

# Mantoux tuberculin skin test



Facilitator Guide



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# Mantoux Tuberculin Skin Test

## Video Transcript and Facilitator Notes

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The following document is the transcript for the Mantoux Tuberculin Skin Test Videotape. Incorporated within the transcript are facilitator notes offering suggestions for discussion during a training conducted with this videotape.



Facilitator notes are identified by a note symbol followed by a text box.

Counter readings are provided for use in reviewing sections of the videotape. Counter readings are approximate and may vary according to the equipment being used. To begin, zero the meter on your videotape recorder upon appearance of the CDC logo. Do not reset the counter between sections.



The clock symbol at the beginning of each section of the transcript identifies the counter reading for the beginning of that section.

## Introduction

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00:46

An estimated 2 billion people, or one third of the world's population, are infected with the bacteria that cause tuberculosis. One reason so many people are infected with TB is that it's spread through the air from one person to another.

When someone with TB disease of the lungs or throat coughs or sneezes, the bacteria are expelled into the air. If people nearby breathe in these bacteria, they can become infected, and usually the infection remains latent.

In latent TB infection, the bacteria are made inactive by the body's immune system. The bacteria can remain inactive for many years, perhaps for life. Most people who become infected with TB don't get active TB disease.

However, an infected person remains at risk of developing active TB disease at any time. The bacteria can become active and multiply, especially if the immune system becomes impaired.

The bad news is, approximately 2 million people in the world die each year from active TB disease.

The good news is, people who have latent TB infection can get treatment that will prevent the development of active TB disease.

As a health care worker, you play an important role in controlling TB. Your knowledge and skills are valuable in accurately identifying people who have TB infection.

In this video, you'll learn how to test for TB infection by administering and reading the Mantoux tuberculin skin test.

The Mantoux tuberculin skin test should always be placed and read by a designated, trained health care worker.



Discuss skin test training, certification programs, and requirements in your locality. In your work site:

- What type of health care worker is designated to place and read the skin test: a nurse, outreach worker, or someone else?
- Is placing and reading done by one person or different people?
- What courses must be taken by health care workers who place and read the skin test?
- Are there required renewal classes?
- Where and how often is this renewal training offered?

## ***Background on the Mantoux Tuberculin Skin Test***



**02:52**

In the United States, the Mantoux tuberculin skin test has been the standard method for detecting latent TB infection since the 1930s.

The skin test is used to evaluate people for latent TB infection. It's primarily used in two situations.

First, it's used in contact investigations to test close contacts of people who have active TB disease.

Second, it's used as part of targeted testing activities in various groups of people who are at high risk for TB, such as health care workers who serve high-risk clients, residents and employees of correctional facilities, and foreign-born people from areas that have a high TB incidence.

The priorities for targeted testing of high-risk populations should be based on local epidemiologic data.



Discuss the targeted testing program at your facility.

- What are the priorities for testing at your facility?
- Which populations or target groups should be considered for testing?

Once you've decided who should be tested, then you can begin the Mantoux tuberculin skin test procedure.

The two main parts are administering and reading the skin test.

## Part One: Administering the Mantoux Tuberculin Skin Test



04:21

This part of the procedure includes preparation steps, injection steps, and final steps.

The preparation steps include collecting supplies, providing patient education, washing your hands, locating and cleaning the injection site, and preparing the syringe.

When preparing to administer the Mantoux tuberculin skin test, make sure that the area for administering the test has a firm, well-lit surface, and that equipment and supplies are ready.

Supplies should include a vial of tuberculin, a single-dose disposable tuberculin syringe, a ruler with millimeter (mm) measurements, 2x2 gauze pads or cottonballs, alcohol swabs, a puncture-resistant sharps disposal container, record-keeping forms for the patient and provider, and a pen.

Tubersol® and Aplisol® are the two commercially available tuberculin products. The multidose vials contain tuberculin for either 10 or 50 tests.

The tuberculin is administered using a single-dose disposable tuberculin syringe that has a one-quarter to one-half inch, 27-gauge needle with a short bevel.

In the United States, the Mantoux tuberculin skin test consists of an intradermal injection of exactly one tenth of a milliliter (mL), which contains 5 tuberculin units.

