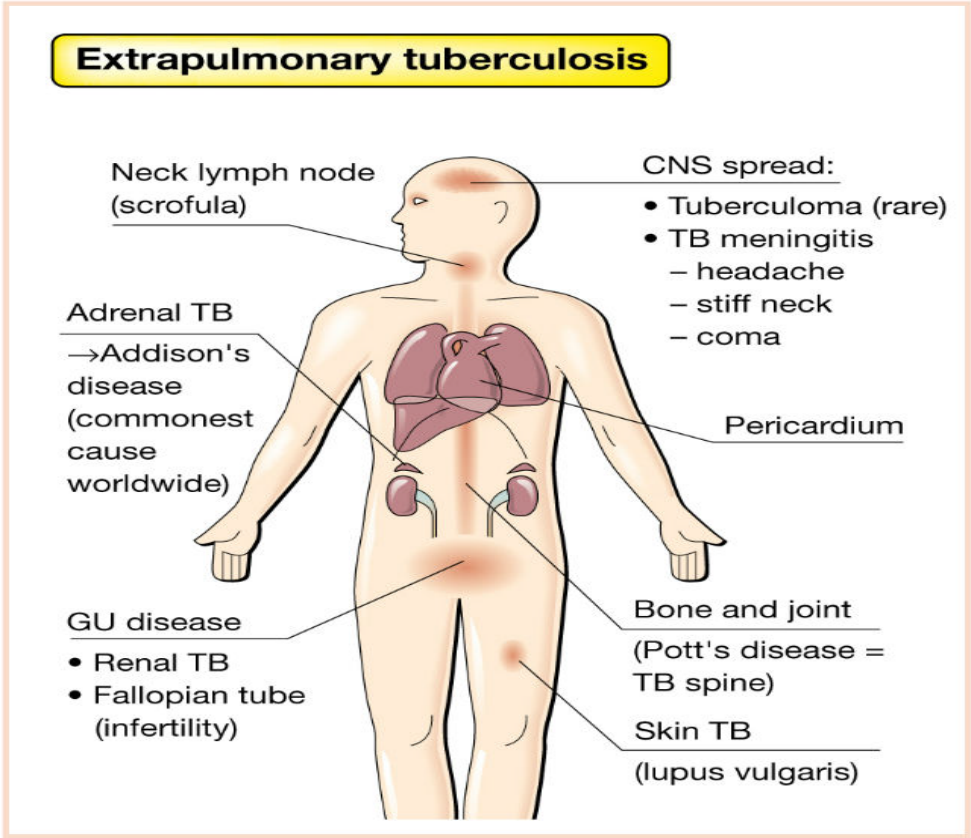
RULING OUT ACTIVE TUBERCULOSIS



SITES OF TB DISEASE

- Lungs are the most common site associated with TB.

- Extrapulmonary:
  - Bones & joints
  - Brain
  - Kidneys
  - Lymph nodes
  - Spine
  - Pericardium



SIGNS & SYMPTOMS OF TUBERCULOSIS

- Pulmonary Symptoms:
  - Cough (can be dry or productive) that is prolonged over at least 3 weeks.
  - Chest pain
  - Hemoptysis

- Systemic Symptoms:
  - Fever
  - Night sweats
  - Unexplained weight loss
  - Loss of appetite
  - Easy fatigue

EXTRAPULMONARY TUBERCULOSIS

- Symptoms depend on the site affected.
- Involves inaccessible sites which means fewer bacteria can cause greater damage.
- Bacteriologic confirmation more challenging.
- Patients have usually went through a large series of tests to get to diagnosis.

MEDICAL HISTORY

Very important component when evaluating for TB infection. A thorough interview with patient can indicate risk factors that may not "stand out" to other providers.

- Any prior TB exposure? TB infection? TB disease? Prior TB treatment?
- Look at demographics: country of birth, age, occupation.
- Current medical diagnosis: HIV, diabetes, cancer, ESRD, immunosuppressive therapy

TESTING FOR TB

- Two commonly used tests:
  - **TST (Tuberculin Skin Test)** – administered as intradermal injection.
    - Applied and then must be read 48-72 hours later.
  - **IGRA (Interferon Gamma Release Assay)** – one-time blood draw
    - Two approved IGRA tests currently in use: TSPOT TB and Quantiferon Gold.

