

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.00 Table of Contents	Page 1 of 1

Table of Contents

2.00 Testing for LTBI

2.01 [The Tuberculin Skin Test \(TST\)](#)

2.02 [Targeted Tuberculin Testing](#)

 2.02.1 [Screening Foreign Born Persons](#)

 2.02.2 [Screening Long-Term Care Facilities](#)

 2.02.3 [Screening Correctional Facilities](#)

2.03 [Information for School Nurses Kindergarten through 12th Grade](#)

2.04 [Administering the TST](#)

2.05 [Reading the TST](#)

2.06 [Classification of TST Reactions](#)

2.07 [Interferon Gamma Release Assay \(IGRA\)](#)

2.08 [Diagnosing LTBI](#)

 2.08.1 [Persons at Increased Risk for Progression of LTBI to TB Disease](#)

2.09 [Two-Step Testing](#)

2.10 [Special Considerations in Testing for LTBI](#)

2.11 [Diagnostic Services Program](#)

2.12 [Anergy Testing](#)

2.13 [References](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.01 The Tuberculin Skin Test	Page 1 of 2

The Tuberculin Skin Test (TST)

Policy: The TST is one of the current testing methods utilized in Missouri to detect individuals who may have been infected with *Mycobacterium Tuberculosis*.

Purpose: To provide basic information concerning the tuberculin skin test.

1. The TST detects antibodies produced in individuals infected with *M. tuberculosis*.
2. The skin test is administered intradermally using the Mantoux technique by injecting 0.1 ml of 5 TU (tuberculin unit) purified protein derivative (PPD) solution.
 - a. PPD is available in various strengths, containing one (1) tuberculin unit (TU), 5 TU, and 250 TU.
 - b. Only 5 TU is routinely used in public health and is the only strength of PPD addressed in this manual.
3. If a person is infected, a delayed-type hypersensitivity reaction is detectable 2 – 8 weeks after infection.
4. Interpretation of TST reactions should be conducted within 48 – 72 hours after administration by a trained health care professional.
 - a. If the test is not read within the 48 – 72 hour window it must be repeated.
 - Patients or family members should NOT interpret or read TST results.
5. Because PPD is light and heat sensitive, when not in use it should be protected from light and stored in a refrigerator at 35 – 46° Fahrenheit.
6. While in use in the field the PPD temperature should be maintained.
7. PPD should never be transferred from one vial to another.
8. Label the PPD vial with the date it was opened. PPD is only good for up to 30 days after it has been opened and any unused PPD after the 30 days should be discarded.
9. The TST should not be performed on a person:
 - Who has written documentation of either a positive TST result or prior treatment for tuberculosis (TB) disease
 - With known blistering at the site of a previous TST
 - With known anaphylactic reaction after a previous TST

NOTE: A repeat TST should be done if there is not written documentation for a patient at risk, unless they have had blistering or an anaphylactic reaction to a previous positive TST. If this is not known then an Interferon Gamma Release Assay (IGRA) should be done instead.

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.01 The Tuberculin Skin Test	Page 2 of 2

10. TB disease must be ruled out before initiating treatment for Latent Tuberculosis Infection (LTBI) to prevent inadequate treatment of TB disease and possible drug resistance.

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.02 Targeted Tuberculin Testing	Page 1 of 2

Targeted Tuberculin Testing

Policy: Targeted testing programs should be conducted among groups at risk for recent infection with *M. tuberculosis* and those who are at increased risk for progression to active tuberculosis (TB).

Purpose: To identify persons at high risk for TB who would benefit from treatment of LTBI.

Persons at high risk for developing TB disease fall into two broad categories:

1. Recently Infected:

The risk of progression is greatest within the first 1-2 years after exposure. Persons likely to have been recently infected with *M. tuberculosis* include the following:

- ❖ Close contacts of infectious TB disease cases.
- ❖ Recent TST converters.
 - ❖ Person with baseline testing results that have an increase of 10mm or more in the size of the TST reaction within 2 years of a previously documented negative TST.
- ❖ Persons who have emigrated from TB-endemic regions of the world.
- ❖ Children <5 years of age who have a positive TST.
- ❖ Persons who work or reside in facilities/institutions with people who are at high risk for TB such as hospitals, homeless shelters, correctional facilities, nursing homes, group homes, residential facilities for patients with HIV, or residential substance abuse treatment facilities.

