TST Practicum

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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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- No conflict of interests
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Targeted Tuberculin Skin Test

HEARTLAND
NATIONAL TB CENTER
THE UNIVERSITY OF TEXAS AT TYLER HEALTH SCIENCE CENTER

Salma Lerma MSN, RN has the following disclosures to make:

- No conflicts of interest
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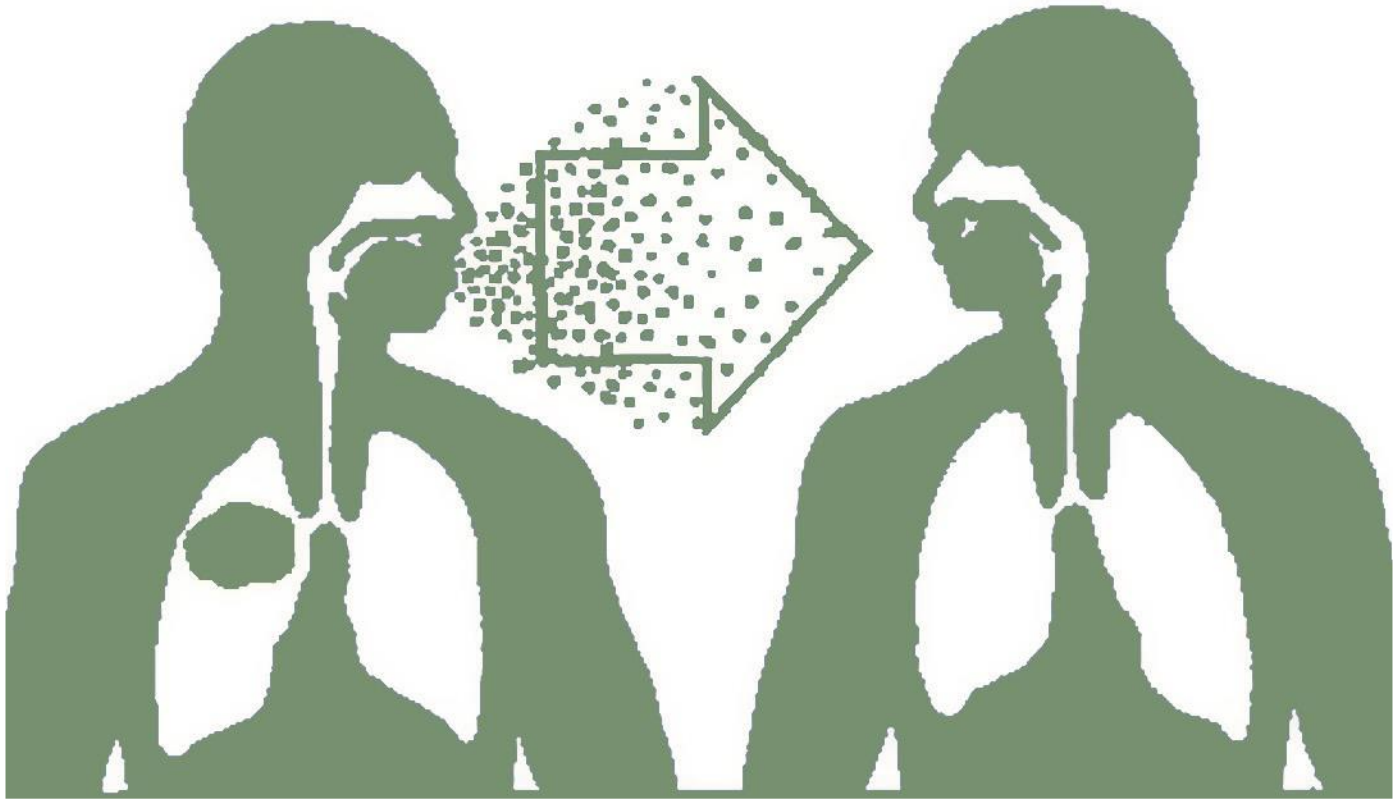
Tuberculosis (TB)

Infectious disease that spreads through the air from one person to another



Latent TB Infection and TB Disease

Latent TB Infection (LTBI)

LTBI is the presence of *M.tuberculosis* organisms (tubercle bacilli) without signs and symptoms or radiographic or bacteriologic evidence of TB disease

- Persons with LTBI are **NOT infectious**
- 90% chance of never getting Active TB Disease
- But the **TB organism is in your body!**

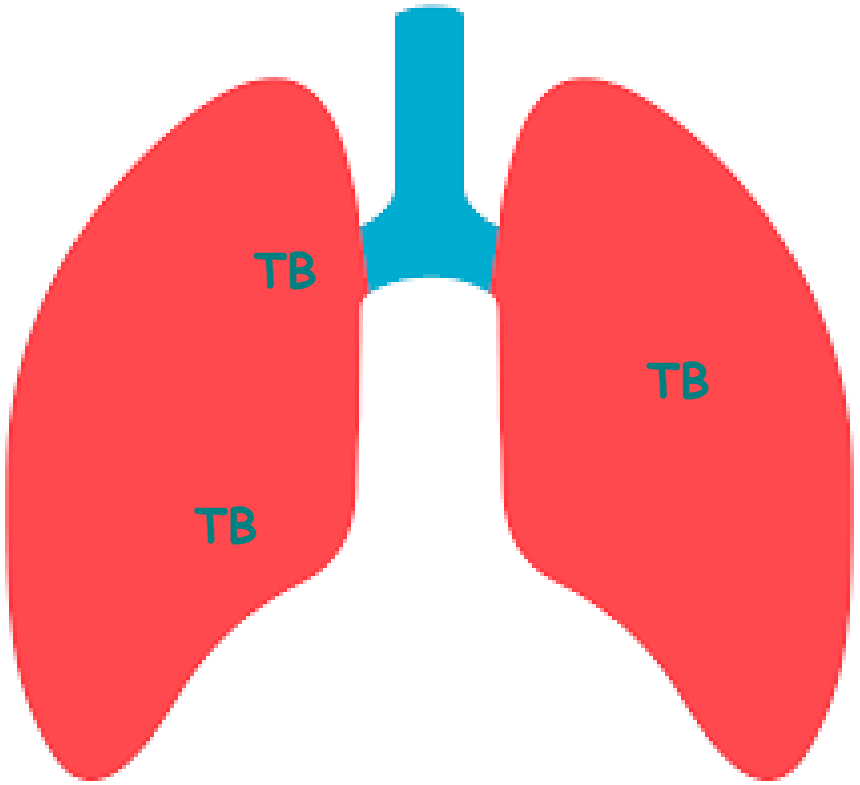
Latent TB Infection (LTBI)

- We used to think the bacteria was in a resting or dormant state however
  - The TB bacteria is metabolically **active and dividing**, however the immune system controls the infection
- Active TB Disease may develop if the immune system weakens
- Current methods of LTBI diagnosis are less than perfect