Syringe and needle technologies continue to evolve to help prevent needlestick injuries. Institutional policy should determine which skin test device has been evaluated and approved for use by your facility.



Discuss and demonstrate the needle technology that has been selected for use at your facility.

Look at the vial label to make sure the vial contains the tuberculin that you want to use, including the tuberculin unit strength.

The label should indicate the expiration date. If it's been open more than 30 days or the expiration date has passed, the vial should be thrown away and a new vial used.

When you open a new vial, write the date and your initials on the label to indicate when the vial was opened and who opened it.

To avoid reducing the potency of the tuberculin, store it inside a refrigerator so that it remains between 35 and 46 degrees Fahrenheit or between 2 and 8 degrees Centigrade.

Also store and transport the tuberculin in the dark as much as possible and avoid exposure to light.

In certain settings, such as when you're in the field, you may need to use another type of cooling container to control the temperature and protect from light.



Discuss the type of cooling device used by your facility in settings when a refrigerator is not nearby.

After collecting supplies, the next step is patient education. You should sit so that you are both comfortable and facing each other.

Discuss why the skin test is given, what is involved in the procedure, and when the patient should return for the test to be read. Explain that 48 to 72 hours after the test is administered, the patient must return to have the induration measured and evaluated. Make an appointment for the patient to return.

If a patient can't return within the 48- to 72-hour time period, do not administer the test. Instead, schedule another time that allows the patient to come for both the test and the return appointment.

It's also important to encourage the patient to ask questions and talk about any anxieties he or she may have about the test.

That way you can answer any questions and ease any fears the patient may have. Consult local practice to find out how best to document informed consent in your setting.



Discuss whether or not your program has a consent form that must be signed by the patient or another way to ensure informed consent. Also discuss translation options for patients who do not speak English.

After providing patient education, you should wash your hands, using an appropriate hand-washing technique, before administering the test or any other procedure involving patient contact. In certain field settings it may be necessary to use other hand-hygiene techniques.



Review the steps for appropriate hand washing and hand hygiene. Discuss the alternatives available in settings where soap and water are not accessible. For more information see “Guideline for Hand Hygiene in Healthcare Settings,” MMWR, Vol. 51, No. RR-16, October 25, 2002. This guideline is also available on-line at <http://www.cdc.gov/handhygiene/>.

On a firm, well-lit surface, expose the patient’s arm and slightly flex it at the elbow. The injection should be placed on the palm-side-up surface of the forearm, about 2 to 4 inches below the elbow. Your local institutional policy may specify the right or the left forearm for the skin test.

The area selected should be free of any barriers to placing and reading the skin test such as muscle margins, heavy hair, veins, sores, or scars.

If the patient has any of these at the site, then you should use the other arm or the standard alternative site selected by your institution.



The videotape demonstrates consistent placement on the left arm. Typically, the other arm is used as the alternate site; however, in some situations other alternatives need to be considered (the shoulder is demonstrated as an alternative site, as it is often selected in patients who have less skin turgor). Describe the skin test placement site selection standards for your facility.

- What is the standard arm used for placement?
- What is the standard alternative site if there are barriers to placing on that arm?
- Are there any other alternative sites?

Discuss the importance of documenting the alternative site in the patient's chart or other record-keeping forms.

After choosing the injection site, clean the area with an alcohol swab by circling from the center of the site outward. Allow the site to dry completely before the injection. Because some of the tuberculin solution can adhere to the inside of the plastic syringe, the skin test should be given as soon as possible after the syringe is filled.

Always follow your institution's standard precautions for infection control.



Discuss your institution's policies for infection control while placing the skin test. Scenes in the videotape demonstrate placement with gloves and without gloves. Discuss whether gloves are used in your facility, and under what circumstances.

Wipe the top of the vial with a new alcohol swab before drawing up the tuberculin solution.

Pick up the syringe and be sure to fasten the needle tightly on the syringe by holding the cap and twisting it onto the tip of the syringe. Next, remove the needle cap.

The needle bevel should be perpendicular to the flange of the syringe. If necessary, turn and tighten the needle to line up the bevel correctly with the flange.

