

Latent TB, TB and the Role of the Health Department

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March 21, 2018

Elaine Darnall has disclosed that there is no actual or potential conflict of interest in regards to this presentation. The planners, editors, faculty and reviewers of this activity have no relevant financial relationships to disclose. This presentation was created without any commercial support.

Learning Objectives

- Summarize diagnosis and treatment of LTBI
- Illustrate diagnosis and treatment of active TB disease
- Summarize the role of the health department in TB care
- To obtain credit you must:
 - Be present for the entire session, complete and return an evaluation form
 - Certificate will be sent to you by e-mail upon request

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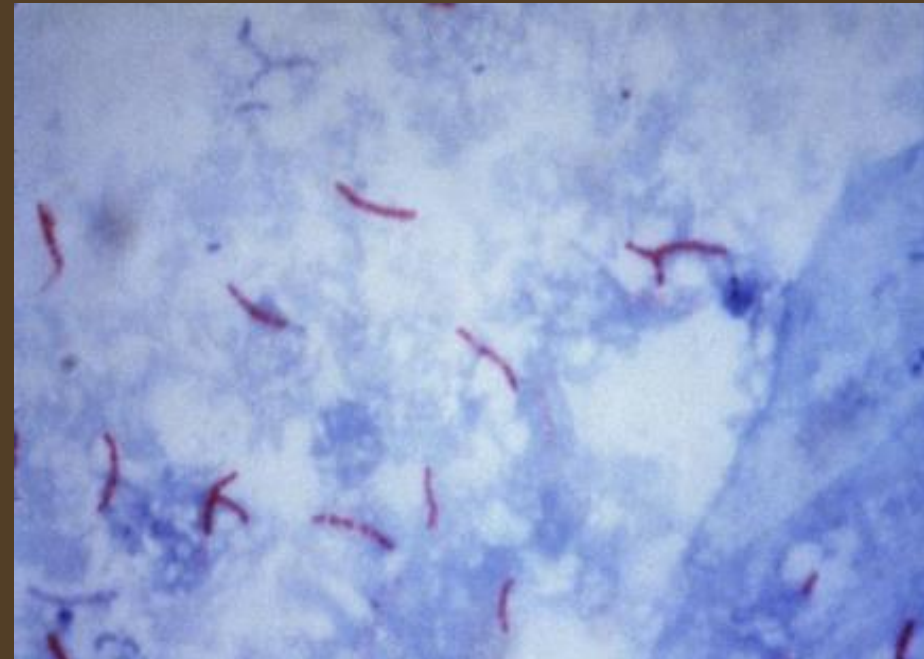
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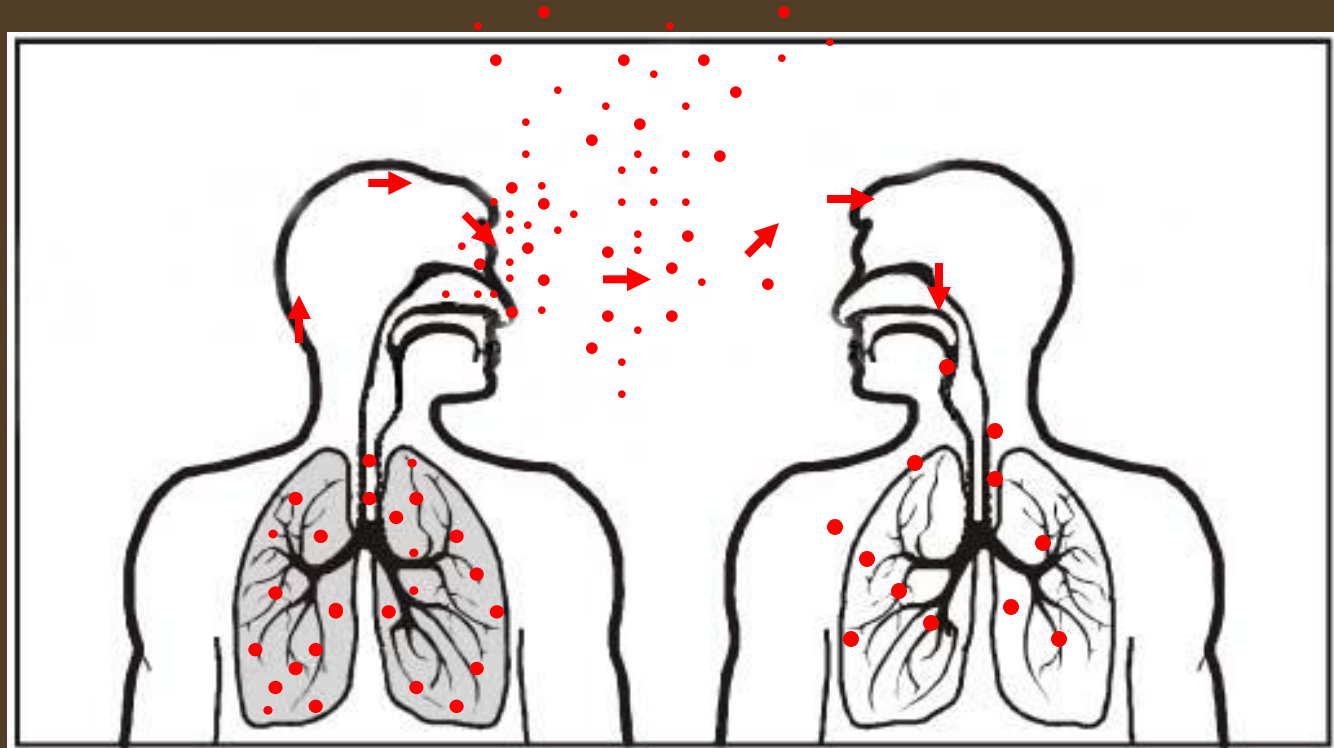
Tuberculosis