2. Clinical conditions associated with progression from LTBI to TB disease:

- ❖ HIV Infection
- ❖ Injection drug use
- ❖ Radiographic evidence of prior healed TB
- ❖ Low body weight (>10% below ideal)
- ❖ Other medical conditions:
 - ✓ Silicosis
 - ✓ Diabetes
 - ✓ Chronic renal failure or on hemodialysis
 - ✓ Gastrectomy
 - ✓ Jejunioleal bypass
 - ✓ Solid organ transplant
 - ✓ Head and neck cancer
 - ✓ Prolonged use of steroids or TNF-*a* antagonist

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.02 Targeted Tuberculin Testing	Page 2 of 2

Screening of low-risk persons is discouraged because it diverts resources from activities of higher priority. However, low risk persons can be screened if resources allow.

TST testing is also discouraged unless a plan has been developed to complete a course of treatment in persons found to have LTBI. “A decision to test is a decision to treat.”

This would include:

- Arrangements for medical evaluation
- Chest x-rays
- Medical supervision for a course of treatment
- A plan of care for follow up including treatment adherence and addressing missed doses

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.02.1 Screening Foreign-Born Persons	Page 1 of 1

Screening Foreign-Born Persons

Tuberculosis (TB) cases among foreign-born persons make up a large percentage of the total number of cases in Missouri. In some countries, TB is much more prevalent than it is in the United States; therefore, persons emigrating from TB endemic countries will have a higher prevalence of TB infection and disease.

STATEWIDE RECOMMENDATIONS:

Foreign-Born Students: As of August, 2013, revised statute 199, section 199.290.1 requires:

1. All students and faculty to be screened for TB upon matriculation and those identified with risk factors must be tested.
2. Any entering student of an institution of higher education in Missouri who does not comply with the targeted testing program shall not be permitted to maintain enrollment in the subsequent semester at such institution.

Foreign-Born Persons That Have Been in U.S. Less Than Five Years: Recognizing that recent arrival to the United States from TB-endemic countries is a significant risk factor for the development of TB in foreign-born individuals, it is recommended that these individuals be considered high priority for TB screening and TB infection treatment. Specifically, it is recommended that foreign-born persons (including students, immigrants, and refugees), notably those from endemic countries*, who have TB infection as evidenced by a positive TB test [TST or IGRA] and who have been in the United States less than five years, receive TB infection treatment, **regardless of age or BCG vaccination status.**

*A list of high TB burden countries can be found at: <http://www.stoptb.org/countries/tbdata.asp>

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2..02.2 Screening Long-Term Care Facilities	Page 1 of 4

Screening Long-Term Care Facilities

The control and prevention of tuberculosis (TB) in the elderly must be accomplished in order to eliminate TB as a public health problem.

Many of the elderly were infected with TB years ago, with the tubercle bacilli dormant most of the time. When the bacilli occasionally became active and began reproducing, the normal immune system quickly overcame the problem. As the body ages, the immune system becomes less active, and other medical problems may develop that further increase the risk of TB infection becoming active disease. If TB disease is in the lung, which is the most common site, the person may start coughing and expelling the organisms into the air. This can be especially devastating in a long-term care facility, where many susceptible elderly persons are sharing the same air.

It is therefore important for each long-term care facility to have a TB control program in place. This must include the documentation of the TB status of each resident, staff member and volunteer of each long-term care facility. This can best be accomplished by screening residents on admission, and pre-employment and annual testing of employees and volunteers as outlined below.

Missouri State Regulations: 19 CSR 20-20.100 (Appendices, or https://www.sos.mo.gov/cms_images/adrules/csr/current/19csr/19c20-20.pdf).