Place the vial on a flat surface, hold the vial between the thumb and fingers, and insert the needle through the neoprene stopper.

Invert the vial while keeping a firm hold on the syringe and plunger. The tip of the needle should be below the fluid level in the vial.

Pull back on the plunger and draw out slightly more than the one tenth of a milliliter needed for the test.

Remove the needle from the vial. Hold the syringe in an upright position, then draw back slightly on the plunger. Tap the syringe lightly to break up air bubbles, then push forward.

Expel all air and excess fluid from the syringe and needle, leaving exactly one tenth of a milliliter of tuberculin solution in the syringe.

The second step in administering the Mantoux tuberculin skin test is injection. You'll inject the tuberculin, discard the needle and syringe, check that the skin test was administered properly, and repeat the test if needed.

Stretch taut the selected area of skin between the thumb and forefinger.

This provides a surface that is easier for the needle to penetrate. With the needle bevel facing up and the syringe flange parallel to the forearm, hold the syringe between your thumb and forefinger.



There are several techniques for pulling the skin taut for placement (e.g., pulling from under the arm, inserting with one hand from the side, pulling toward the wrist with one finger). Only two techniques are demonstrated in the videotape. If a different technique is used at your facility, describe it.

The Mantoux tuberculin skin test is an intradermal injection.

With the needle bevel against the patient's skin, insert it slowly at a 5- to 15-degree angle.

The 5- to 15-degree angle is very important because this layer of skin is very thin.

For an intradermal injection, the needle bevel is advanced through the epidermis, the superficial layer of skin, approximately 3 mm so that the entire bevel is covered and lies just under the skin.

The injection will produce inadequate results if the needle angle is too deep or too shallow.

When the needle is inserted at the correct angle you can see the bevel of the needle just below the skin surface. Next, release the stretched skin and hold the syringe in place on the forearm.

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

Now, slowly inject the tuberculin solution. You should feel fairly firm resistance as the tuberculin enters the skin. A tense, pale wheal that's 6 to 10 mm in diameter appears over the needle bevel. Remove the needle without pressing or massaging the area.

Next, discard the used syringe immediately in the designated puncture-resistant container.

If you're using a safety needle, engage the safety-needle mechanism before discarding.

To prevent needlestick injuries, used needles should not be recapped, purposely bent or broken, removed from disposable syringes, or otherwise manipulated by hand.

It's not unusual for a drop of blood to appear at the injection site, even when the needle is inserted properly.

Should this happen, lightly blot the blood away with a 2x2 gauze pad or cotton ball. Do not cover the site with an adhesive bandage because the adhesive could cause irritation and interfere with the test. Properly dispose of the contaminated gauze pad. To determine if the skin test was administered properly, use the millimeter ruler to immediately measure the wheal at its maximum size.

The wheal should be at least 6 mm in diameter.

If the wheal is less than 6 mm in diameter, then the test should be administered again.

The needle bevel may have been inserted too deeply or an inadequate dose administered.

If leakage occurs at the insertion site, the needle bevel may not have been inserted far enough for the bevel to be covered by the skin.

If the tuberculin test must be repeated, use another site at least 2 inches, or 50 mm, from the original site. Or use the standard alternate placement site. You will need to indicate this alternate site when you fill out the record keeping forms.

The final step in administering the Mantoux tuberculin skin test includes washing your hands, recording information, reminding the patient about the return visit, providing patient education, and returning the vial to the refrigerator.

In this step, immediately and thoroughly wash your hands.

This step also includes recording information on the patient's chart and other record-keeping forms. Write the date and the time the test was administered, the name and manufacturer of the injected solution, the lot number, the tuberculin dose administered, the expiration date, the forearm or alternative site in which the injection was given, the site location if you repeat the test, the name of the person who administered the test, and the reason for giving the skin test.



Provide copies of the record-keeping forms used at your facility and demonstrate how the information should be recorded.

Since it's important for the patient to return within 48 to 72 hours to have the test result read, always remind the patient to return. Giving the patient a card with information on care of the site and the date for the return appointment may help serve as a reminder.

Explain that mild itching, swelling, or irritation may occur and that these are normal reactions that do not require any treatment. These types of reactions usually go away within a week. Explain how to care for the injection site after the test.