- Caused by a bacteria of the family Mycobacteria
- Mycobacteria species that cause TB:
 - *M. tuberculosis*
 - *M. bovis*
 - *M. africanum*
 - *M. microti*
 - *M. canetti*
 - *M. caprae*
 - *M. pinnipedii*
 - *M. mungi*
- ✓ ***M. Tuberculosis causes the most TB cases in the U.S.***
- Mycobacteria that do not cause TB
 - e.g., *M. avium complex*, *m. gordonae*, *m. kansasii*



M. tuberculosis, a slightly curved or straight rod

TB Transmission



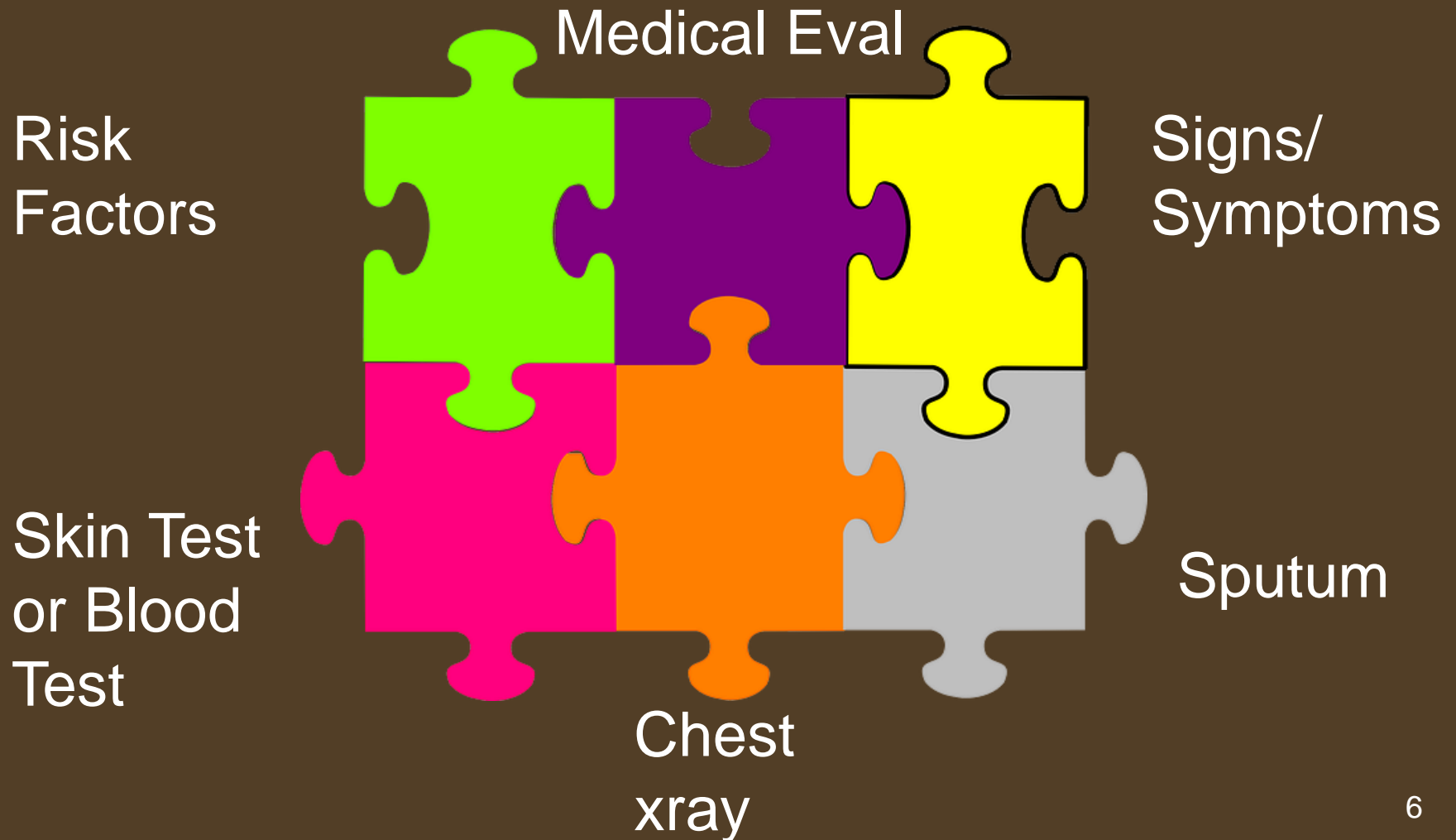
Dots in air represent droplet nuclei containing
M. tuberculosis

Table 1. The Difference Between Latent Tuberculosis Infection and Tuberculosis Disease

A Person with Latent Tuberculosis Infection . . .	A Person with Tuberculosis Disease . . .
<ul style="list-style-type: none">• has no symptoms	<ul style="list-style-type: none">• has symptoms that may include<ul style="list-style-type: none">○ a bad cough lasting 3 weeks or longer○ pain in the chest○ coughing up blood or sputum○ weakness or fatigue○ weight loss○ no appetite○ chills○ fever○ sweating at night
<ul style="list-style-type: none">• does not feel sick	<ul style="list-style-type: none">• usually feels sick
<ul style="list-style-type: none">• cannot spread tuberculosis bacteria to others	<ul style="list-style-type: none">• may spread tuberculosis bacteria to others
<ul style="list-style-type: none">• usually has a skin test or blood test result indicating tuberculosis infection	<ul style="list-style-type: none">• usually has a skin test or blood test result indicating tuberculosis infection
<ul style="list-style-type: none">• has a normal chest radiograph and a negative sputum smear	<ul style="list-style-type: none">• may have an abnormal chest radiograph, or positive sputum smear or culture
<ul style="list-style-type: none">• needs treatment for latent tuberculosis infection to prevent tuberculosis disease	<ul style="list-style-type: none">• needs treatment to treat tuberculosis disease