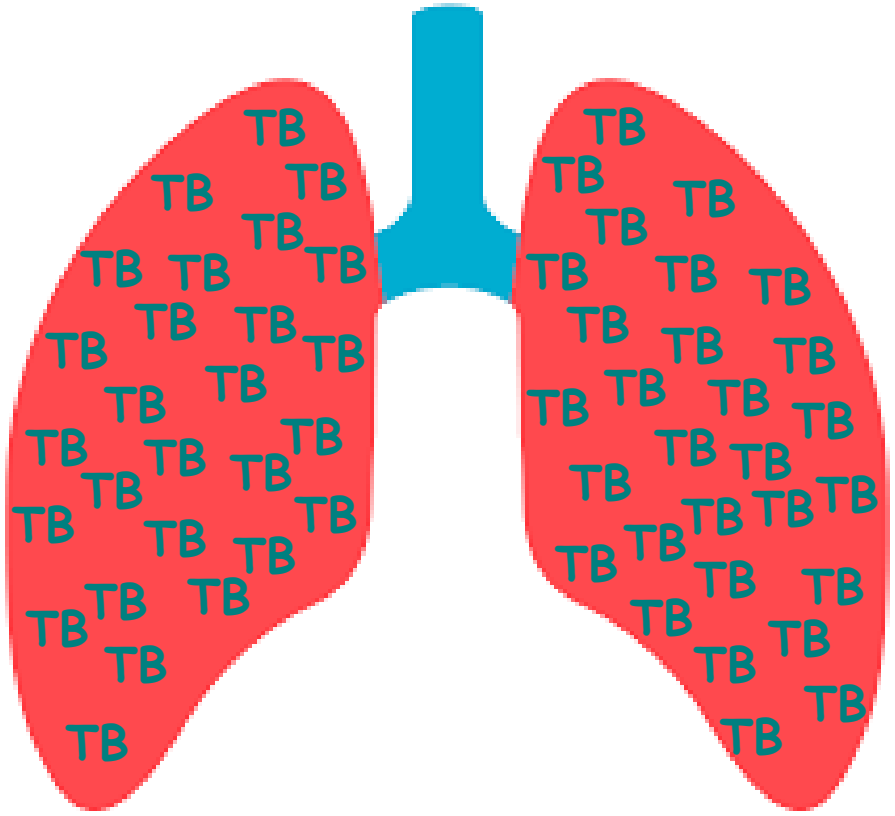
Active TB Disease

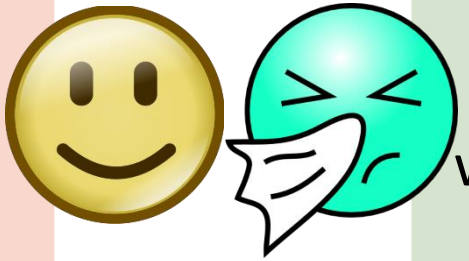
- TB bacteria become active when the immune system cannot stop the bacteria from growing and multiplying
- Symptoms
  - Fever
  - Chest Pain
  - Chills
  - Night Sweats
  - Weight Loss
  - Fatigue/ Weakness
  - Cough (dry or productive)
  - Hemoptysis
  - Loss of appetite

