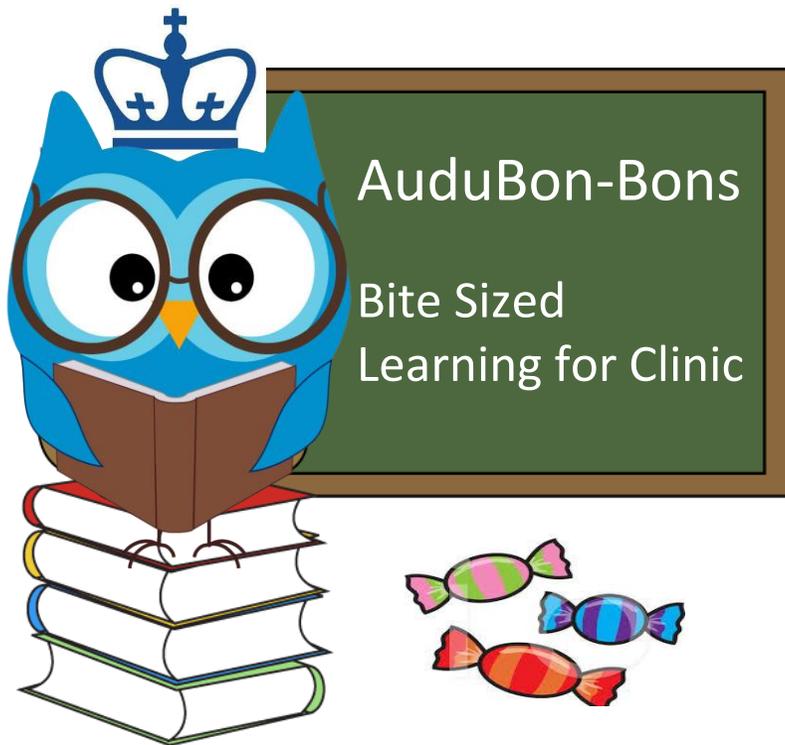


TUBERCULOSIS SCREENING

Week 70

Prepared By: Libby Will, MS4
Rini Banerjee Ratan, MD

Reading Assignment:
Campos-Outcalt, Doug "Screening for tuberculosis: Updated recommendations." *The Journal of Family Practice* 66.12 (2017): 755-757.



LEARNING OBJECTIVES



- To review the pathophysiology of tuberculosis
- To understand the prevalence of tuberculosis in the USA and abroad
- To comprehend which patients at CUIMC should be screened for tuberculosis
- To know the options for tuberculosis screening tests
- To feel comfortable counseling pregnant patients requiring screening for active tuberculosis



CASE VIGNETTE

- Patient is a 30 yo G3 P2 woman at 12+2 weeks EGA who presents to clinic complaining of 1 week of cough, nocturnal sweating, and some loss of appetite.



FOCUSED HISTORY

What elements of this patient's history are most relevant?

- **PMH:** No hx of HIV or malignancy
- **PSH:** CS x 2
- **POBH:** 2 Cesarean deliveries (2015, 2018)
- **PGYNH:** No history abnormal Paps
- **MEDS:** None
- **ALL:** None
- **SOCIAL:** Remote history of IVDU, works as a medical assistant
No recent travel



DIFFERENTIAL DIAGNOSIS

What are diagnoses on the differential?

- Tuberculosis: active or reactivation
- Non-tuberculosis mycobacterial infection
- Fungal infection
- Sarcoidosis
- Lung abscess
- Septic emboli
- Lung cancer
- Lymphoma



A word to the wise: put
on a mask BEFORE
seeing this patient!

PERTINENT PHYSICAL EXAM FINDINGS

What elements of this patient's physical exam are most relevant?

