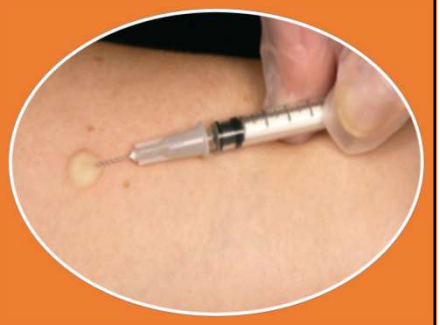
Targeted Tuberculin Skin Test



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

1

Catalina Navarro, BSN, RN has the following disclosures to make:

- No conflicts of interest
- No relevant financial relationships with any commercial companies pertaining to this educational activity

2

Tuberculosis (TB)

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

3

Latent TB Infection and TB Disease

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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!**

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Latent TB Infection (LTBI)

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

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Active TB Disease

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

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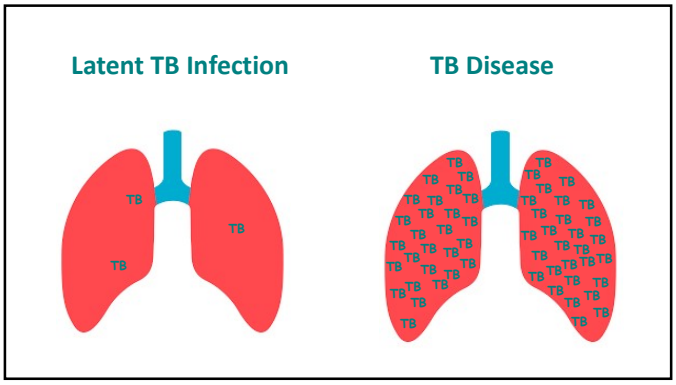

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Latent TB Infection	Pulmonary TB Disease
Positive TST or IGRA	TST or IGRA is usually positive
Chest radiograph normal	Chest radiograph is usually abnormal
No symptoms or physical findings suggestive of TB	Symptoms may include: fever, cough, night sweats,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

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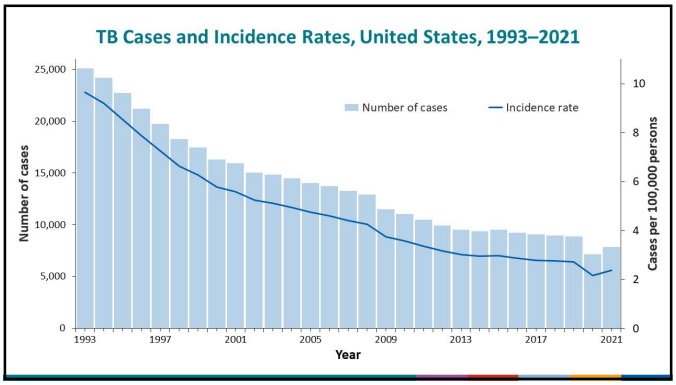

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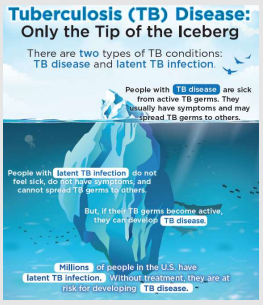

TB is not a disease of the past

CDC estimates that

13,000,000 people have LTBI in the U.S.

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More than 80% of TB diagnoses in the U.S. are associated with long-standing, latent TB infection

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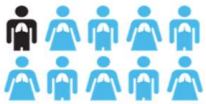
Tuberculosis Hides in Plain Sight

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

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Prevention is the Key

Clinical Review & Education

JAMA | US Preventive Services Task Force | RECOMMENDATION STATEMENT

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

US Preventive Services Task Force

JAMA May 2, 2023, Volume 329, Number 17 1489

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Targeted TB Skin Testing

- As disease rates in the United States decrease, finding and ***treating persons at high risk for latent TB infection*** (LTBI) has become a priority
- Treatment of LTBI substantially reduces the risk that persons infected with *M. tuberculosis* will progress to TB disease
- Targeted TB testing is used to focus program activities and provider practices on groups at the highest risk for TB

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Targeted TB Skin Testing

- Essential TB prevention and control strategy
- Detects persons with LTBI who would benefit from treatment
- De-emphasized testing of groups that are not at high risk for TB
- Can help reduce the waste of resources and prevent inappropriate treatment

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Morbidity and Mortality Weekly Report

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

Lynn E. Sosa, MD[1,2]; Gibril J. Njie, MPH[3]; Mark N. Lobato, MD[2]; Sapna Bamrah Morris, MD[3]; William Bachta, MD[4,5]; Megan L. Casey, MPH[3]; Neela D. Goswami, MD[3]; MaryAnn Gruden, MSN[7]; Bobbi Jo Hurst[7]; Amera R. Khan, MPH[3]; David T. Kuhar, MD[8]; David M. Lowinsohn, MD, PhD[9]; Trini A. Mathew, MD[10]; Gerald H. Mazurek, MD[3]; Randall Reves, MD[2,11]; Lisa Paulos, MPH[2,12]; Wendy Thanassi, MD[2,13]; Lorna Will, MA[2]; Robert Belknap, MD[2,11]