Latent TB Infection

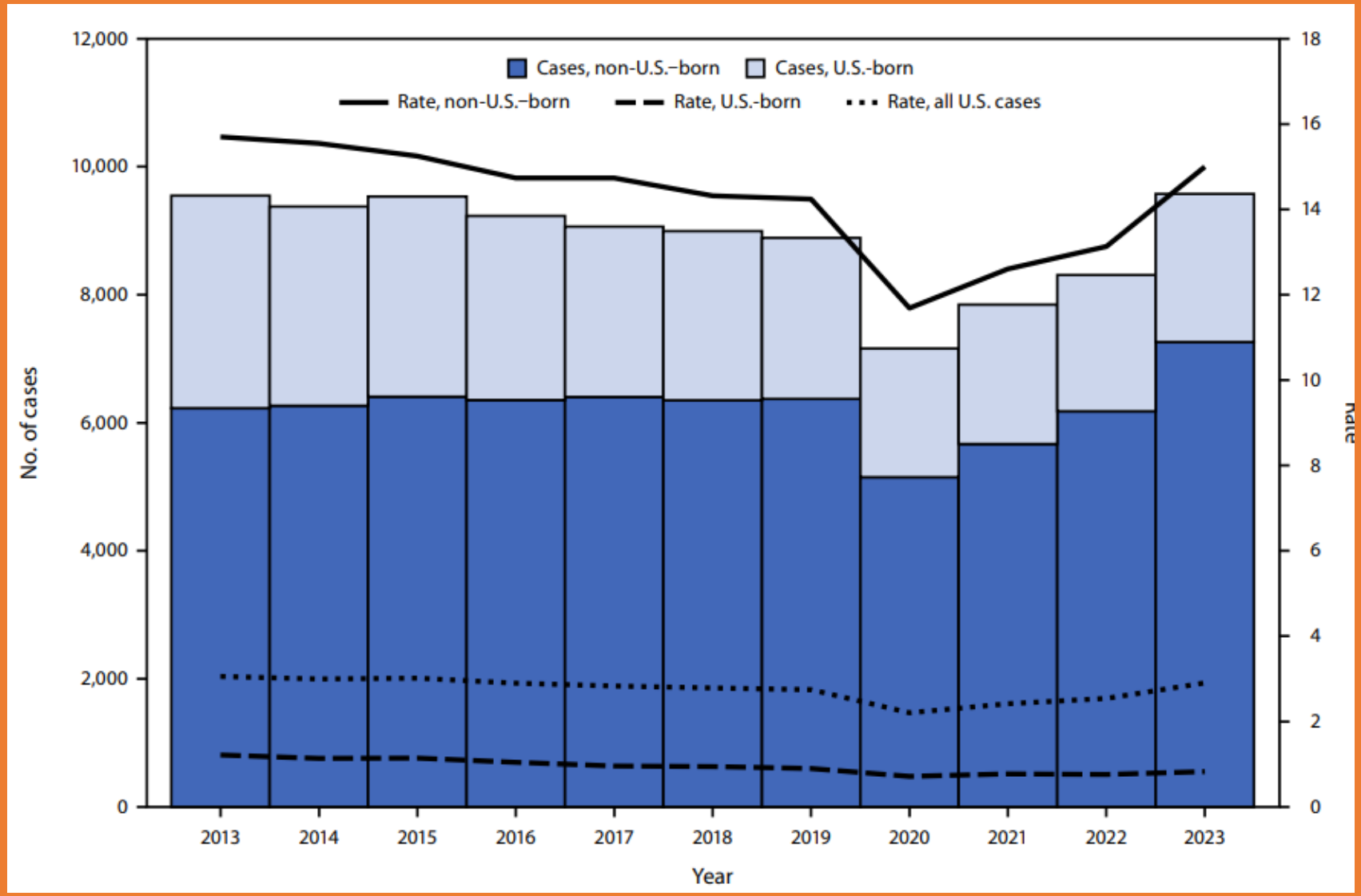


TB Disease



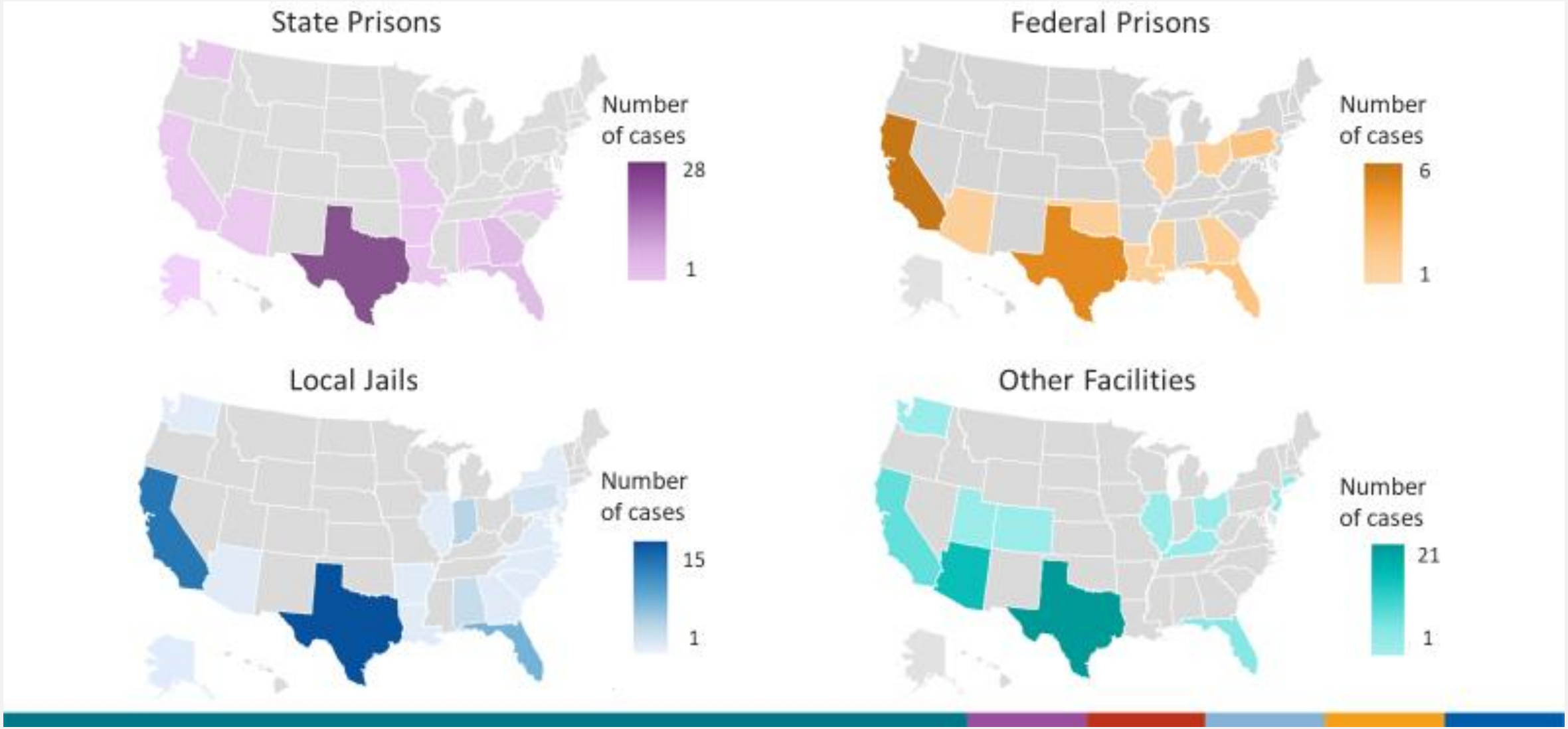
Latent TB Infection		Pulmonary TB Disease
Positive TST or IGRA		TST or IGRA is usually positive
Chest radiograph normal		Chest radiograph is usually abnormal
No symptoms or physical findings suggestive of TB		Symptoms may include: fever, chest pain, chills, cough, night sweats, weight loss, fatigue, hemoptysis, loss of appetite
If done, respiratory specimens are smear and culture negative		Respiratory specimens are usually culture positive

Annual Numbers and Rate of Cases of TB Disease, by Patient U.S birth Origin USA, 2013-2023