- **General:** **Thin**, anxious appearing woman
- **HEENT:** Mucous membranes moist and pink, **scant dried blood on lips**
- **Pulmonary:** **Decreased fremitus over right superior back, cough productive of blood-streaked sputum**
- **Extremities:** W+WP, 2+ DP pulses bilaterally. No clubbing



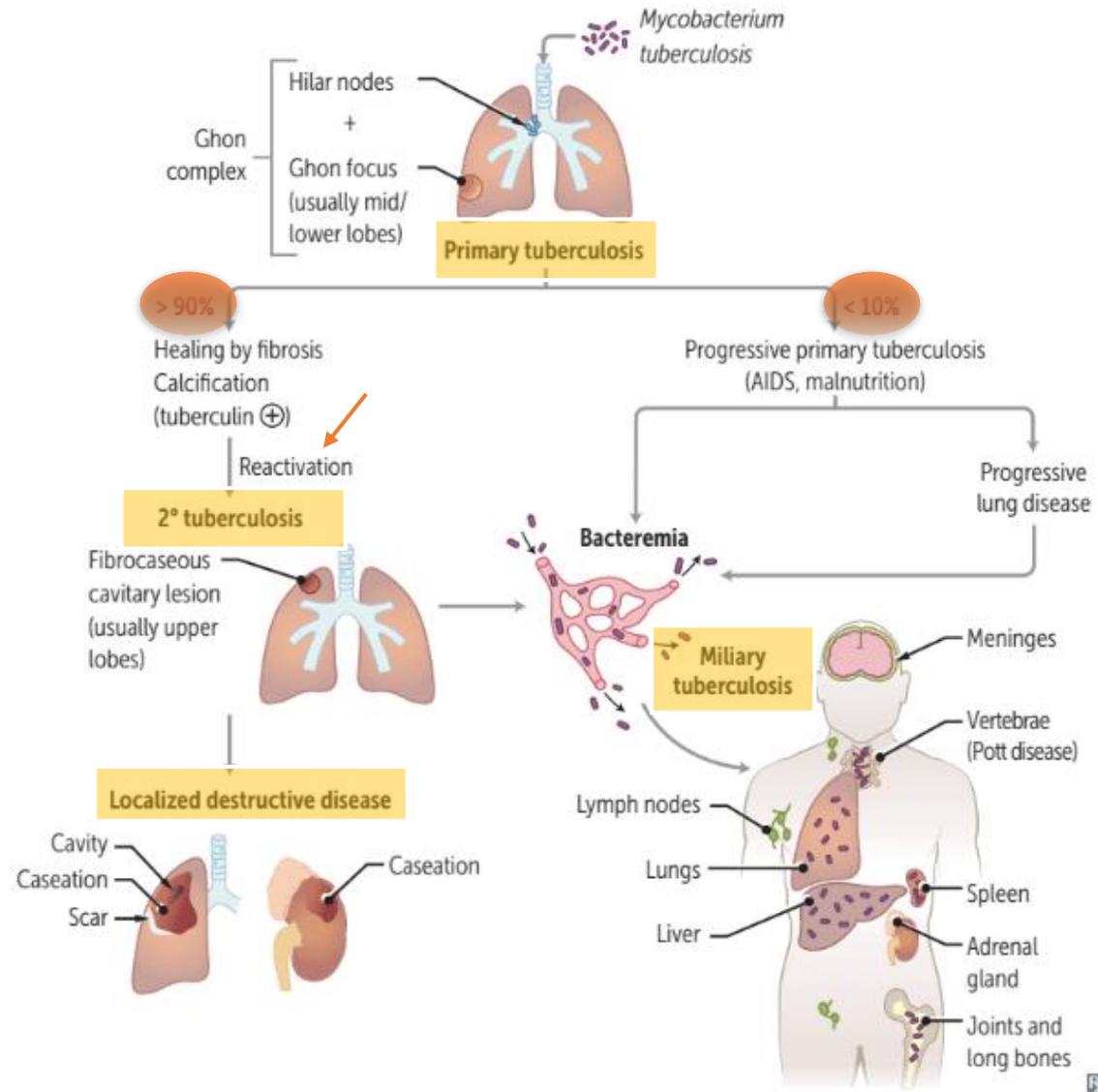
PATHOPHYSIOLOGY OF TB

What is the pathophysiology of TB?