A TST or IGRA can aid in helping differentiate between individuals infected with TB and those individuals that are uninfected.

INTERPRETING THE TST

5 mm is classified as a positive reaction in:

- HIV-positive individuals
- Recent contacts to an individual diagnosed with TB disease.
- Individuals with organ transplants and other individuals who are immunosuppressed.
- Individuals with fibrotic changes on chest imaging consistent with prior TB disease.

INTERPRETING THE TST

10 mm is classified as a positive reaction in:

- Individuals that recently immigrated from a high-prevalence country
- Injection drug users
- Mycobacteriology laboratory personnel
- Children less than 4 years of age
- Residents and employees of high-risk congregate settings (hospitals, jails, LTC facilities for example)
- Individuals with clinical conditions that place them at high risk

INTERPRETING THE TST

15 mm is classified as a positive reaction in:

- In any individual, including people with no known risk factors for TB
  - Targeted skin testing programs should only be conducted among high-risk groups

INTERFERON GAMMA RELEASE ASSAY (IGRA)

- A one-time blood draw compared to the two visits for the TST
- Two approved tests: TSPOT TB and Quantiferon Gold
- Results: positive, negative, borderline (TSPOT), or indeterminate (QFT)
- More sensitive to BCG than a TST

TESTING FOR TB

- Patients who have a positive IGRA or TST should **always** be referred for a CXR.

- If abnormalities are noted on the CXR, or the patient has symptoms consistent with extrapulmonary TB, additional diagnostic tests should be conducted.

CHEST X-RAY

- Chest x-ray (CXR) alone cannot confirm TB disease

- PA (posteroanterior) view is more commonly utilized; may also see AP (anteroposterior) view

- **VERY IMPORTANT** for patient to take as deep a breath as possible when having imaging performed. Poor inspiratory effort can make lung field look “compressed” (abnormal)

CHEST X-RAY

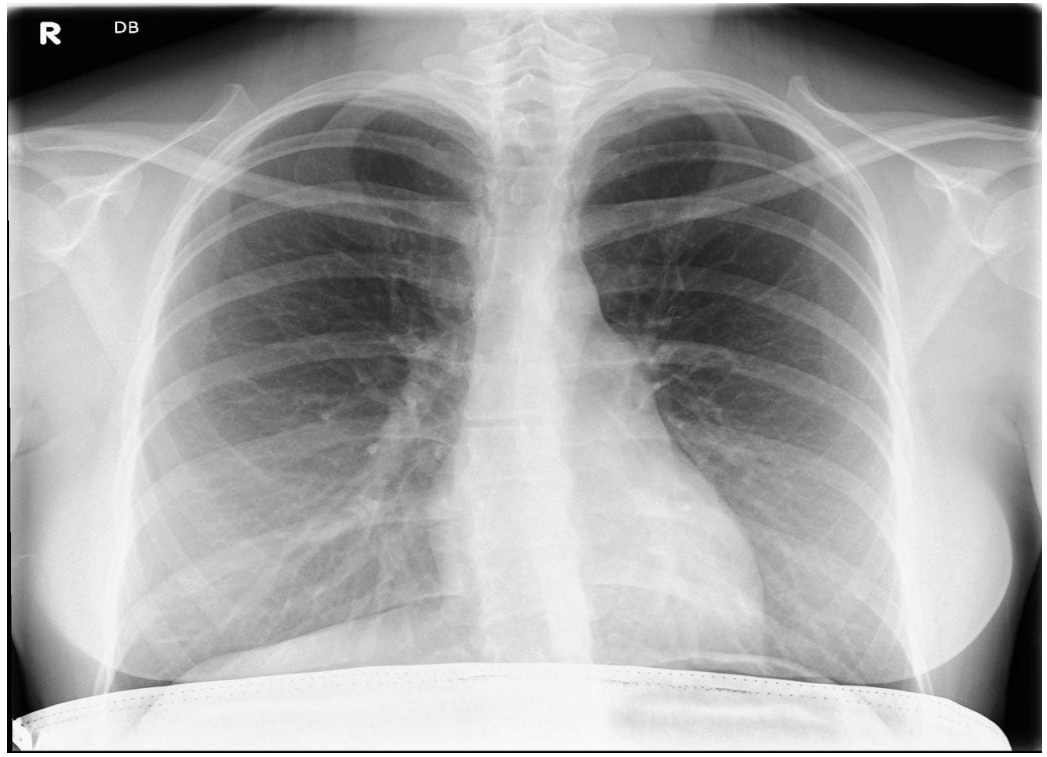
- Cavitary lesions likely to be TB, but not always! Common TB "copycats" include:
  - **NTM (Non-Tuberculous Mycobacterium)**
  - **Fungal infection**
  - **Lung neoplasm**