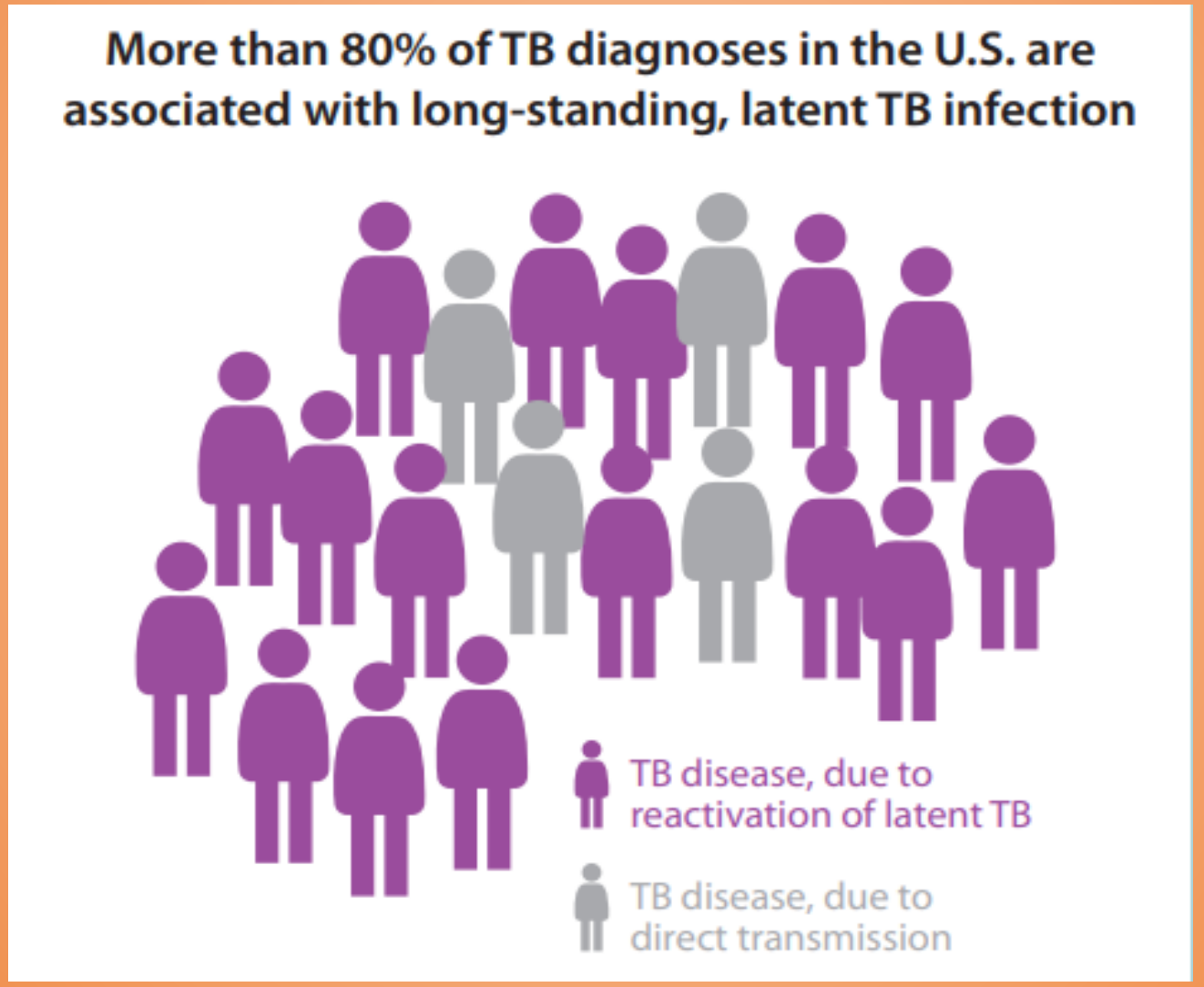


** Case counts are based on data from the National Tuberculosis Surveillance System as of February 17, 2024.*

TB Cases Among Correctional Facilities Residents Aged >15 Years, USA 2021



Latent TB in USA



Tuberculosis Hides in Plain Sight

13 million people in the United States live with inactive TB

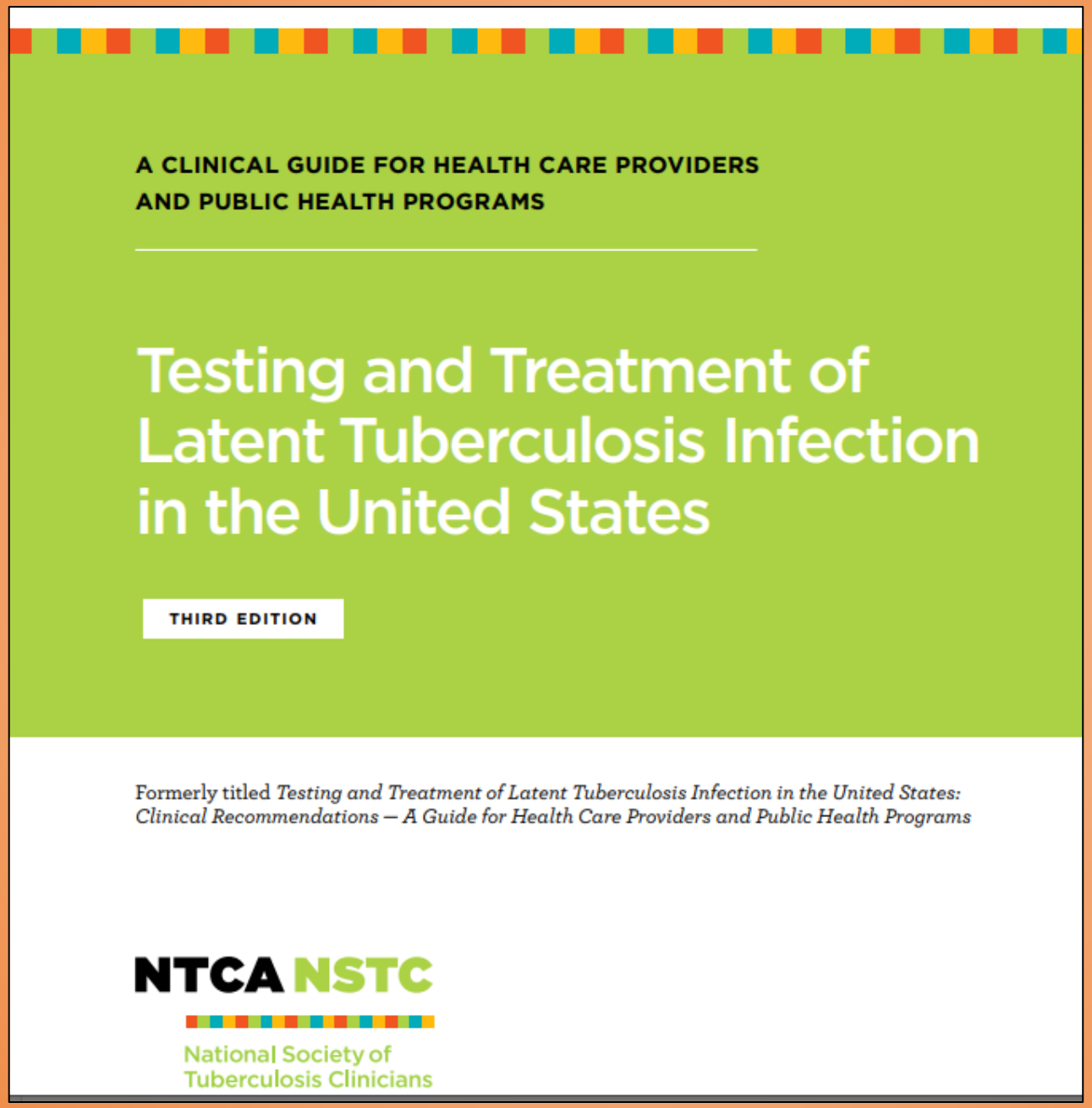
1 in 10 people with inactive TB will get sick with active TB disease

General Principles of TB Testing

- ***Treating persons at high risk for latent TB infection*** (LTBI) has become a priority to progress toward elimination of TB in the USA
- Treatment of LTBI substantially **reduces the risk that persons infected with *M. tuberculosis* will progress to TB disease**
- All adults and children should receive an assessment of **TB risk factors** as part of the routine primary care
- Do not conduct routine testing of low-risk populations

General Principles of TB Testing

- Testing ONLY persons at risk simplify decisions regarding treatment
- TB Risk assessment done to avoid testing groups that are not at high risk for TB
- Can help reduce the waste of resources and prevent inappropriate treatment


A CLINICAL GUIDE FOR HEALTH CARE PROVIDERS
AND PUBLIC HEALTH PROGRAMS
Testing and Treatment of Latent Tuberculosis Infection in the United States
THIRD EDITION
Formerly titled Testing and Treatment of Latent Tuberculosis Infection in the United States: Clinical Recommendations — A Guide for Health Care Providers and Public Health Programs
NTCA NSTC
National Society of Tuberculosis Clinicians

Morbidity and Mortality Weekly Report (*MMWR*)

Search

Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019

Weekly / May 17, 2019 / 68(19);439–443

Updated TB Testing and Treatment Recommendations for Health Care Personnel

https://youtu.be/_3EBwgYh9Zk


Updated TB Testing and Treatment Recommendations for Health Care Personnel
TUBERCULOSIS
TESTING
+
TREATMENT
OF U.S. HEALTH CARE PERSONNEL
MORE VIDEOS
0:06 / 2:31

Health Care Personnel (HCP)

Baseline Individual TB Risk Assessment

HCP should be considered at increased risk for TB if any of the following statements are marked "Yes":

Temporary or permanent residence of ≥1 month in a country with a high TB rate

Any country other than the United States, Canada, Australia, New Zealand, and those in Northern Europe or Western Europe

YES ☐

NO ☐

OR

Current or planned immunosuppression,

including human immunodeficiency virus (HIV) infection, organ transplant recipient, treatment with a TNF-alpha antagonist (e.g., infliximab, etanercept, or other), chronic steroids (equivalent of prednisone ≥15 mg/day for ≥1 month) or other immunosuppressive medication

YES ☐

NO ☐

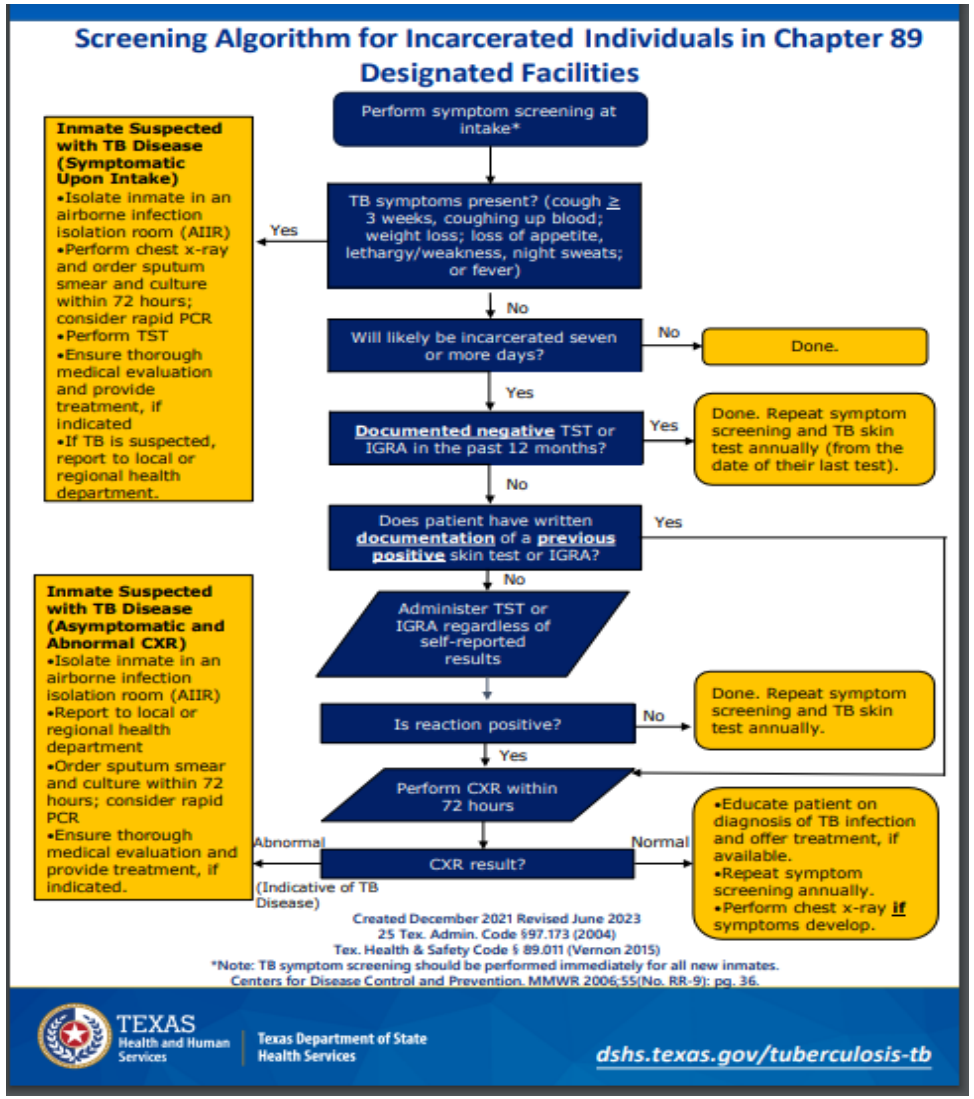
OR

Close contact with someone who has had infectious TB disease since the last TB test