TB Diagnosis...

is like putting the pieces of a puzzle together



Risk Factors: Recently Infected

- Close contacts of a person with infectious TB disease
- Persons who have immigrated from areas of the world with high rates of TB
- Children less than 5 years of age who have a positive TB test
- Groups with high rates of TB transmission, such as homeless persons, injection drug users, and persons with HIV infection
- Persons who work or reside with people who are at high risk for TB in facilities or institutions such as hospitals, homeless shelters, correctional facilities, nursing homes, and residential homes for those with HIV

Risk Factors: Medical Conditions

- Babies and young children
- HIV infection
- Substance abuse
- Silicosis
- Diabetes mellitus
- Severe kidney disease
- Low body weight
- Organ transplants
- Head and neck cancer
- Medical treatments: corticosteroids or organ transplant
- Specialized treatment for rheumatoid arthritis or Crohn's disease

Signs/Symptoms

Adult / Adolescent

- Cough > 3 weeks
- Loss of appetite/wt loss
- Night sweats
- Bloody sputum
- Hoarseness
- Fever
- Chills
- Fatigue
- Chest pain



Child

Majority have NO symptoms

- Fever
- Feelings of sickness or weakness, lethargy, and/or reduced playfulness;
- Weight loss or failure to thrive;
- Night sweats
- Cough
- Swollen glands



Screening Tests: TST or IGRA?



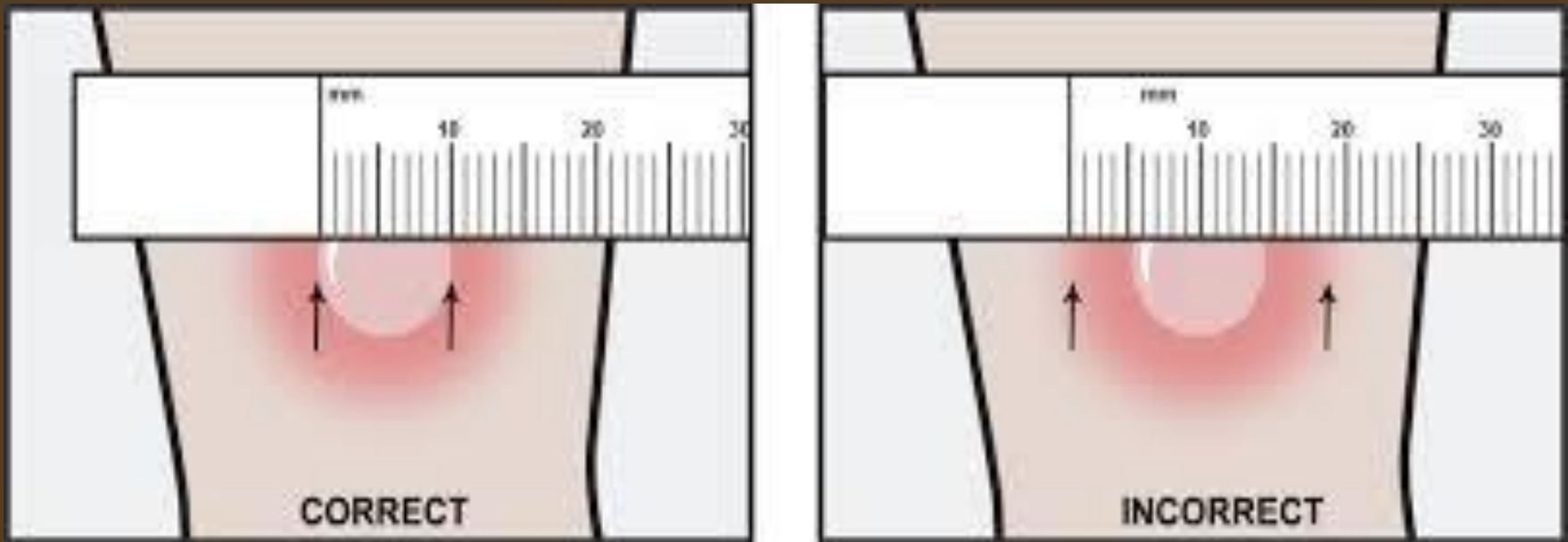
Quantiferon TB Gold, TSpot
and Gold In-Tube are IGRAs
– Interferon Gamma
Release Assays