Recommendations for Residents

All residents new to long-term care who do not have documentation of a previous skin test reaction $\geq 10\text{mm}$ or a history of adequate treatment of TB infection or disease, should have the initial test of a Mantoux PPD two-step test to rule out TB within one month prior to or one week after admission. If the initial result is 0-9mm, the second test, which can be given after admission, should be given at least one week and no more than three weeks after the first test. The results of the second test should be used as the baseline. Documentation of a chest x-ray ruling out active pulmonary TB within one month prior to admission, along with an evaluation to rule out signs and symptoms of TB, may be acceptable by the facility on an interim basis until the Mantoux PPD two-step test is completed.

The two-step test is recommended due to the “booster phenomenon,” which can occur at any age, but is more pronounced with increased age. The body’s response to tuberculin (the antigen in PPD), once that response has been established by infection with TB (or other mycobacteria), may gradually wane over the years. The initial test of two-step test may result in a falsely negative (0 – 9 mm) reading. However, that initial test stimulates the body to respond normally to a subsequent test. This can cause confusion at a later time if the resident is skin tested either as a result of symptoms of TB disease or as a contact to a newly diagnosed infectious person. The “boosted”

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2..02.2 Screening Long-Term Care Facilities	Page 2 of 4

skin test then may appear to be the result of new infection, which puts the individual at much higher risk of progressing to TB disease. Therefore, it is imperative to purposely elicit this boosted response deliberately in all persons in whom it is important to know their TB status.

All skin test results of 5mm or more for contacts to infectious TB or for an individual who is immunocompromised, or 10mm or more for all others, whether documented in the resident's medical history, obtained by the first test, or obtained by the second of the two-step test applied by the facility, require a chest x-ray within one week, or a review of the results of a chest x-ray taken within one month prior to admission along with an evaluation to rule out current TB disease. It is important to also perform an evaluation to determine if signs and symptoms of TB (unexplained weight loss, fever, and persistent cough) are present. Once TB disease is ruled out, it is important to record the results of the skin test in millimeters (mm), in a prominent place on the resident's medical record.

Individuals with a positive finding presenting evidence of a recent, within one month of the date of admission, chest x-ray need not be given a new x-ray. However, the results of the chest x-ray must be reviewed in the light of the additional information of the identification of TB infection as indicated by the Mantoux PPD skin test.

An individual who is skin-test positive with a normal chest x-ray and no signs or symptoms of TB should be considered for preventive (LTBI) medication.

Those who complete a recommended (documented) course of preventive treatment and those for whom preventive treatment is not medically indicated do not need further testing, unless signs and symptoms of TB are present.

Staff persons must be constantly vigilant for signs and symptoms of TB in residents and obtain a medical evaluation, chest x-ray, and sputum for acid-fast bacilli should they appear.

Recommendations for Employees

The results of annual tuberculin testing of employees in a long-term care facility are a good indicator of the extent of transmission of TB within that facility. All new long-term care facility employees and volunteers who work 10 or more hours weekly are required to obtain a Mantoux PPD. (<http://s1.sos.mo.gov/cmsimages/adrules/csr/previous/19csr/19csr0806/19c20-20.pdf>)

Every facility should have a TB surveillance program that includes the following procedures:

1. Initial Examination. Provide a tuberculin skin test (Mantoux, 5 tuberculin units (TU) of purified protein derivative (PPD) to all employees during pre-employment procedures, unless a previous reaction ≥ 10 mm is documented. If the initial skin test result is 0 -9 mm, a second test should be given at least one week and no more than three weeks after the first test. The results of the second test should be used as the baseline in determining

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.02.2 Screening Long-Term Care Facilities	Page 3 of 4

treatment and follow-up of these employees. A history of BCG (bacilli Calmette-Guerin) does not preclude an initial screening test, and a reaction of 10 mm or more should be managed as a TB infection. A chest x-ray examination should be provided for employees who have a skin test reaction ≥ 10 mm or who have symptoms compatible with pulmonary TB in order to determine the presence of current disease.