YES ☐

NO ☐

Screening Algorithm for Incarcerated Individuals in Chapter 89 Designated Facilities



CongregateSettings@dshs.texas.gov
and
CQIteam@dshs.texas.gov

https://dshs.texas.gov/sites/default/files/LIDS-TB/forms/ScreeningAlgorithmIncarcerated.pdf

Tuberculosis Risk *Factors*

- Anyone can get TB but some are at higher risk
- You can get TB even if you received the BCG vaccine

People at Higher Risk for TB fall in <u>two categories</u>

People at higher risk of being exposed to TB germs

People at higher risk of developing Active TB disease once infected with TB germs

Persons and Population to Test

LTBI testing should be considered for persons with the following risk factors:

- Birth or residence in a country with high or medium incidence rate of TB, regardless of year of arrival in the USA (See next slide)
- Travel for at least one month in a country with a high or medium incidence rate
- Close contact to someone with infectious TB disease

Table 2. Countries with High or Medium Tuberculosis Incidence Rate

TB Incidence Rate Comparison

	TB incidence rate per 100,000 person years
High incidence countries (estimated)	>100/100,000
Medium incidence countries (estimated)	10-100/100,000
United States (2019, reported)	2.7/100,000

Most Common Countries of Origin for Non-US-born Persons Diagnosed with Active TB Disease in the United States

Among persons in the United States with active TB disease who were non-US born, the most common countries of birth were Mexico, the Philippines, India, Vietnam, and China. The TB incidence rates in 2019 in those countries were estimated by the World Health Organization to be

- Mexico: 23/100,000 (Medium)
- The Philippines: 554/100,000 (High)
- India: 193/100,000 (High)
- Vietnam: 176/100,000 (High)
- China: 58/100,000 (Medium)

Persons who were born in, or resided in, these countries should be tested at least once regardless of how long they have resided in the United States.

Persons and Population to Test (Cont.)

- Immunosuppression current or planned includes HIV infection; organ transplantation; treatment with TNF-alpha antagonist, corticosteroids or other immunosuppressive medications

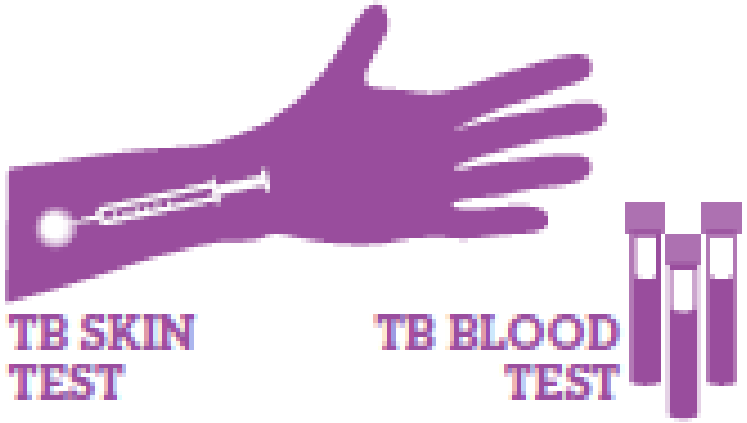
- **Other conditions or social circumstances** such as homelessness, incarceration, occupational risk factors, or **medical conditions**

  - Diabetes
  - Silicosis
  - BMI <20
  - ESRD
  - Cancer head/neck
  - Leukemia/lymphoma
  - Intestinal bypass/gastrectomy

Testing for *M. tuberculosis* infection

Testing for *M. tuberculosis* infection

- There are two testing methods available for the detection of *M. tuberculosis* infection in the United States
  - Mantoux tuberculin skin test (TST)
  - Interferon-gamma release assays (IGRA)



- These tests **do not** rule out LTBI or TB disease

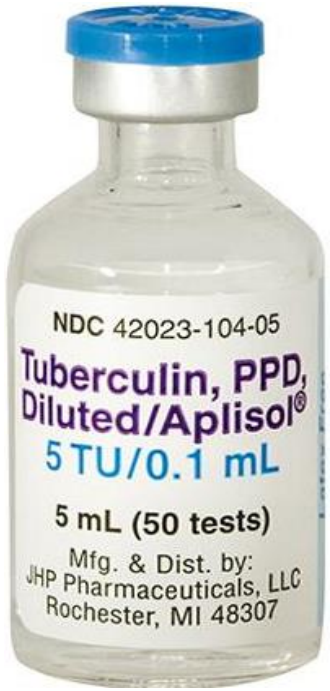
Mantoux Tuberculin Skin Test

Skin test that produces delayed-type hypersensitivity reaction in persons with *M. tuberculosis* infection

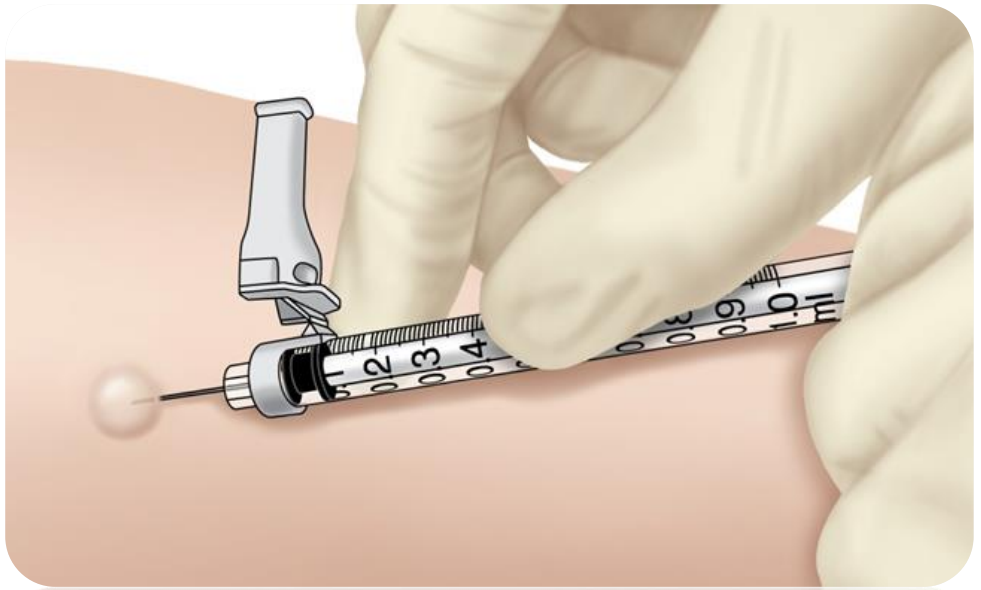
- Administration
- Reading
- Interpretation