Inhalation of aerosol droplets containing *M. tuberculosis* with subsequent deposition in the lungs leads to one of four possible outcomes:

- **Immediate clearance of the organism**
- **Primary tuberculosis:** immediate onset of active disease, symptomatic, contagious, at risk for vertical transmission
- **Latent infection:** asymptomatic, not contagious, no risk for vertical transmission
- **Reactivation/secondary tuberculosis:** onset of active disease many years following a period of latent infection

Primary and secondary tuberculosis



TB IN THE NEWS

The New York Times

Why Tuberculosis Is Back

Nov. 10, 2015

Los Angeles Times

Modesto high school student diagnosed with tuberculosis
OCT. 8, 2019 | 11:35 AM

The Washington Post

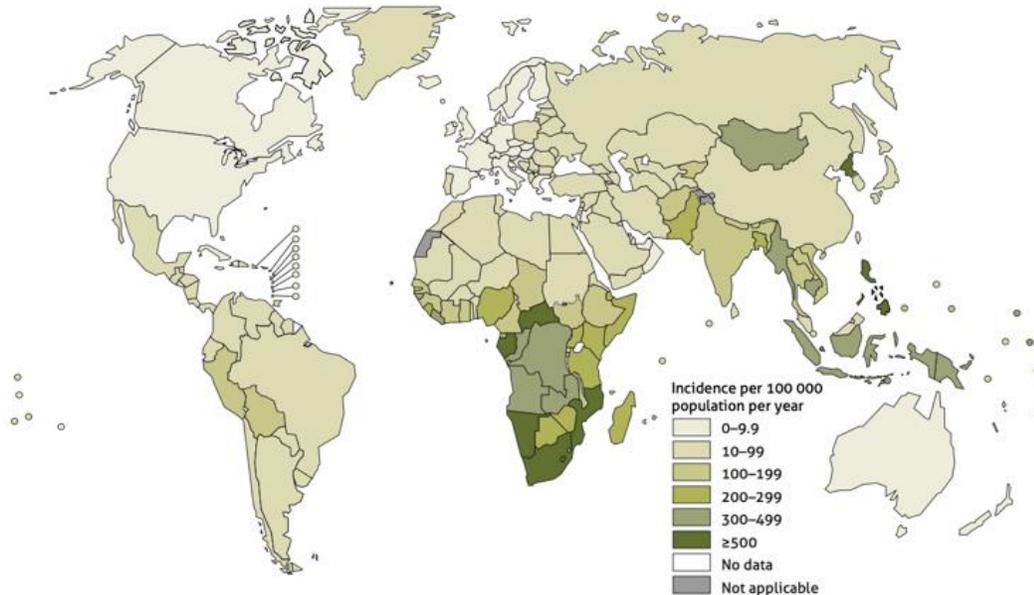
Johns Hopkins Hospital sites evacuated after possible tuberculosis exposure