Tell the patient to avoid scratching the site, keep the site clean and dry, and avoid putting creams, lotions, or adhesive bandages on it. Also mention that getting the site wet with water is not harmful, but the site should not be wiped or scrubbed.

Finally, return the tuberculin vial to the refrigerator, or other cooling container if you are in the field.

## Review of Part One

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**18:02**

In review, remember that when you administer the Mantoux tuberculin skin test, the preparation steps include collecting the supplies, providing patient education, washing your hands, locating and cleaning the injection site, and preparing the syringe.

The injection steps include injecting the tuberculin at a 5- to 15-degree angle, discarding the needle and syringe properly, checking that the skin test was administered properly, and repeating the test if needed.

The final steps include washing your hands, recording the information, reminding the patient about the return visit, providing patient education, and returning the vial to the refrigerator.

## Part Two: Reading the Mantoux Tuberculin Skin Test

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19:02

The last part of the procedure is to read the Mantoux tuberculin skin test. The method demonstrated in this videotape is based on the palpation method. The steps include collecting supplies; inspecting the site; palpating, marking, and measuring the induration; and recording the measurement.

There are several different methods for reading the Mantoux tuberculin skin test, and they can vary among facilities. For each facility, everyone reading the skin test should receive training in and use the same method.

A great deal of practice is required to achieve consistently reliable measurements.

The skin test should be read between 48 and 72 hours after the skin test has been administered.

A patient who doesn't return within 72 hours will probably need to be rescheduled for another skin test.

To begin, collect the following supplies: a small, plastic, flexible ruler marked in millimeters to measure the test, a pen to mark the edges of the induration, and an alcohol pad to clean off the pen marks. You'll need the patient's record or other appropriate forms for documenting the measurement results.



A sharp eyeliner pencil and baby oil can be substituted for the pen and alcohol pad, to remove the marks easily. This is especially useful if blinded duplicate readings are done as part of quality control.

Also have culturally appropriate patient education materials available for the patient to reinforce information that is explained to the patient, help answer questions, and provide information on follow-up evaluation.



Patient education materials are available from CDC and the National TB Model Centers (see Appendix C). In addition, the National Prevention Information Network (<http://www.cdcnpin.org>) provides access to a TB Resource Guide that has information about where to find TB educational materials and other resources. Discuss the utility of sharing appropriate patient education materials with the patient prior to placing the test as well as prior to reading the test.

To locate the skin-test site, inspect the arm in good light and on a firm surface. When the site is on the forearm, turn the arm palm up, support it, and slightly flex it at the elbow.

The basis of reading the skin test is the presence or absence of induration, which is a hard, dense, raised formation. This is the area that is measured.

Sometimes the site has erythema, a reddening of the skin that can also have swelling. The erythema should NOT be measured.

Whatever induration is present at 48 to 72 hours should be measured and recorded. Only the part of the reaction that can be felt, which is the induration, is measured, even if there is soft swelling or redness at the site. Keep in mind there might not be an induration.

Reactions to the tuberculin test at the injection site can range from no induration to a large, well-defined induration.

In order to feel the induration properly, keep your fingernails short enough so that they don't protrude beyond the finger.

The induration is not always visible, so you must rely on palpation with your fingertips to discover if there's induration at the site.

With your fingers together, touch the area lightly with the pads of your fingertips.

Using a light, gentle motion, sweep the fingertips over the surface of the forearm in a 2-inch diameter in all four directions to locate the margins or edges of induration.



Explain how the fingertips are swept from north to south, south to north, east to west, and west to east. Explain that there should be no pushing or prodding to find the induration, only gentle sweeping motions.

If induration is present, use a zigzag, feather-like touch over the area of induration to outline the margins of induration. Determining margins all around the induration helps to find the edges, which will be measured later.

When palpating for margins, be careful not to confuse a margin of induration with a margin of muscle on the forearm. To check this, raise the patient's arm to a 45-degree angle and palpate again. You should still be able to palpate the margins of induration.

The diameter of the induration is measured across the forearm, from the thumb side of the arm to the little finger side of the arm or vice versa.



Explain that the orientation of the line of measurement can be remembered by visualizing the direction in which a watchband lies across the arm.

