Tuberculin Skin Testing (TST)

Mehmet Ungan, MD, Professor
Panel Physician, Turkey

www.doctorun.com
mungan@doctorun.com
Learning Objectives

After this session, you should be able to:

- Explain Tuberculin Skin Test (TST) preparations, doses, and methods of administration
- Describe proper storage of purified protein derivative (PPD) vials
- List TST administration steps
- Interpret TST results
TST and the Culture and DOT TB Technical Instructions

• TST (or IGRA) is required for applicants 2 through 14 years of age in countries with a WHO TB incidence rate ≥ 20 TB cases per 100,000 population

• Prior receipt of Bacille Calmette-Guérin (BCG) vaccination does not change the screening requirements or the required actions based on tuberculin skin test results

• Chest X-Ray required for applicants with a TST ≥ 10 mm (≥ 5 mm for TB contacts)
PPD Preparations, Doses and Method of Administration

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Purified Protein</td>
<td>5 TU (NOT 1 TU or 250 TU)</td>
</tr>
<tr>
<td>Derivative (PPD-S)</td>
<td></td>
</tr>
<tr>
<td>International Purified</td>
<td>2 TU</td>
</tr>
<tr>
<td>Protein Derivative (PPD-RT23)</td>
<td></td>
</tr>
</tbody>
</table>

Ideally, other preparations should be equivalent to PPD-S

- **Method of Administration**
  - Intradermal with tuberculin needle (Mantoux method)
- **Delegated responsibility of panel physician**
No Tine Test
No Heaf Test
Label the date you open the vial and also write initials of your name.
Storage of PPD

- Carefully follow manufacturer’s instructions for proper storage and handling
- Keep PPD vials refrigerated 2-8 Centigrade. Do not store vials in refrigerator door
- Store vials in the dark; avoid exposure to strong light
- Carefully monitor manufacturer’s expiration date on each vial
- Record date that each vial is opened. Discard vials open for > 30 days

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PPD Administration

• Never pre-fill a syringe

• Inject intradermally 0.1 milliliter (5 TU PPD-S or 2 TU RT-23*) tuberculin (or equivalent) into inner surface of forearm.

• Produce a wheal (discrete, pale elevation of skin) 6 mm to 10 mm in diameter

• Do not recap, bend, or break needle, or remove needle from syringe

• Follow universal precautions for infection control

*5 TU PPD-S = 2 TU RT-23 = 0.1 mL
Tuberculin Syringe(s)

Source: DTBE, CDC
1. Locate and clean injection site

- 2 to 4 inches below elbow joint
- Place forearm palm side up on a firm, well-lit surface
- Select an area free of barriers (e.g., scars, sores) to placing and reading
- Clean the area with an alcohol swab

[Source: www.cdc.gov/tb/publications/Posters/images/Mantoux_wallchart.PDF]
PPD-S Administration

2 Prepare syringe

- Check expiration date on vial and ensure vial contains tuberculin (5 TU per 0.1 ml)
- Use a single-dose tuberculin syringe with a ¼- to ½-inch, 27-gauge needle with a short bevel
- Fill the syringe with 0.1 ml of tuberculin

www.cdc.gov/tb/publications/Posters/images/Mantoux_wallchart.PDF
Inject tuberculin

- Insert slowly, bevel up, at a 5- to 15-degree angle
- Needle bevel can be seen just below skin surface
- After injection, a tense, pale wheal should appear over the needle
• With the needle bevel against the patient’s skin, insert it slowly at a 5- to 15-degree angle

• Grip the flange of the syringe between your first and middle fingers. Use your thumb to press on the plunger

• Produce a wheal (discrete, pale elevation of skin) 6 mm to 10 mm in diameter

• Circle the wheal with a pen to locate injection site later
Check skin test

- Wheal should be 6 to 10 mm in diameter. If not, repeat test at a site at least 2 inches away from original site.
Video – Part 1: PPD Administration

http://www2c.cdc.gov/podcasts/player.asp?f=3739#
TST Interpretation

A trained health-care worker should read the TST 48–72 hours after injection (I read it myself)

Record reaction in millimeters
(No induration = 0 mm)

A **positive** reaction can be measured up to 1 week after testing

If a **negative** reaction is not read within 72 hours, must repeat test

**Applicants should never read their own TST results**
1. Inspect site

- Visually inspect site under good light

- Erythema (reddening of the skin) – do not measure

- Induration (hard, dense, raised formation)
2 Palpate induration

- Use fingertips to find margins of induration
3 Mark induration

- Use fingertip as a guide for marking widest edges of induration across forearm

www.cdc.gov/tb/publications/Posters/images/Mantoux_wallchart.PDF
4 Measure induration (not erythema)

- Place “0” ruler line inside left dot edge

- Read ruler line inside right dot edge (use lower measurement if between two gradations on mm scale)
Prior to U.S. immigration, the panel physician is required to document test result with additional information asked in Technical Instructions:

- Date of TST reading,
- Name of product,
- Expiration date,
- Amount administered, and the type of product used (e.g., 5TU PPD-S),
- Results in millimeters of induration.