July 5, 2018 at 5:44 p.m. EDT

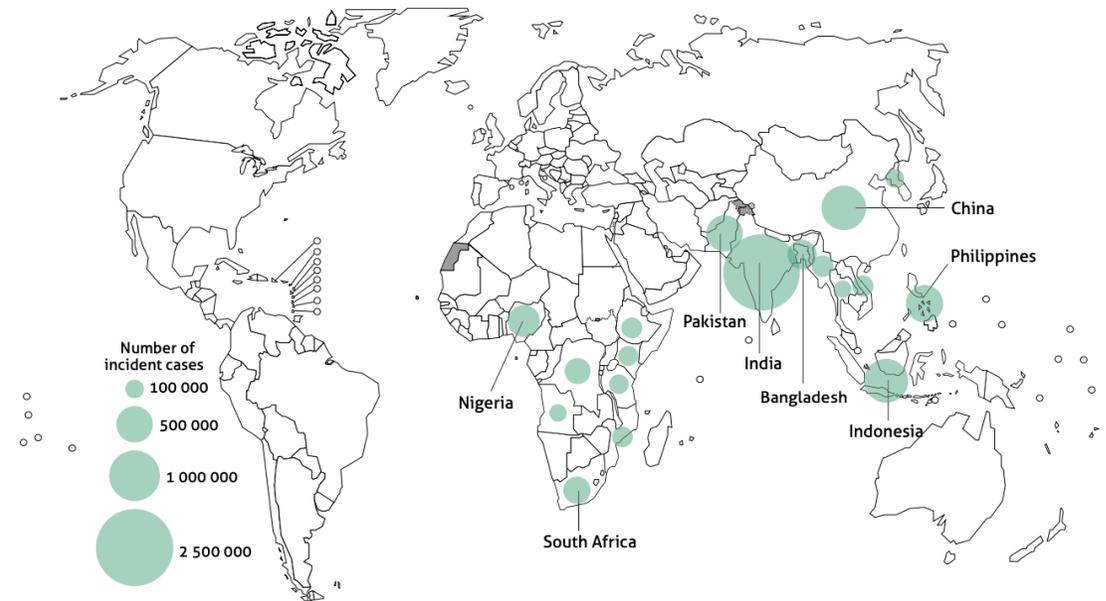
THE IMPACT OF TB WORLDWIDE

- An estimated 10 million people fell ill with TB in 2018¹
- Globally, there were 1.2 million TB deaths among HIV-negative people in 2018¹
- Since 2007, TB has been the leading cause of death from a single infectious agent, ranking above HIV/AIDS¹
- **Prevalence of latent TB worldwide is 23%, and in the US is 5%** ^{2,3}
 - In the US, 2/3 of active TB cases occur among those who are foreign born⁴
 - **Five countries account for more than half of foreign-born cases: Mexico, the Philippines, India, Vietnam, and China**⁴

Estimated TB incidence rates, 2018



Estimated TB incidence in 2018, for countries with at least 100 000 incident cases



EVALUATION

Who should be screened for tuberculosis?

- Those at risk for new infection due to TB exposure
 - Individuals with recent exposure
 - Health care workers
 - Employees and residents of homeless shelters and correctional facilities
- Those with latent tuberculosis who are at increased risk of reactivation (progression to active disease) due to underlying conditions
 - Individuals with latent tuberculosis who are otherwise healthy have an annual risk of 0.1% of developing active TB disease⁵
 - Groups at increased risk of activation: HIV infection, malignancy, individuals from high-incidence countries



All patients at Audubon Clinic should be screened for TB!

There is a PCAP mandate for TB screening among Medicaid enrollees

Screen these individuals for tuberculosis infection⁴⁻⁶

Those at high risk of acquiring latent infection

- Household contacts and others in close contact with an individual who has active tuberculosis
- Mycobacteriology laboratory personnel
- Immigrants from countries with high rates of tuberculosis*
- Residents and staff of high-risk congregate settings (homeless shelters and correctional facilities)
- Populations determined to be at high risk by local or state health departments

Infected individuals at high risk of progressing to active disease

- Patients infected with HIV or another condition that weakens the immune system (eg, silicosis, diabetes mellitus)
- Patients receiving immunosuppressive therapy (including chemotherapy and tumor necrosis factor–alpha inhibitors) and recipients of organ transplants
- Children <5 years
- Those with chest x-ray findings consistent with old tuberculosis
- Users of injectable illicit drugs

Campos-Outcalt, D. "Screening for tuberculosis: Updated recommendations." *The Journal of family practice* 66.12 (2017): 755-757.

EVALUATION

What are your options for tests used to screen for tuberculosis?