US Department of Health and Human Services/Centers for Disease Control and Prevention MMWR / May 17, 2019 / Vol. 68 / No. 19

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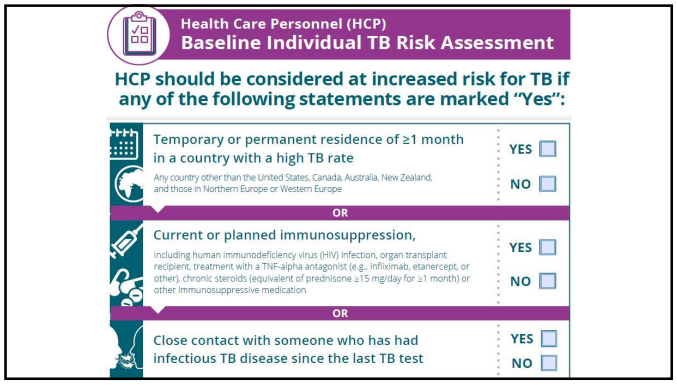
TABLE. Comparison of 2005* and 2019† recommendations for tuberculosis (TB) screening and testing of U.S. health care personnel (HCP)

Category	2005 Recommendation	2019 Recommendation
Baseline (preplacement) screening and testing	TB screening of all HCP, including a symptom evaluation and test (IGRA or TST) for those without documented prior TB disease or LTBI.	TB screening of all HCP, including a symptom evaluation and test (IGRA or TST) for those without documented prior TB disease or LTBI (**unchanged**); individual TB risk assessment (new).
Postexposure screening and testing	Symptom evaluation for all HCP when an exposure is recognized. For HCP with a baseline negative TB test and no prior TB disease or LTBI, perform a test (IGRA or TST) when the exposure is identified. If that test is negative, do another test 8–10 weeks after the last exposure.	Symptom evaluation for all HCP when an exposure is recognized. For HCP with a baseline negative TB test and no prior TB disease or LTBI, perform a test (IGRA or TST) when the exposure is identified. If that test is negative, do another test 8–10 weeks after the last exposure (**unchanged**).
Serial screening and testing for HCP without LTBI	According to health care facility and setting risk assessment. Not recommended for HCP working in low-risk health care settings. Recommended for HCP working in medium-risk health care settings and settings with potential ongoing transmission.	Not routinely recommended (new); can consider for selected HCP groups (**unchanged**); recommend annual TB education for all HCP (**unchanged**), including information about TB exposure risks for all HCP (new emphasis).
Evaluation and treatment of positive test results	Referral to determine whether LTBI treatment is indicated.	Treatment is encouraged for all HCP with untreated LTBI, unless medically contraindicated (new).

18



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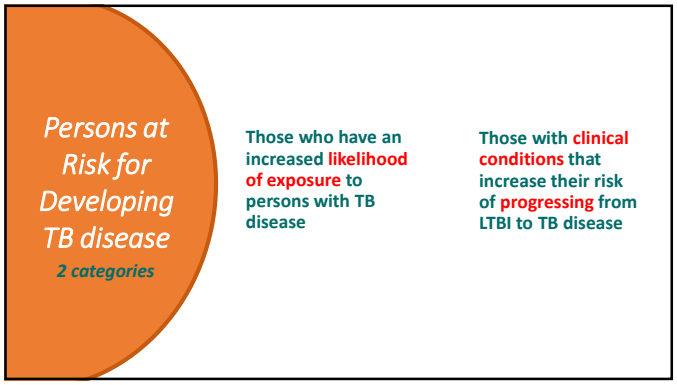

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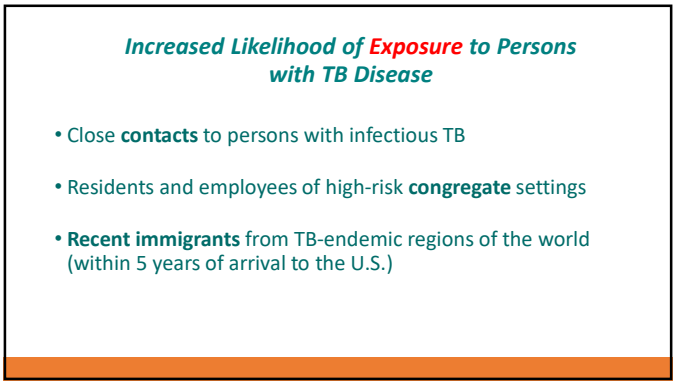