CHECK THOSE APICES!

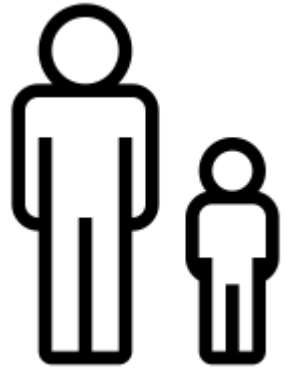
CHEST X-RAY SPECIAL SITUATION

Common question: can a pregnant woman get a CXR?

- Any pregnant woman who is being evaluated for TB disease can, and should, have a CXR performed and can at any trimester (some prefer to wait until after first trimester). Lead shields should be used.



DIFFERENCES IN ADULT AND PEDIATRIC TB



REACTIVATION DISEASE

More consistent with TB disease seen in adults, reactivation disease occurs **years** after initial infection

Often cavitary disease

HIGH number of organisms (AFB+)

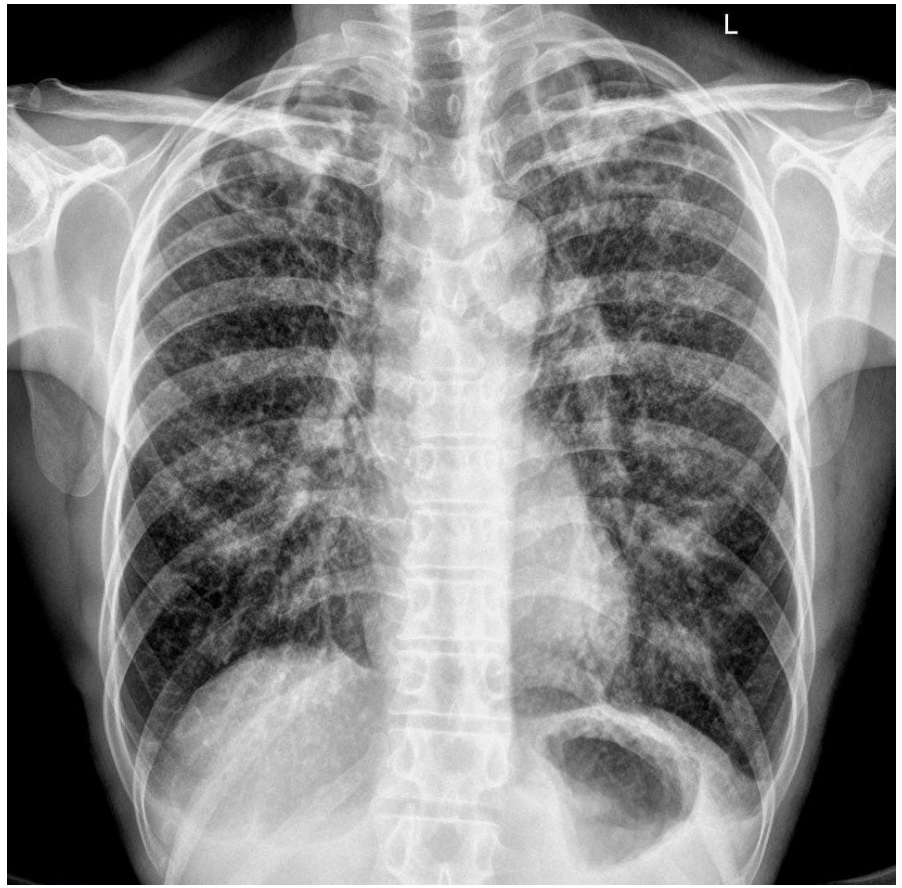
Usually symptomatic (but not always)