### Class B Tuberculosis - Continued

<table>
<thead>
<tr>
<th>Class B3 TB, Contact Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TST mm</td>
</tr>
<tr>
<td>No preventive treatment</td>
</tr>
<tr>
<td>Current preventive treatment <em>(Indicate medications in Part 4 of DS-2054 form)</em></td>
</tr>
<tr>
<td>Completed preventive treatment <em>(Indicate medications in Part 4 of DS-2054 form)</em></td>
</tr>
</tbody>
</table>

**Source Case:**
- Name ______________________________________
- Alien Number ________________________________
- Relationship to Contact ______________________
- Date Contact Ended (mm-dd-yyyy) ______________

**Type of Source Case TB:** *(Mark only one and ATTACH DST RESULTS)*
- Pansusceptible TB
- MDR TB (resistant to at least INH and rifampin)
- Drug-resistant TB other than MDR TB
- Culture negative
- Culture results not available

**Class B Other:** *(specify or give details on checked conditions from worksheets)*
Summary
TST Interpretation

Use ruler

Measure across forearm only, perpendicular to long bones

Induration only (palpable, raised area)

Exclude erythema

Use roller, ballpoint pen
- Date and time of administration
- Arm that is tested (right or left)
- Brand name, lot number, PPD expiration date
- Name of person administering test
- Date and time of reading
- Exact millimeters of induration
  - No induration = 0 mm
  - Never state “positive” or “negative”
- Name of person reading the test
Video – Part 2: PPD Interpretation

http://www.youtube.com/watch?v=Ns7UypJgNiE&feature=channel
BCG and TST

- Administer TST regardless of history of, or evidence of BCG vaccination

Remember …

- Tuberculin test conversion rates after BCG vaccination may be much less than 100%
- Tuberculin sensitivity tends to wane over time after the vaccination
- The mean reaction size among vaccinated persons is often less than 10 mm of induration
BCG and TST

- Also disregard history of BCG when interpreting TST reaction

Remember …

- BCG is given because TB is endemic

- Perform a chest radiograph on all applicants with a skin test reaction of $\geq 10$ mm of induration (or $\geq 5$ mm if a contact), regardless of BCG history
Other Notes

• Exceptions to TST administration
  ▪ Written documentation of prior TST of 10mm or greater induration
    • Once positive = always positive
    • Need chest radiograph

• Immobilization may be needed for young children
  ▪ Papoose boards, other restraints

• Pregnancy is not a contraindication to TST
Other Notes

• Place the test always in a consistent location (i.e. left inner arm) so that negative results can easily be interpreted

• If Varicella, Measles, Rubella like viral infection exists wait at least 4 weeks after the infection ends to administer TST

• Do not place a TST if any live vaccine (like varicella, MMR) applied to applicant in the last 30 days. Wait 30 days at least.

• Do not use any TST result of < 10mm from other medical centers

• May accept written documentation of TST ≥ 10mm. Must include date of the test, millimeters of induration, type of PPD used, and the testing physician’s name and office information
Applicants 2 through 14 Years of Age

LTBI Evaluation

Class B2 TB: Applicants who have a tuberculin skin test $\geq 10$ mm or positive IGRA but otherwise have a negative evaluation for tuberculosis.

The size of the TST reaction or IGRA result, the applicant’s status with respect to LTBI treatment, and the medication(s) used should be documented.
Applicants 2 through 14 Years of Age
LTBI Evaluation

For applicants who had more than one TST or IGRA, document the most recent date and result and whether the applicant’s TST or IGRA converted

Contacts with TST ≥5 mm or positive IGRA require Class B3 and Class B2 classification

• Exception: Do not classify as B2 if applicant already Class B1 TB, Pulmonary.
Class B3 TB, Contact Evaluation

- Applicants who are recent contacts of a known tuberculosis case may require a Class B3 designation depending on:
  - TST measurement
  - Length of time since exposure to contact ended

- The size of the applicant’s TST reaction or IGRA response should be documented

- Information about the source case, name, alien number, relationship to contact, and type of tuberculosis should be documented on the DS-2054 form
Thank You

Questions?