2. Repeated Tuberculin Skin Tests. It is required that employees with an initial negative two-step PPD be tested annually with a one-step PPD to prevent them from developing disease and infecting others. Preventive therapy is recommended for all infected employees, unless specifically contraindicated, to prevent them from developing disease and infecting others. Infected employees who are without disease and who do not complete a course of preventive therapy will need an individualized plan of surveillance. Those who are at high risk of developing disease, i.e. converters, should be assigned where they cannot expose small children, immunocompromised patients, and others for whom the consequences of infection may be especially serious.
3. Repeat Chest X-Ray. After the initial evaluation of persons with skin test reactions ≥ 10 mm, routine repeated chest x-rays are not recommended. They are neither a substitute for preventive therapy nor vigilance for signs and symptoms of TB disease. Employees who have completed an adequate course of treatment or preventive treatment should be exempt from further chest x-rays unless they become symptomatic.
4. Positive Reactors with Symptoms of TB. All persons that test positive, with or without treatment should be instructed to seek immediate medical attention if they develop symptoms of TB disease.
5. Contact Investigations. When there is an exposure to a suspected or recently diagnosed case of TB, a contact investigation should be conducted. Each person exposed who previously had a documented negative reaction to the skin test should receive a tuberculin test. Those who are still negative should be retested eight to ten weeks after exposure. Preventive therapy should be given to high-risk contacts (i.e. immunocompromised) with negative skin tests since they may be infected, even though their skin tests have not yet converted.

Chest x-rays should be provided for employees whose skin test reactions increase ≥ 6 mm for ≤ 10 mm to ≥ 10 mm. Treatment for infection or disease should be provided according to the results of the x-ray and the medical evaluation.

All employees or volunteers that were exposed and tested shall have a documented annual evaluation to rule out signs and symptoms of TB. If the employee should develop signs and symptoms of TB they should be seen immediately by a medical provider, obtain a

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2..02.2 Screening Long-Term Care Facilities	Page 4 of 4

chest x-ray, and sputums for AFB smear and culture to rule out TB. The facility should be in contact with their local public health agency staff for further recommendations. The employee/volunteer should be given a surgical mask and instructed to wear it when being seen for medical evaluation and chest x-ray and should avoid being in public places until further direction by the facility in collaboration with the local health agency.

6. Evaluation. The data generated from this testing should be analyzed periodically to determine and revise policies. The best index of the effectiveness of the program will be the absence of new infections in employees.

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2..02.3 Screening Correctional Facilities	Page 1 of 2

Screening Correctional Facility Staff and Inmates

Policy: To ensure that tuberculosis (TB) evaluation and control services are provided for residents and staff of the Missouri Department of Corrections, according to MO 19 CSR [20-20.100](#).

Purpose: To control TB within the Missouri Department of Corrections by early identification of those persons with infectious TB and providing appropriate isolation and anti-TB medication regimens, early identification of those with TB infection and providing infection treatment, and by rapid contact identification, investigation, evaluation and follow-up for all residents and staff of the Department.

Procedure: **Initial Screening**

Staff members: Upon employment, all staff members of the Missouri Department of Corrections, including volunteers who spend 10 or more hours weekly within the system, and who do not have documentation a tuberculin skin test reaction of ≥ 10 mm, will be screened for TB, using the Mantoux PPD two (2)-step tuberculin skin test or the Interferon Gamma Release Assay (IGRA). (See Chapter 3 of the *Core Curriculum on Tuberculosis: What the Clinician Should Know* located at: https://www.cdc.gov/tb/education/corecurr/pdf/corecurr_all.pdf). This screening may be provided at the local public health agency (LPHA), under contract to the Missouri Department of Corrections, or by the person’s own health care provider. Documentation of the reaction to the tuberculin skin test reported in mm of induration and positive blood assay results must be presented to the TB elimination coordinator of the institution. **All positive results must be reported to the Missouri Department of Health and Senior Services TB Elimination Program on Form TBC-4**

(See the *TB Case Management Manual; Appendices/Sample Forms* located at: <http://health.mo.gov/living/healthcondiseases/communicable/TB/tbmanual/pdf/Appendices.pdf>).

Inmates: Upon entrance into the Department of Corrections system, all residents will be screened for TB, **using an approved TB screening test** (see Chapter 3 of *Core curriculum on TB: What the Clinician Should Know* located at https://www.cdc.gov/tb/education/corecurr/pdf/corecurr_all.pdf). This screening will be provided at the Department of Correction Reception Centers. Documentation of the reaction to the tuberculin skin test, reported in mm of induration, and positive blood assay results become a part of the resident’s medical record.