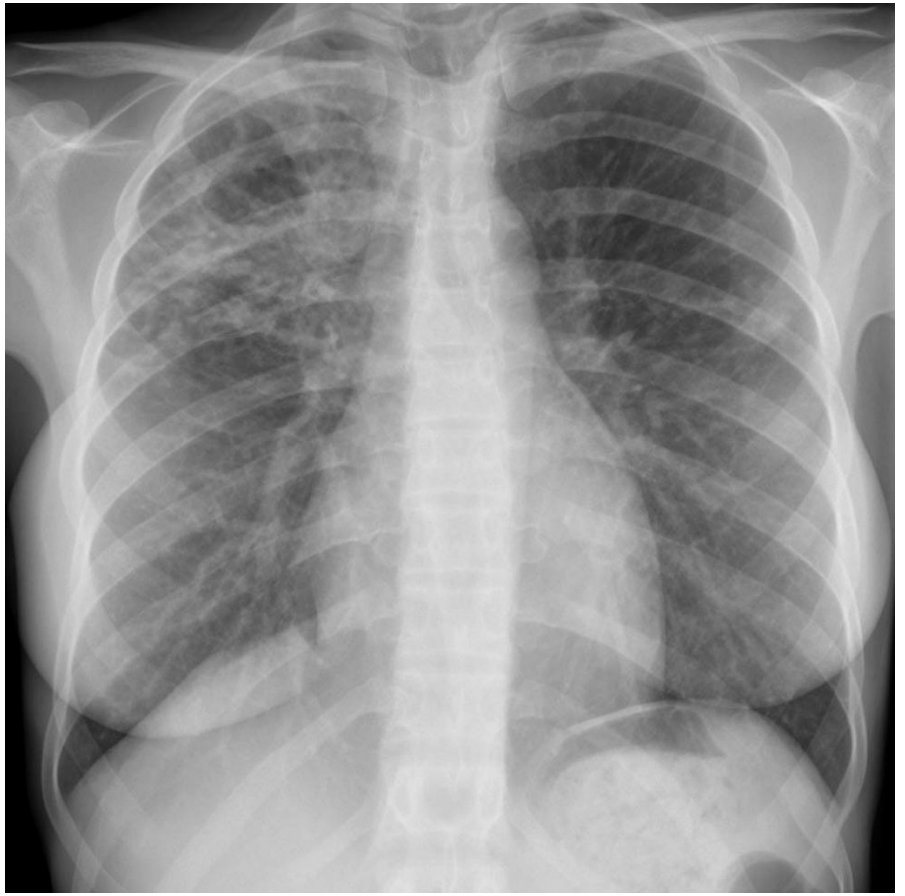
Infectious

PRIMARY DISEASE

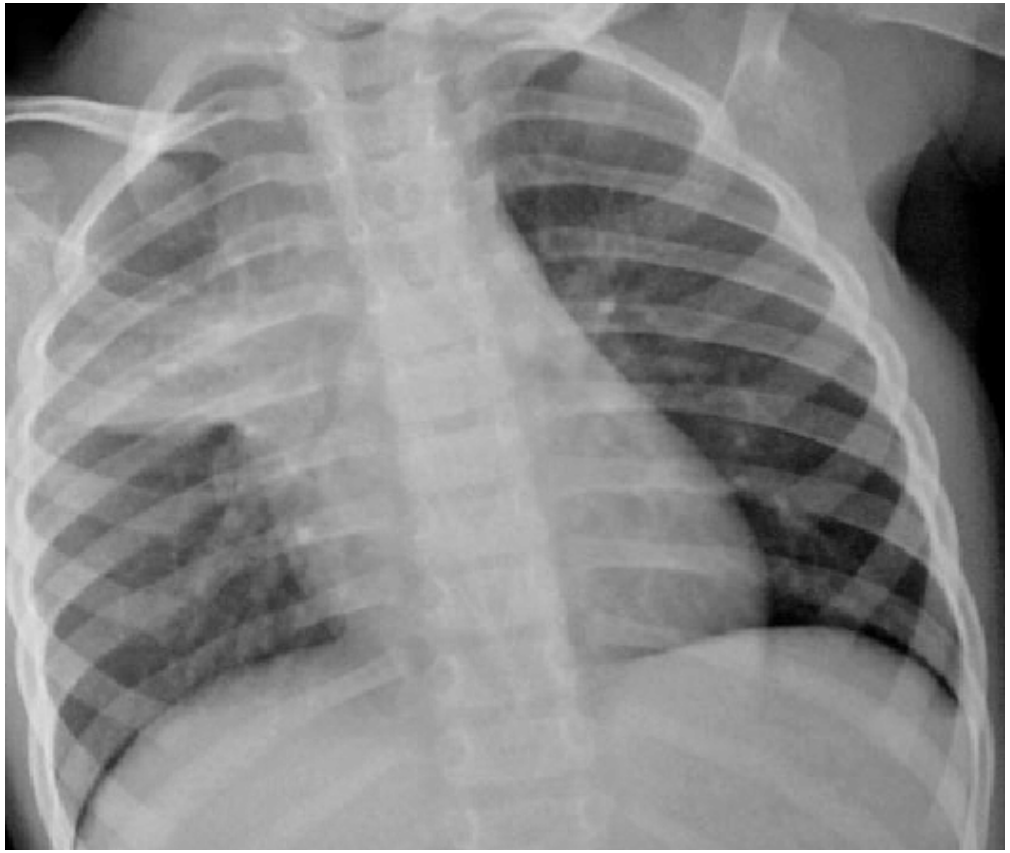
- More commonly seen in childhood TB disease
- Usually not cavitary
- Low number of organisms: AFB smear negative 95% / culture negative 60%
- Often asymptomatic
- Most children under 12 YO are not considered infectious

ADULT CHEST X-RAYS





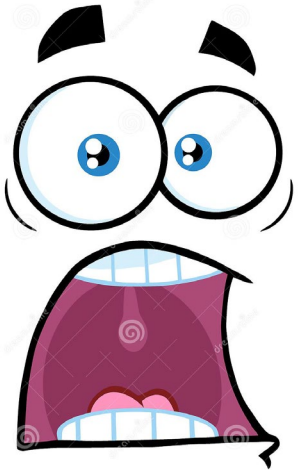
PEDIATRIC CHEST X-RAYS



COMMON SYMPTOMS – PEDIATRIC TB DISEASE

- Lymphadenopathy or lymphadenitis
- Persistent fever (FUO)
- Cough and/or respiratory distress
- Weight loss or failure to thrive
- S/S of meningitis including seizures

Unlike adults, up to 50% of children with TB disease do not have any symptoms



TESTING CONTACTS UNDER 5

- TST or IGRA (2 and older)
- Chest x-ray (2-view preferred)
- Rule out active disease
- Window prophylaxis treatment
  - Treatment given in the period between initial and repeat testing

GUIDELINES FOR PREVENTION AND TREATMENT OF OPPORTUNISTIC INFECTIONS IN HIV-INFECTED ADULTS AND ADOLESCENTS, MMWR 2009

HIV-infected persons, regardless of age, should be treated for LTBI ***if they have no evidence of active TB*** and exhibit the following characteristics:

- a positive diagnostic test for LTBI and no prior history of treatment for active or latent TB (AI);
- a negative diagnostic test for LTBI but are close contacts of persons with infectious pulmonary TB (AII);
- a history of untreated or inadequately treated healed TB (i.e., old fibrotic lesions on chest radiography) regardless of diagnostic tests for LTBI (AII)

TREATMENT FOR TB INFECTION

Latent TB Infection

TREATMENT REGIMENS

Most commonly used regimen is “3HP”; consists of Rifapentine, Isoniazid, and B6.

- Given once weekly for twelve weeks (10 pills)
- Preferred DOT, but some states are doing self-administration (not Arkansas)
- Unlike other regimens, side effects seem more noticeable if occur

TREATMENT REGIMENS

4-month Rifampin (RIF) regimen:

- Taken daily by self-administration
- Must pay close attention to other medications as RIF interacts with almost everything

9-month Isoniazid (INH) regimen:

- Taken daily by self-administration
- Persistence is key! Longer time-frame than other options
- B6 is given with INH to counteract any neuropathy

ANY QUESTIONS??