To mark the edges of the induration, hold your palm over the injection site with your fingertips at the outer edge of the patient's forearm. Without lifting, move the fingertips from the outer edge of the forearm towards the induration. Rest one fingertip firmly against the induration margin border on one side before marking the margin. The fingertip should remain in contact with the skin at all times. Mark lightly with a fine dot at the widest edge of the induration, using the fingertip as a guide.

Repeat the procedure from the other side of the patient's forearm and place the second mark on the margin of induration. Palpate again to double check that the induration was marked correctly.

If the margin is not equally clear all the way around the induration, it's still necessary to mark the margins on each side of the induration. Palpate around the induration from the easily felt margin to the not-so-easily-felt margin.

If the margins of induration are irregular, mark and measure the longest diameter across the forearm.

To measure the diameter of the induration, use the millimeter ruler.

Place the zero ruler line inside the left dot edge and read the ruler line inside the right dot edge. If the measurement falls between two divisions on the millimeter scale, record the lower mark. The induration shown here measures 10 mm.

Reactions to the skin test will vary. For example, this is a very large reaction with blistering, swelling, and redness.

Make sure to record blistering, even if no induration is present. Palpate this induration gently, as it may be painful. Measure only the induration.

This reaction measures 17 mm.

There is redness and swelling in this reaction, but there is no induration. Because only the margins of induration are significant, the redness and swelling should not be mistakenly measured.

Therefore, the measurement of this induration is 0 mm.

Immediately after the test is measured, write the exact measurement in millimeters of induration on the patient's record. Do not simply record the interpretation of the results as "negative" or "positive," and do not record the results in centimeters.

For example, an induration that measures 3 mm should be recorded as "3 mm" and not as "negative."

Additional information should include the date and time the test was read, the name and signature of the person who read the skin test, and the presence or absence of adverse effects.

State or local policies may require additional documentation of adverse effects.



Discuss the documentation policies and procedures in your facility. Share a copy of the documentation form(s) that is used in your facility. Describe any additional documentation that may be necessary for reporting adverse effects (e.g., MedWatch forms).

Accurately reading and recording skin test measurement results is important and gives the health care provider useful information for evaluation. Results are often used as a baseline or as a comparison with past or future test results.

Interpretation should be performed by a trained health care provider in accordance with institutional policies based on CDC guidelines.

Check your institution's policy for evaluation and referral procedures.



Discuss your facility's policy for interpretation of the skin test measurement. If interpretation is conducted by the same person who reads the skin test, discuss cut points for interpretation (see Appendix D). If interpretation is conducted by someone else at your facility, discuss evaluation and referral procedures.

Reliable reading of the tuberculin skin test requires a great deal of practice and adherence to appropriate steps for quality control.

The steps in this method include standardization of procedures, training, supervision, and practice. This may include periodic standardized reliability testing.



Discuss the opportunities available for additional practice and training on the Mantoux tuberculin skin test in your facility. Discuss any reliability testing and supervision procedures that are used at your facility.

- Who will supervise the readings?
- How many readings need to be performed before supervision is no longer necessary?

## Review of Part Two

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**27:53**

In review, remember: when you read the Mantoux tuberculin skin test, you should collect the appropriate supplies; inspect the site; palpate the induration; mark the induration; measure the induration, not the erythema; and record the measurement.

## Closing

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**28:17**

Although it takes practice to perform the Mantoux skin test accurately and reliably, the skills and knowledge you develop in administering and reading the Mantoux tuberculin skin test will help you play an important role in TB control.

**Appendix A:**  
**Mantoux Tuberculin Skin Test References**

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**Diagnostic Standards / Classification of TB in Adults and Children** - Am J Respir Crit Care Med 2000; 161: 1376-1395

**Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection** - MMWR 2000; 49 (No. RR-6)

## ***Appendix B: Ordering Information***

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The Mantoux Tuberculin Skin Test Training Materials Kit may be ordered:

- Through the Division of Tuberculosis Elimination (DTBE) on-line ordering system:  
<http://www.cdc.gov/tb>
- By mailing or faxing the DTBE Educational and Training Materials Order Form, available at  
<http://www.cdc.gov/tb>

## **Appendix C: Additional Resources and Information**

Additional resources and information on the Mantoux tuberculin skin test can be obtained from the Division of Tuberculosis Elimination through the Centers for Disease Control and Prevention and the National Tuberculosis Model Centers.