Administering the TST

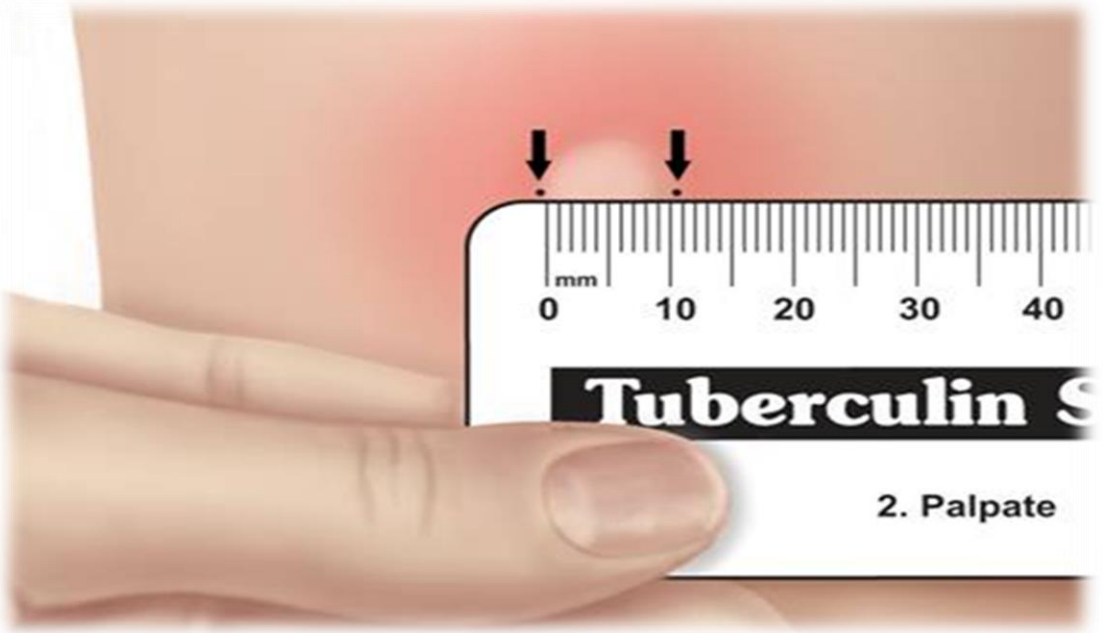
- Inject 0.1 mL of 5 TU PPD tuberculin solution intradermally on volar surface of lower arm using a 27-gauge needle



- Produce a wheal 6 to 10 mm in diameter



Reading the TST



- Measure reaction in 48 to 72 hours
- Measure induration, not erythema
- Record reaction in millimeters, not negative or positive
- Ensure a trained health care professional measures and interprets the TST
- Educate the patient and family on the significance of a positive TST

Reading the TST

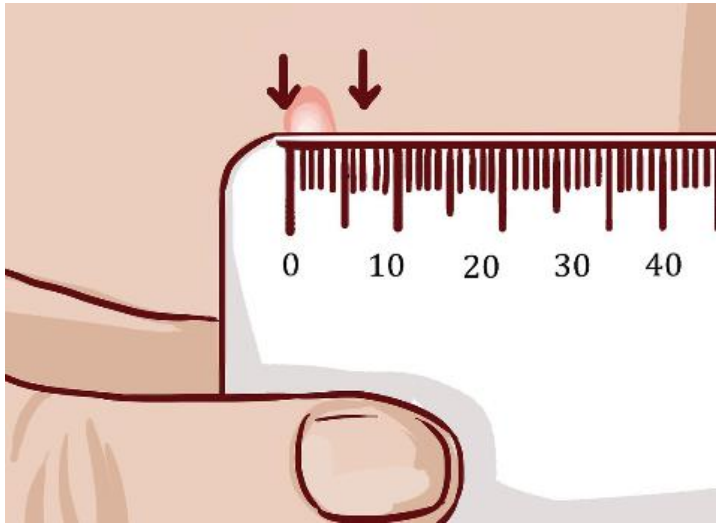
Palpating for induration
Can use zig zag motion.

Marking the borders.

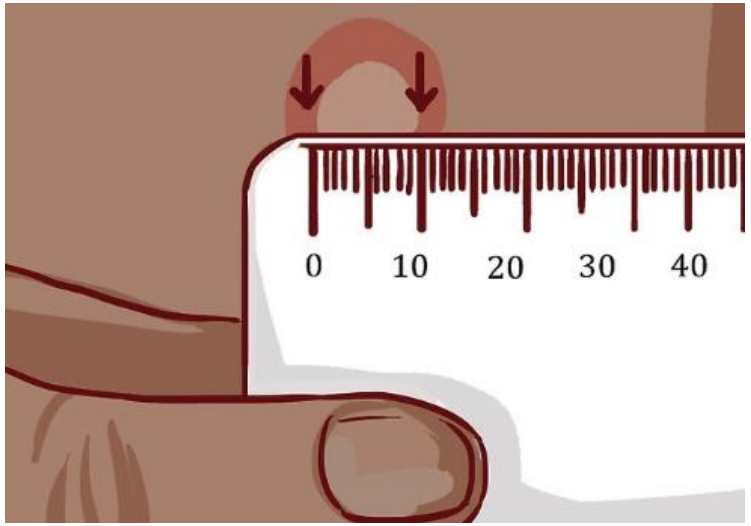
Pen method

TST Interpretation

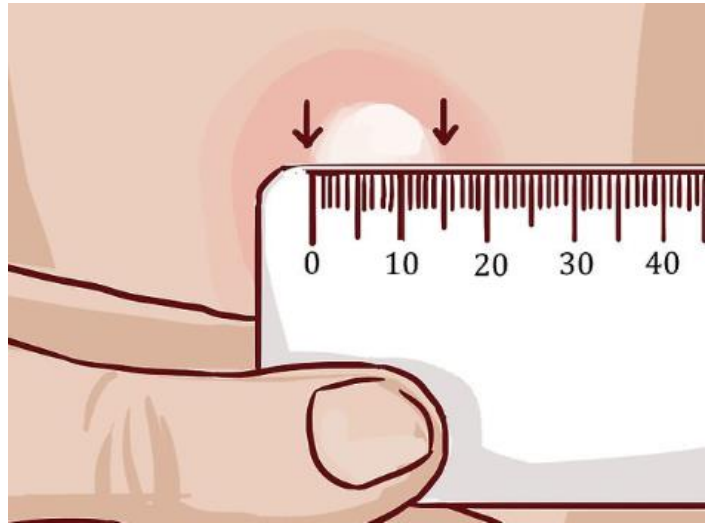
≥ 5 mm



≥ 10 mm



≥ 15 mm



3 Cut-Points

TST Interpretation ≥ 5 mm

- **≥ 5mm** is interpreted as **positive** in:
  - HIV- infected persons
  - Close contacts to a person with infectious TB
  - Persons with chest radiographs consistent with prior untreated TB
  - Organ transplant recipients
  - Other immunosuppressed patients
    - Taking the equivalent of > 15 mg/day of prednisone for 1 months
    - Taking TNF-α antagonists

TST Interpretation ≥ 10 mm

- **≥ 10 mm** is interpreted as **positive** in:
  - Recent immigrants (arrived in past 5 years)
  - Injection drug users
  - Residents or employees of congregate settings
  - Mycobacteriology lab personnel
  - Persons with medical conditions that place them at high risk
  - Children ≤ 4 years old
  - Infants, children, and adolescents exposed to adults at high risk

TST Interpretation ≥ 15 mm

- **≥ 15 mm** is interpreted as **positive** in:
  - Persons with no known risk factors for TB

Note:

Skin testing programs should be conducted ***only*** among high-risk groups

Certain individuals may require TST for employment or school attendance

Diagnosis and treatment of LTBI should always be tied to ***risk assessment***

ADMINISTERING the Mantoux Tuberculin Skin Test

Video

Mantoux

Tuberculin Skin Test

CDC

READING the Mantoux Tuberculin Skin Test

Video

Mantoux

Tuberculin Skin Test

CDC

Mantoux Tuberculin Skin Test

Live Demo

Texas Department of State Health Services Standing Delegation Orders for Tuberculosis Tuberculin Skin Testing Services Provided by Authorized Staff, Fiscal Year 2025

ATTACHMENT 2: *TST Administration Procedure*

1. Remove PPD from refrigerated storage. To avoid reducing the potency of the PPD, do not store on the door of a refrigerator. When the TST is to be administered in the field, transport and store the PPD in an insulated cooler to protect from heat and light.