Two major types of tests for identification of tuberculosis infection (both evaluate cell-mediated immunity);

- **Tuberculin skin test (TST)**
 - Higher false-positive rate
 - Requires ~15 extra minutes of nursing/tech time (compared to IGRA)⁶
 - Cost ~\$18.70/test⁶
- **Interferon-gamma release assay (IGRA) blood test (QuantiFERON-TB Gold Tube test and T-SPOT TB test)**
 - More time-efficient⁶
 - Preferable for those who received BCG vaccination
 - Cost ~\$41.97/test⁶



A positive test indicates only that the person has been infected with *M. tuberculosis* – does not provide insight into whether the disease is active or latent

EVALUATION FOR LATENT TB

Official American Thoracic Society/Infectious Diseases Society of America/Centers for Disease Control and Prevention Clinical Practice Guidelines: Diagnosis of Tuberculosis in Adults and Children (2017)



- For individuals with low risk for tuberculosis infection and disease progression should not be tested. If diagnostic testing is required (medical, legal), an initial positive test result with IGRA or TST warrants confirmatory testing with the alternative test, and the person should be considered to have latent TB only if both tests are positive
- For individuals with low-to-intermediate risk of progression to active disease, **the IGRA is preferred** over TST for diagnosis of latent tuberculosis
- For individuals with high risk of progression to active disease, either the IGRA or TSST may be used

JAMA | US Preventive Services Task Force | **RECOMMENDATION STATEMENT**

Screening for Latent Tuberculosis Infection in Adults (2016)
US Preventive Services Task Force Recommendation Statement

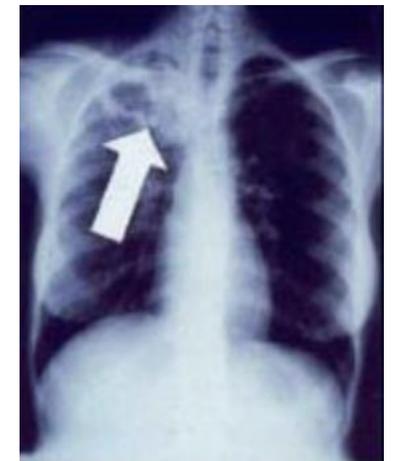


- **Screen for latent tuberculosis in populations at increased risk**
- No evidence on optimal frequency of screening intervals. Could range from **1-time only** screening among persons who are at low risk for future tuberculosis exposure to **annual** screening among those who are at continued risk of exposure

EVALUATION FOR ACTIVE TB

You obtain an interferon-gamma release assay blood test for the patient, and it is positive. What do you do now?

- All individuals with a positive test for TB infection (with either TST or IFN- γ assay) warrant evaluation to **exclude active TB** prior to initiation of treatment for latent TB
 - To minimize the risk of drug resistance associated with inadvertent monotherapy of active TB
- To evaluate for **active TB**: clinical history, chest radiograph
 - **Clinical history**: positive with cough >2 weeks' duration, fevers, night sweats, weight loss
 - **Chest radiograph**: positive with abnormal findings (parenchymal abnormalities, particularly opacification of the upper lobe or superior segment of the lower lobe)



EVALUATION FOR ACTIVE TB – CHEST X-RAY

The patient is reluctant to get a chest radiograph because she is worried about the exposure to the fetus. How do you respond?

- **What is the radiation exposure for a chest X-Ray?**
 - 0.1 mSv (comparable to natural background radiation for 10 days)
- **What is the acceptable amount of radiation exposure in pregnancy?**
 - Fetal risk of anomalies, growth restriction, or abortion have not been reported with radiation exposure of less than 50 mSv (a level above the range of exposure for diagnostic procedures)⁷



ACOG COMMITTEE OPINION Number 723 • October 2017
Guidelines for Diagnostic Imaging During Pregnancy and Lactation



Take home point: the consequence of missing active TB is major as compared to the minimal risk of chest x-ray in pregnancy