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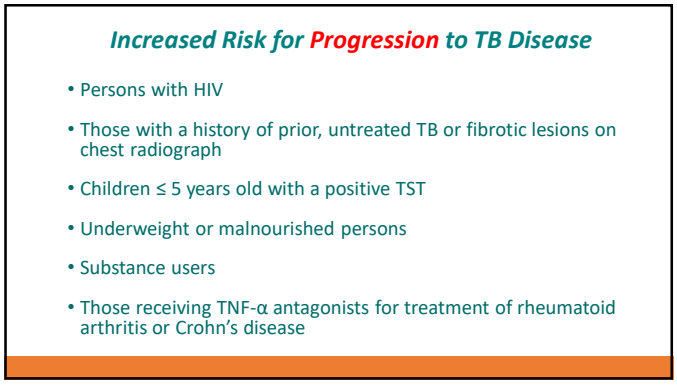

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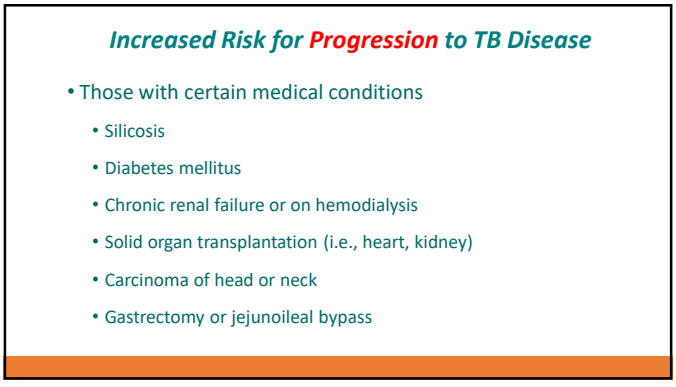

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Testing for *M. tuberculosis* infection

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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 exclude LTBI or TB disease

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Mantoux Tuberculin Skin Test

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

- Administration
- Reading
- Interpretation

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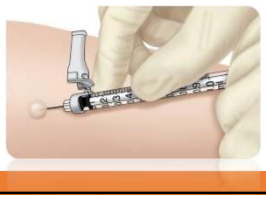
Administering the TST

- 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



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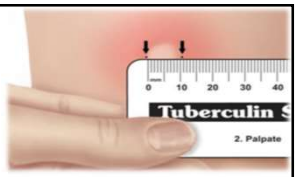
Reading the TST

- 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



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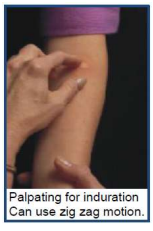
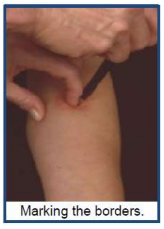
Reading the TST


Palpating for induration
Can use zig zag motion.

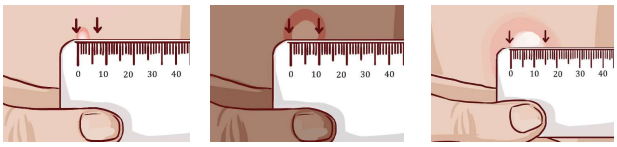

Marking the borders.


Pen method

30

TST Interpretation

31



3 Cut-Points

32

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

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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

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TST Interpretation ≥ 15 mm

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

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Mantoux Tuberculin Skin Test Video

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Mantoux Tuberculin Skin Test
Live Demo

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Case Studies: *Interpreting the TST results*

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The TST & 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

44

The TST & 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)

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The TST & 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, Middle East, Africa, Latin America, former Soviet Union).
(For a full list of high burden countries, please see the WHO website)

46

The TST & 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

47

The TST & 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

48

The TST & 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 had 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

49

The TST & 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 10 mm 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

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The TST & Children

Julia, a 4-year-old U.S. born female, has been accepted into an accelerated pre-school. As part of the application process, the school requires all first-time entry students to have a TST placed. She has had no history of exposure to a person with TB disease and is generally healthy. When she returned to have the TST read, the induration was identified as 13 mm.

- **What is the interpretation of this reading?**
  - a) Positive
  - b) Negative

51

The TST & Children

Rationale:

✓ In a U.S. born child with no previous history of exposure to a person with TB disease and otherwise generally healthy, the induration **would have to be 15 mm or greater**.

✓ In order for the TST to be interpreted as positive in a child with an induration of 13 mm (or greater than 10 mm), certain risk factors would need to be considered: children who are born in or travel to high-prevalence regions of the world, children frequently exposed to adults who are HIV infected, experiencing homelessness, incarcerated, or are users of illicit drugs.

✓ An induration of 5 mm or greater is considered positive in children who are in close contact with known or suspected contagious people with TB disease.

AAP. 2018 Red Book. Tuberculosis in Children.

52

The TST & Persons Living with HIV

George, a 42-year-old male, living with HIV, was identified as a close contact to his girlfriend who was 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

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The TST & Persons Living with HIV

Rationale:

✓ This test would be classified as **negative.** An induration of 5 mm or greater 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.

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