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2..02.3 Screening Correctional Facilities	Page 2 of 2

All positive reactions to the tuberculin skin test are reported to the Department of Health and Senior Services TB Control Program on Form TBC-4 (see the *TB Case Management Manual; Appendices/Sample Forms* located at:

<http://health.mo.gov/living/healthcondiseases/communicable/TB/tbmanual/pdf/Appendices.pdf>.

Annual Screening

Staff members: All staff members with tuberculin skin test reaction \leq 10 mm will have an annual Mantoux PPD tuberculin skin test, (1) step only or IGRA during each employee's birth month.

Inmates: All inmates with tuberculin skin test reaction \leq 10 mm will have an annual Mantoux PPD tuberculin skin test, (1) step only or IGRA during each inmate's birth month.

For more information on Department of Corrections Guidelines see the American Correctional Association at: https://www.bop.gov/resources/pdfs/TB_CPG.pdf.

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.03 Information for School Nurses Kindergarten – 12 th Grade	Page 1 of 2

Information for School Nurses Kindergarten – 12th Grade

For effective tuberculosis (TB) control among school employees in Missouri, the following policies are recommended:

All personnel, paid and unpaid, who work with children in a school environment shall be certified free from TB in an infectious form prior to beginning employment. This includes an evaluation that indicates **no signs or symptoms** of infectious TB disease (persistent cough for ≥ 3 weeks, unexplained weight loss, fever, night sweats, general malaise) **AND** one of the situations described below:

1. An individual who has documentation of a Mantoux PPD tuberculin skin test reading of 0 – 9 mm within the past month, or a negative IGRA, and no history of contact with a person with TB immediately prior or subsequent to this documentation, shall be considered to be free from TB. No further TB testing shall be necessary except for epidemiologic or diagnostic purposes which may be required by the local public health agency (LPHA) or the Missouri Department of Health and Senior Services.
2. If the individual **DOES NOT** have documentation of a Mantoux PPD tuberculin skin test reading of 0 – 9 mm within the past month, or a negative IGRA, and **DOES NOT** have a history of ever having had a Mantoux PPD tuberculin skin test reading of 10 or more mm, or a negative IGRA, the following procedures shall be followed:
 - a. Five tuberculin units (TU) of purified protein derivative (PPD) shall be administered by the Mantoux method and the results read 48 – 72 hours subsequent to the administration of the test.
 - b. If the reading shows an induration of 0 – 4 mm in a person with a recent history of contact with TB **OR** an induration of 5 -9 mm and no history of contact with TB, he/she shall be considered to be free of TB.
 - c. If the reading shows an induration of 5 – 9 mm **and** there is a history of contact with TB **OR** an induration of 10 or more mm, he/she shall be considered to be a tuberculin reactor and shall be handled as described in number 3 below.
3. If the individual is a tuberculin reactor as described in 2.c above **OR** has a history of a Mantoux PPD tuberculin skin test reading of 10 or more mm without documentation of having received an adequate course of preventive therapy, the following procedure shall be followed:
 - a. If the individual has documentation of a normal chest x-ray within the past month, the employee shall be considered to be free from infectious TB.
 - b. If the individual does not have documentation of a normal chest x-ray within the past month, a signs and symptoms review is to be completed. If the individual has symptoms consistent with TB, then a chest x-ray is necessary. Individuals, for

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised June 2017
	Subsection: 2.03 Information for School Nurses Kindergarten – 12 th grade	Page 2 of 2

whom no TB symptoms exist, no further chest x-rays are required but shall be given preventive therapy.

Individuals described in 3a or 3b above, for whom chest x-rays are normal, shall be considered for preventive therapy. No further chest x-rays are necessary, unless the employee has symptoms consistent with TB, as described in the first paragraph of this subsection.