2. Confirm that the concentration of PPD is 5 tuberculin units (TU) of PPD per test dose of 0.1 mL.

3. Confirm that the PPD has not expired and that the vial has not been opened for more than 30 days. When opening a new vial, mark the vial with the date opened and initial.

4. Clean vial stopper with antiseptic swab.

5. Draw up slightly more than 0.1 mL of PPD into tuberculin syringe as soon as the PPD is removed from refrigeration in order to protect from heat. PPD should be used immediately in order to avoid adsorption onto the syringe.

6. Remove excess volume or air bubbles to exactly 0.1 mL of PPD while needle remains in vial to avoid wasting of antigen.

7. Remove needle from vial.

8. Return antigen vial to refrigeration immediately after filling.

9. Rest the client's arm on a firm, well-lit surface. Prepare injection site using aseptic technique.

10.Slightly stretch the skin of the inner aspect of the forearm to facilitate the introduction of the needle. Stretch skin by placing your non-dominant hand on the client's forearm below the needle insertion point and then applying traction in the opposite direction of the needle insertion. Be careful not to place your non-dominant hand opposite the administration needle if the client is likely to move during the procedure

11.Hold the tuberculin syringe close to the skin, bevel up, so that the hub of the needle touches the skin as the needle is introduced. Insert the needle in the first layer of skin with the tip visible beneath the skin. Advance the needle approximately 3mm until the entire bevel is under the first layer of skin. Release the stretch in the skin and hold the syringe in place on the forearm. (Holding the syringe in this position will reduce the needle angle to about 5 to 15 degrees at the skin surface, promoting the correct entry for a proper intradermal injection.)

12.Inject the PPD into the superficial layer of the skin to form a wheal 6 mm to 10 mm in diameter

13.Remove needle without pressing the skin at the test site and activate the safety feature of the syringe according to manufacturer's recommendations.

14.Place used needle and syringe in a puncture resistant container without recapping the needle.

15.Immediately measure the wheal to ensure that it is 6 to 10 mm in diameter. If a wheal does not appear (because the injection was made too deeply), or the wheal is smaller than 6 mm (because the needle was not under the skin and part of the antigen leaked on the outer surface of the skin), reapply test at another site at least 5 centimeters (2 inches) from the original site.

16.If blood or fluid is present, blot site lightly with gauze or cotton ball and discard used gauze or cotton according to local standard precautions. Do not apply pressure or cover the site with a bandage or other material.

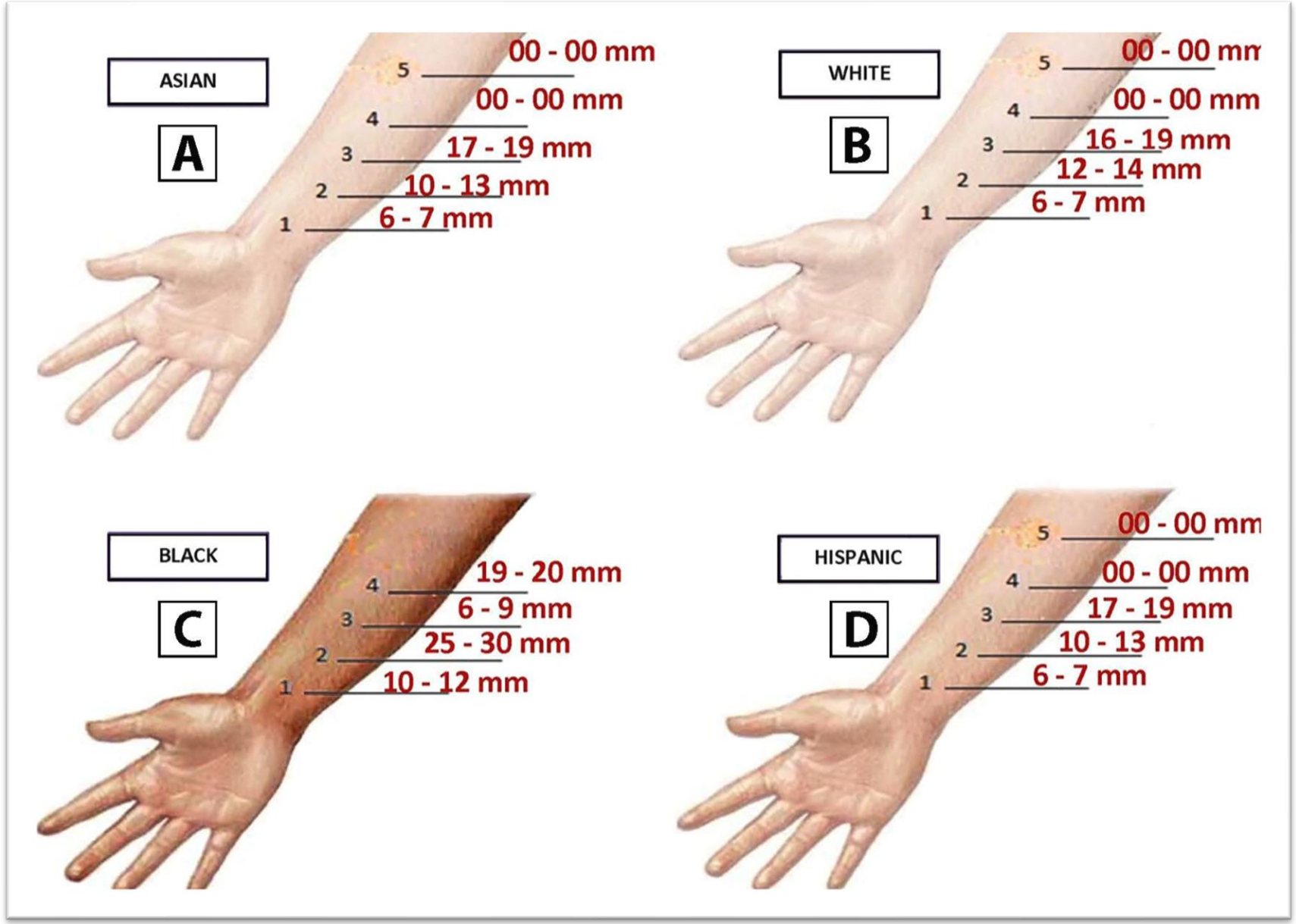
Current methods of LTBI diagnosis are less than perfect..

The TST is not a perfect screening test!!!

Group Activities

- ✓ Placing TST on Each other
- ✓ Reading TST Mannequin Arms

TST induration measurement answers will be posted after completion of practicing placement & reading of TST


ASIAN
A
5 00 - 00 mm
4 00 - 00 mm
3 17 - 19 mm
2 10 - 13 mm
1 6 - 7 mm
WHITE
B
5 00 - 00 mm
4 00 - 00 mm
3 16 - 19 mm
2 12 - 14 mm
1 6 - 7 mm
BLACK
C
4 19 - 20 mm
3 6 - 9 mm
2 25 - 30 mm
1 10 - 12 mm
HISPANIC
D
5 00 - 00 mm
4 00 - 00 mm
3 17 - 19 mm
2 10 - 13 mm
1 6 - 7 mm

Case Studies: *Interpreting the TST results*

The TST and Biologics

A 58-year-old U.S. born female with rheumatoid arthritis presents to her rheumatologist for a follow up visit. She has been taking Humira since her diagnosis two years ago. The patient reports a lingering dry cough, loss of appetite and night sweats for the past 3 weeks. The Humira is stopped and a TST is placed. Three days later the patient returns for her skin reading. The nurse notes the patient to have a 6 mm induration.