Tuberculin Skin Test (TST)

- Each measures different aspects of immune response.
- Each uses different antigens and interpretation criteria.

TSTs



- Read 48-72 hours after injection
- Only measure induration, not erythema
- Record reaction in millimeters

5 mm Induration is Significant In:

- Recent close contacts
- Persons with abnormal cxr consistent with prior TB
- Persons who are immunosuppressed due to HIV infection, organ transplant, long term steroid use, etc.



The size of the swelling is used to determine if the TST is positive or negative.

**Source: CDC,
Gabrielle Beninson**

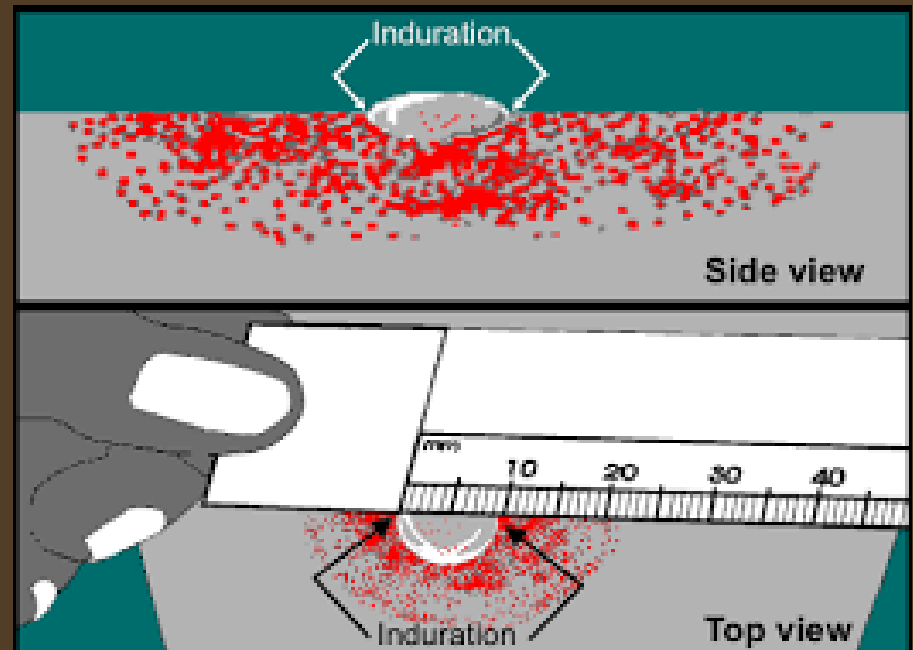
10 mm Induration Significant In:

- Persons with medical risk factors
- Children ≤ 4 yrs of age
- Recent immigrants (5 years) from high prevalence countries
- Injection drug users
- Residents and employees of high risk congregate settings (i.e. nursing homes, prisons)



15 mm Induration Significant In:

- Persons with no risk factors for TB
- *Usually shouldn't be tested unless as part of baseline assessment for those at risk due to jobs in high risk settings*
 - bus drivers
 - teachers
 - most students