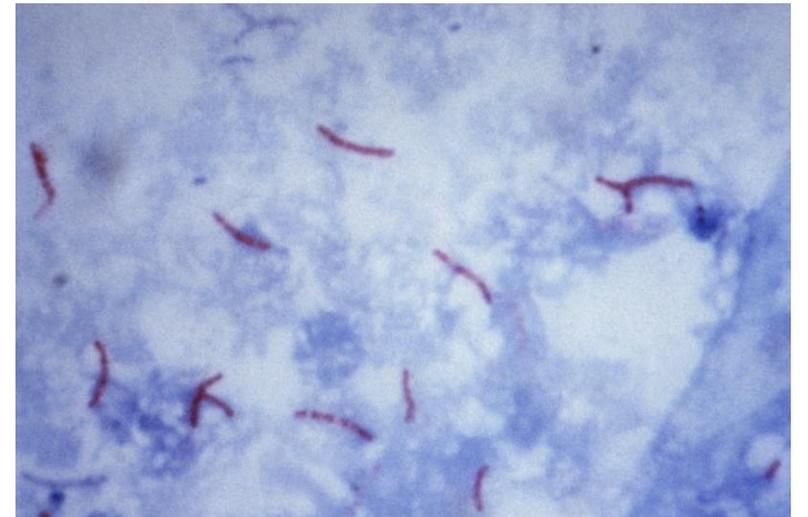
EVALUATION FOR ACTIVE TB

You obtain a chest X-ray for the patient, and it shows opacification of the right upper lobe. What do you do now?

Obtain three **sputum samples** via cough or induction at least eight hours apart, including at least one early-morning specimen for acid-fast bacilli smear, mycobacterial culture, and nucleic acid amplification testing



Diagnosis of active TB should prompt evaluation for HIV infection



TREATMENT OF TB IN PREGNANCY

The sputum cultures come back positive for *M. tuberculosis*. The patient expresses concern about taking medications during her pregnancy. What do you do?

- Pregnant women who are diagnosed with active TB should start treatment as soon as TB is detected. Untreated active TB represents a greater hazard to the mother and fetus than anti-tuberculosis therapy⁸
- **Latent TB infection:** isoniazid daily or twice weekly for 9 months with pyridoxine (vitamin B6) supplementation
- **Active TB disease:** initial regimen of isoniazid, rifampin, ethambutol daily for 2 months, followed by isoniazid and rifampin daily or twice weekly for 7 months, for a total of 9 months of treatment



TB IN PREGNANCY - COUNSELING

- Pregnancy has not been shown to influence the pathogenesis of TB or the likelihood of progression from latent infection to active disease, nor has it been shown to affect the response to treatment
- Mothers with active pulmonary TB can transmit infection to their infants
 - Women with known or suspected active TB at the time of delivery should be separated from the infant until both have been evaluated



FUTURE ADVANCES?

SCIENCE TRANSLATIONAL MEDICINE | RESEARCH ARTICLE

TUBERCULOSIS

Urine lipoarabinomannan glycan in HIV-negative patients with pulmonary tuberculosis correlates with disease severity

December 13, 2017

A sensitive and specific urine test for active pulmonary tuberculosis

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Final Analysis of a Trial of M72/AS01_E Vaccine to Prevent Tuberculosis

October 29, 2019

Conclusions: Among adults infected with M. tuberculosis, vaccination with M72/AS01E elicited an immune response and provided protection against progression to active tuberculosis for at least 3 years.

Superior to BCG? Larger studies needed before roll-out.

TAKE HOME POINTS

- TB appears in one of 2 forms: active disease (symptoms, morbidity, mortality, infectious) and latent infection (asymptomatic, noninfectious)
- Screen those at high risk of acquiring latent infection or infected individuals at high risk of progressing to active disease – this includes all patients at Audubon Clinic
- Screen with one of two tests: the TB skin test or the interferon-gamma release assay
- With positive screening test, evaluate for active disease with clinical history and chest X-ray
 - Counsel pregnant women appropriately
 - With positive chest X-ray, obtain three sputum samples to definitively diagnose active TB



CODING/BILLING

- **Z11.1:** Encounter for screening for respiratory tuberculosis



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