- How would you interpret this reading?

a) Positive

b) Negative

The TST and Biologics

Rationale:

- ✓ A reaction of 5 mm or greater is considered **positive** for immunosuppressed persons taking tumor necrosis factor-alpha (TNF) antagonists.

- ✓ Screening for TB should be done on persons who are receiving immunosuppressive therapy, such as TNF antagonists, because they are at increased risk for progression to active TB disease if they have been infected.

  (2015 American College of Rheumatology Guidelines)

- ✓ It is recommended that at least 1 month of LTBI treatment is completed before resuming biologics. (2015 American College of Rheumatology Guidelines)

The TST and Foreign-Born

A 19-year-old female who immigrated from India 2 years ago had a TB skin test placed as part of her school application process. Three days after the PPD placement the student returns to the school clinic where the school nurse examines her forearm and notes a 12 mm induration.

- **What would be the appropriate interpretation of the TST reading?**

  a) Positive

  b) Negative

Rationale:

✓ A reaction of 10 mm or greater is considered **positive** for recent immigrants (<5 years) from high prevalence countries (e.g. Asia, Africa, Latin America).
(For a full list of high burden countries, please see the WHO website)

The TST and Organ Transplant

Kelly is a 55-year-old Caucasian female, born and raised in Montana. She has never travelled outside of the U.S. and is diagnosed with leukemia. She has been identified as a candidate for Stem Cell transplant. As part of the pre-transplant physical, she received a TB skin test. When she returns to the office for her skin test reading, it is identified that she has a 4 mm induration.

- **What is the interpretation of this reading?**

  a) Positive

  b) Negative

The TST and Organ Transplant

Rationale:

- ✓ A reaction of **5 mm or greater is considered positive** for immunosuppressed persons such as persons with auto-immune diseases. This patient received an induration of 4 mm therefore is negative.

- ✓ Targeted pre-transplant screening of both recipient and, if possible, donors to allow focused management of recipients selected for preventive intervention in the pre- and/or post-transplant period is recommended.

- ✓ If not identified prior to transplantation, active TB in transplant recipients can result from latent infection with *M. tuberculosis* (LTBI) in the transplant candidate or in the donor tissue.

European Respiratory Journal 40 (4) E22; Published 30 September 2012. ***The risk of tuberculosis in transplant candidates and recipients:*** *a TBNET consensus statement* https://erj.ersjournals.com/content/40/4/990#sec-19

The TST and Congregate Settings

Barry is a 33-year-old U.S. born male. He has currently worked for 5 consecutive years as a security guard at a state correctional facility. He works overtime and has constant interactions with the inmates. In the past, his required annual TB skin test has resulted in a 0 mm induration. During the most recent annual TB skin test, his induration was read at 10 mm.

- **What is the interpretation of this reading?**

a) Positive

b) Negative

The TST and Congregate Settings

Rationale:

- ✓ An induration of **10 or more** millimeters is considered **positive** in residents and employees of high-risk congregate settings (e.g., correctional facilities, nursing homes, homeless shelters, hospitals, and other health care facilities).

- ✓ Persons more likely to progress from LTBI to TB disease include recent converters (those with an increase of 10mm or more in size of TST reaction within a 2-year period).

- ✓ Generally, persons at high risk for developing TB disease fall into two categories: those who have an increased likelihood of exposure to persons with TB disease, and those with clinical conditions that increase the risk of progression from LTBI to TB disease.

CDC. Fact Sheet. Targeted Tuberculosis Testing and Interpreting Tuberculin Skin Test Results

The TST and persons living with HIV

George, a 42-year-old male, living with HIV, was identified as a close contact to his girlfriend recently diagnosed with TB disease. They do not live together. The local health department contacted him for a TB skin test. When he returned for the reading, the induration was read at 4 mm.

- **What is the interpretation of this reading?**

  a) Positive

  b) Negative

The TST and Persons Living with HIV

Rationale:

✓ This test would be classified as **negative.** A 5 mm or greater induration would be a positive result for an HIV positive patient.

Note: Despite the results of a TST, a follow-up chest x-ray is indicated for persons living with HIV who are close contacts of a person diagnosed with TB disease.

U.S. Department of Health and Human Services, AIDS info. (2017). Guidelines for the Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents.

Frequently Asked Questions
(FAQs)

FAQ #1

“A positive skin test means I have TB disease.”

True/False

False

A positive TB skin test only confirms that you have been exposed to tuberculosis and are infected, but not necessarily that you have disease.

FAQ #2

Is placing a TST on a nursing mother safe?

Yes

Placing a TST on a nursing mother is safe.

FAQ #3

Can infants be tested?

Yes

However, infants may not react to a TST before 6 months of age but should be tested if there is risk of exposure.

FAQ #4

Can a person with a previous positive TST be retested?

Yes

However, retesting is not necessary if the previous result was documented. Also, repeated skin tests do not sensitize or make persons “allergic” to tuberculin.

FAQ #5

Does having more than one TST placed in 1 year pose any risk?

No risk exists for having TSTs placed multiple times per year.

FAQ #6

If a person does not return for a TST reading within 48 – 72 hours, when can a TST be placed on them again?

A TST can be administered again as soon as possible.

FAQ #7

Can a TST result be read 7 days after the TST was placed?

Yes

A positive TST result can be read up to 7 days after the original placement
However, if the result is negative, another TST should be placed as soon as possible.

FAQ #8

Should the TST site be covered with a bandage?

NO

After the test, you should avoid using bandages, putting on lotion, or scratching the test area because it may affect the results. You can wash the area with water, but do not wipe or scrub. If the area itches, put an ice cube or cold cloth on it.

FAQ #9

Can an insulin syringe be used to place a TST?

No

Insulin Syringes can not be used in place of a Tuberculin syringe because the units of measure are different and the needle of a TB syringe is shorter than that of an insulin syringe.

FAQ #10

Do vaccinations interfere with TST results?

Yes

Vaccinations may cause false (-) reactions. A TST should be administered either on the same day as vaccination with live virus or 4–6 weeks later.

Vaccines that might cause a false-negative TST result are:

- ✓ Measles
- ✓ Varicella
- ✓ yellow fever
- ✓ Smallpox
- ✓ BCG
- ✓ Mumps
- ✓ Rubella
- ✓ oral polio
- ✓ oral typhoid
- ✓ live-attenuated influenza.

- Administer the TST or IGRA simultaneously with the live vaccine (preferred scenario).
- If a TST or IGRA has already been administered, a live vaccine can be administered at any time >1 day after the administration of the TB test.
- But....if a live vaccine has already been administered, wait at least 28 days before administering a TST or IGRA.

FAQ # 11

Can HCWs read their own TST?

No

HCWs should NEVER be allowed to read their own TST.
Experience has shown that HCWs do not measure their own TST results reliably.

What Do We Do with a *Negative* TST Result ?

- ✓Provide documentation of result
- ✓No further evaluation necessary

What Do We Do with a *Positive* TST Result ?

- Evaluate Further
- Rule Out TB Disease
  - ✓ CXR
  - ✓ TB Symptom Screen/ Assessment
  - ✓ MD Evaluation
  - ✓ Sputum Collection
- If disease is ruled out, consider for LTBI treatment
- If patient not willing or able to take treatment, educate on TB signs and symptoms

References

- CDC Guidelines, Targeted Tuberculin Testing and Treatment of LTBI; MMWR June 9, 2000/Vol.49/No. RR-6

- CDC Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis; MMWR December 16, 2005/Vol. 54/ No. RR-15

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