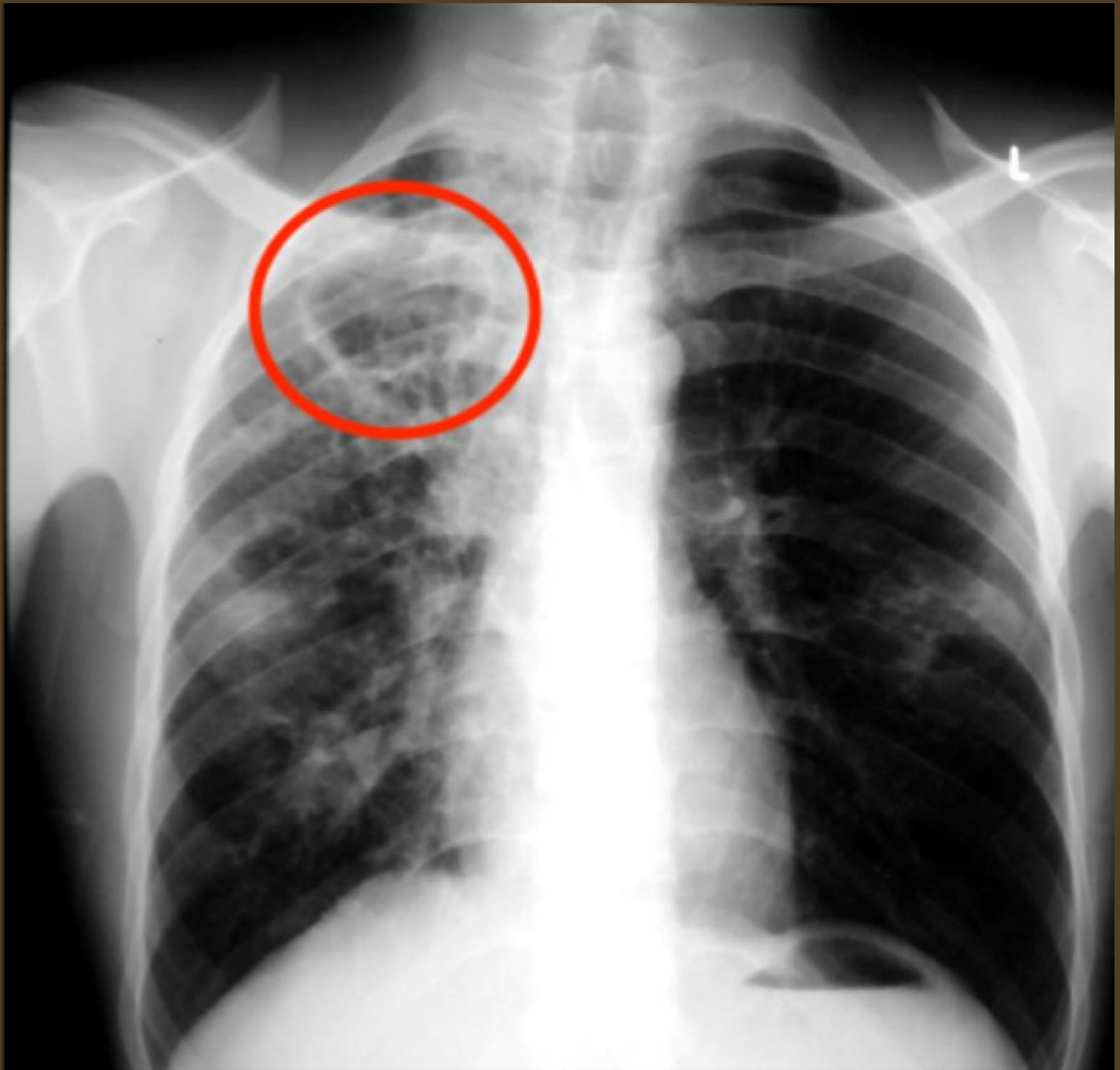
Interferon Gamma Release Assays (IGRAs)