### **Centers for Disease Control and Prevention**

National Center for HIV, STD, and TB Prevention  
Division of Tuberculosis Elimination  
1600 Clifton Road, MS E-10  
Atlanta, GA 30333  
Phone: (404) 639-8140  
Email: [tbinfo@cdc.gov](mailto:tbinfo@cdc.gov)  
<http://www.cdc.gov/tb>

### **National Tuberculosis Model Centers**

#### **Charles P. Felton National Tuberculosis Center**

2238 Fifth Avenue, First Floor  
New York, NY 10037  
Phone: (212) 939-8254  
Fax: (212) 939-8259  
Email: [tbcenter\\_info@columbia.edu](mailto:tbcenter_info@columbia.edu)  
<http://www.harlemtbcenter.org/>

#### **Francis J. Curry National Tuberculosis Center**

3180 Eighteenth Street, Suite 101  
San Francisco, CA 94110-2028  
Phone: (415) 502-4600  
Fax: (415) 502-4620  
Email: [tbcenter@nationaltbcenter.edu](mailto:tbcenter@nationaltbcenter.edu)  
<http://www.nationaltbcenter.edu/index.html>

**New Jersey Medical School National  
Tuberculosis Center**

University of Medicine and Dentistry of New Jersey  
225 Warren Street, Second Floor East Wing

Newark, NJ 07103-3620

Phone: (973) 972-3270

Fax: (973) 972-3268

Information Line: (800) 4TB-DOCS (482-3627)

Email: [amessa@umdnj.edu](mailto:amessa@umdnj.edu)

<http://www.umdnj.edu/ntbcweb/tbsplash.html>

## **Appendix D:** ***Mantoux Tuberculin Skin Test Interpretation Table***

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Skin test interpretation depends on

- (1) the measurement in millimeters (mm) of the induration and
- (2) the person's risk of being infected with TB and/or progression to disease if infected.

The following three cut points should be used to determine whether the skin test reaction is *positive*. A measurement of 0 mm or anything below the defined cut point for each category is considered *negative*.

Induration of $\geq 5$ mm is considered positive in	Induration of $\geq 10$ mm is considered positive in	Induration of $\geq 15$ mm is considered positive in
<ul style="list-style-type: none"> <li>• Human immunodeficiency virus (HIV)-positive persons</li> <li>• Recent contacts of TB case patients</li> <li>• Persons with fibrotic changes on chest radiograph consistent with prior TB</li> <li>• Patients with organ transplants and other immunosuppressed patients (receiving the equivalent of <math>\geq 15</math> mg/d of prednisone for 1 month or more. Risk of TB in patients with corticosteroids increases with higher dose and longer duration.)</li> </ul>	<ul style="list-style-type: none"> <li>• Recent immigrants (i.e., within the last 5 years) from high-prevalence countries</li> <li>• Injection drug users</li> <li>• Residents and employees<sup>†</sup> of the following high-risk congregate settings: prisons and jails, nursing homes and other long-term facilities for the elderly, hospitals and other health care facilities, residential facilities for patients with acquired immunodeficiency syndrome (AIDS), and homeless shelters</li> <li>• Mycobacteriology laboratory personnel</li> <li>• Persons with the following clinical conditions that place them at high risk: silicosis, diabetes mellitus, chronic renal failure, some hematologic disorders (e.g., leukemias and lymphomas), other specific malignancies (e.g., carcinoma of the head, neck, or lung), weight loss of <math>\geq 10\%</math> of ideal body weight, gastrectomy, and jejunioileal bypass</li> <li>• Children <math>&lt; 4</math> years of age, or infants, children and adolescents exposed to adults at high risk</li> </ul>	<ul style="list-style-type: none"> <li>• Persons with no known risk factors for TB</li> </ul>

<sup>†</sup> For persons who are otherwise at low risk for TB and who are tested at the start of employment, a reaction of  $\geq 15$  mm is considered positive.