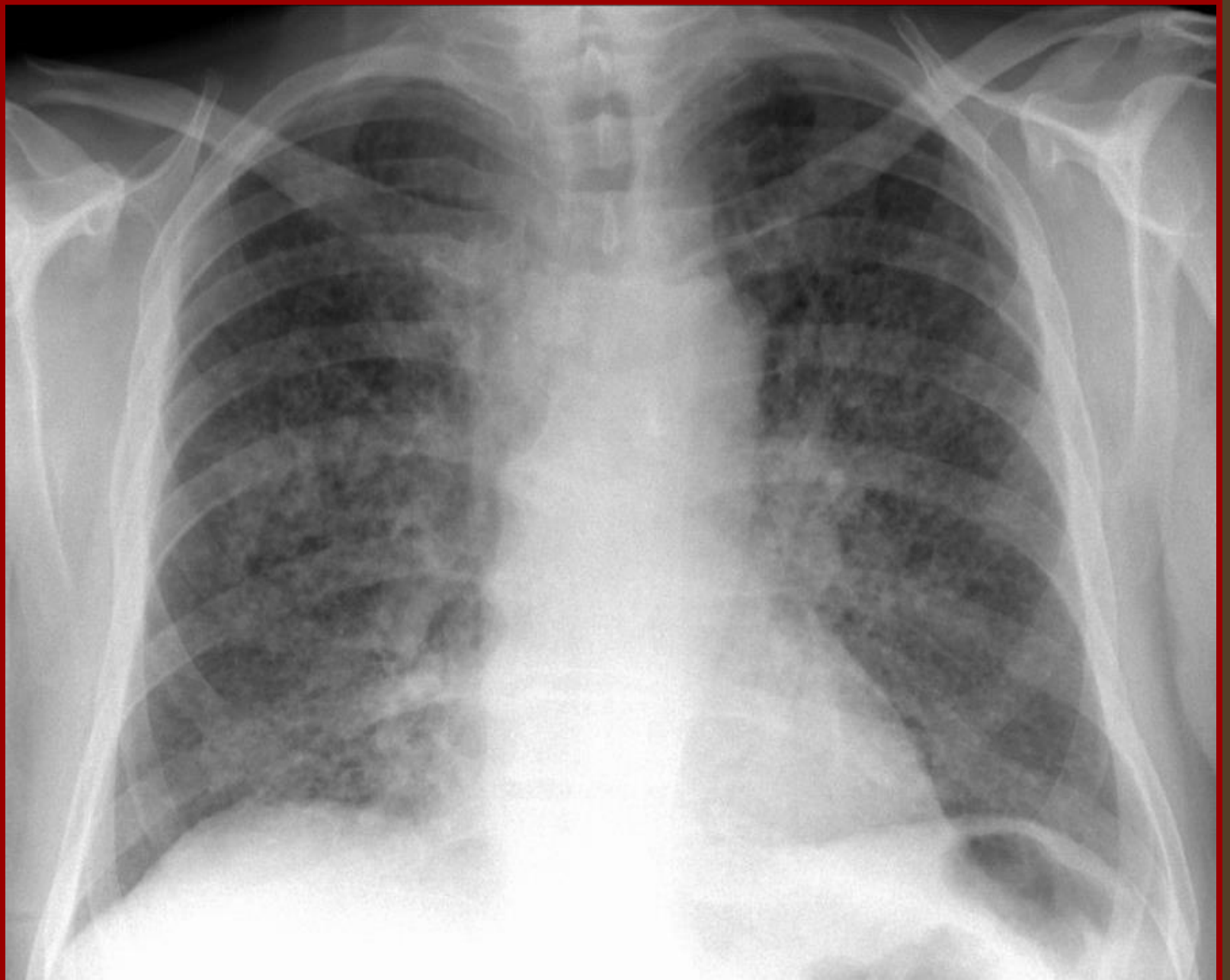
- QFT- Detect sensitization to *M. tb* by measuring IFN- γ release in response to antigens representing *M. tuberculosis*
- T-Spot- measures individual T cells that produce interferon gamma
- FDA Approved tests:
 - Tspot (Elispot)
 - QuantiFERON-TB Gold (QFT-G)
 - QuantiFERON-TB Gold In-Tube (QFT_GIT)
 - QuantiFERON-TB Gold Plus



Chest Radiography

- Upper lobe infiltrates- patchy or nodular
- Cavitation
- Effusion
- Children get 2 views: PA and Lat





Miliary TB (AIDS)

Medical Evaluation

- Anyone with a positive test for TB infection, symptoms of TB, or a history of contact with a person with infectious TB disease should undergo a medical evaluation.
- Medical evaluations for TB disease include a chest x-ray and physical examination to exclude TB disease, and must be done before beginning treatment for latent TB infection.

Sputum

- 3 sputa collected at least 8 hours apart with one being an early AM specimen
- Smear, PCR, Culture, Drug Susceptibilities
- Gastric Aspirates for children
- Please send one specimen to IDPH Lab



Medical Evaluation

- Medical History- symptoms and how long, past exposure to TB, past diagnosis of TB infection or disease, past treatment,
- Country of origin, age, ethnicity, occupation, race
- Underlying medical conditions
- Physical Exam

Symptoms of Pulmonary and Extrapulmonary TB Disease

Symptoms of Pulmonary TB Disease (TB disease usually causes one or more of the symptoms)	Symptoms of Possible Extrapulmonary TB Disease (Depends on the part of the body that is affected by the disease)
<ul style="list-style-type: none">• Cough (especially if lasting for 3 weeks or longer) with or without sputum production• Coughing up blood (hemoptysis)• Chest pain• Loss of appetite• Unexplained weight loss• Night sweats• Fever• Fatigue	<ul style="list-style-type: none">• TB of the kidney may cause blood in the urine• TB meningitis may cause headache or confusion• TB of the spine may cause back pain• TB of the larynx can cause hoarseness• Loss of appetite• Unexplained weight loss• Night sweats• Fever• Fatigue

TB Infection (without disease)

- Diagnostic Criteria: positive TST or IGRA is a suspected case of TB infection
- Clinical Criteria:
 - No evidence of active TB
 - No signs/symptoms of TB
 - CXR without abnormality consistent with TB
OR
 - CXR abnormality not consistent with TB or TB ruled out

Treatment

- Directly Observed Therapy (DOT)
- TB Infection is ideally given by DOT but realistically, self-administered except for 3HP
- TB Disease standard of care is DOT by a trained health care professional, usually the local TB control authority

Rifampin

- Bactericidal
- Inhibits protein synthesis
- Sterilizing activity against semi-dormant bacteria



Isoniazid

- Bactericidal, especially in rapidly dividing cells
- Affects cell wall synthesis



Pyrazinamide

- Bactericidal for semi-dormant bacteria
- Potent sterilizing ability within acidic environment of areas of acute inflammation, suppuration (pus)



Ethambutol

- Bacteriostatic inhibitor of cell wall synthesis
- Bactericidal only at the high end of the dosing range.
- At doses used over long periods of time, protects against further development of resistance
- Readily absorbed



Treatment

TB Infection

- INH 9 mos
- RIF 4 mos
- 3HP once a week x 12 wks
- Possible:
INH and RIFx3-4 mos
RIPE for 2 months

TB Disease

- RIPE for 2 months, followed by
- IR for an additional 4 months
- Cavitory disease is followed by 7 months of IR

LTBI in Pregnancy

- Evaluate patients at risk of progression during pregnancy with TST
- Asymptomatic TST positive women should have CXR after first trimester
- Symptomatic women should have immediate CXR to exclude active disease even in first trimester
- “Women should be counseled that x-ray exposure from a single diagnostic procedure does not result in harmful fetal effects. Specifically, exposure to less than 5 rad has not been associated with an increase in fetal anomalies or pregnancy loss.”

Role of the Health Department

- Identify active cases and provide case management
- Directly Observed Therapy (DOT)
- Identify, evaluate and treat contacts of cases/high risk persons
- Epidemiologic surveillance
- Education and public awareness