- c. Individuals with an abnormal chest x-ray indicating current pulmonary disease (TB or other) must be thoroughly evaluated and treated accordingly. Such an evaluation must include, but not be limited to collection of sputum specimens (by induction if necessary) for TB smear and culture. Until infectious TB is ruled out, the individual should be isolated and should not “share air” with any children, nor with any susceptible adults not already exposed.
4. Individuals with an abnormal chest x-ray indicating current pulmonary disease (TB or other) must be thoroughly evaluated and treated accordingly. Such an evaluation must include, but not be limited to collection of sputum specimens (by induction if necessary) for TB smear and culture. Until infectious TB is ruled out, the individual should not “share air” with any children, nor with any susceptible adults not already exposed.
5. If the individual has documentation of an adequate course of therapy for TB disease or adequate infection treatment for TB infection AND no current pulmonary symptoms, no further chest x-rays are necessary and the employee shall be considered to be free from TB in an infectious form.

The school should consult with the local public health agency or the Bureau of Communicable Disease Control and Prevention of the Missouri Department of Health & Senior Services for evaluation, management, and surveillance if the individual meets any of the following criteria:

- a. Has a history of TB disease or infection without documentation of adequate treatment as determined by the Unit.
- b. Is currently being treated for TB disease.
- c. Has a chest x-ray consistent with pulmonary TB without documentation of adequate treatment.
- d. Has symptoms consistent with TB.
- e. Has a history of contact with TB within the past 24 months.



[Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.04 Administering the TST	Page 1 of 4

Administering the TST

Policy: Tuberculin skin tests will be administered per CDC recommendations as indicated below.

Purpose: To standardize administration of the tuberculin skin test.

Equipment and Supplies:

1. Order for administering TST – either individual’s health care provider or per standing order for the Local Public Health Agency (LPHA).
2. Sterile 1 ml tuberculin syringe with 27 gauge blunt beveled 1/4 – 1/2 inch needle
 - Syringe and needle technologies continue to evolve to prevent needlestick injuries. The most effective needleless system should be used.
 - Institutional policy will determine which device has been approved by your facility.
3. Alcohol pads
4. 5TU PPD – Properly stored at 2 – 8° C/35 – 46°F; Avoid exposure to light. Label PPD vial with date opened and dispose unused PPD after 30 days from opening.
 - a. Tubersol and Aplisol are two commercially available tuberculin products.
 - Compared with the US reference PPD, no difference exists in TST interpretation between the two products.
 - Tuberculosis (TB) screening programs should use one antigen consistently.
 - b. Avoid temperature fluctuations: do not store on the refrigerator door.
5. Cotton balls.
6. Sharps disposal container.
7. Ruler with mm indicators.
8. Signature for informed consent to be tested (the parent or guardian must sign the consent for testing, if the person to be tuberculin skin tested in ≤ 18 years of age).
9. Emergency kit and standing orders for use should an anaphylactic reaction occur (extremely rare).

Procedure for Administration of Tuberculin Skin Test:

1. Obtain results of all previous TSTs. Ask the patient to describe what the test area looked like 2 -3 days after administration; obtain documentation.
 - a. If documentation cannot be obtained you may repeat the TST.

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.04 Administering the TST	Page 2 of 4

- b. A previous positive TST is not a contraindication to a subsequent TST unless the test was associated with a severe ulceration or anaphylactic shock.
 2. Use appropriate hand hygiene before starting procedure.
 3. Explain the procedure to the individual:
 - a. How the test is administered
 - b. The need for reading the skin test in 48 – 72 hours
 - c. Make an appointment for the patient to return:
 - If the patient cannot return within 48 – 72 hours, do not administer the test.
 - Schedule another time that allows for the patient to return at the appropriate time.
 4. Remove the antigen vial from the refrigerator and confirm that it is the 5 TU PPD antigen.
 5. Check label and expiration date.
 6. Mark opening date and initials on vial. If vial has reached expiration or is greater than 30 days since opened, vial should be discarded.
 7. Clean vial stopper with antiseptic swab.
 8. Twist needle guard on syringe to ensure tight fit.
 9. Fill syringe immediately after vial is removed from refrigeration.
 - **Syringes should be filled immediately prior to administration as the PPD can adhere to the inside of the syringe and affect the potency.**
 10. Insert needle into vial.
 11. Draw slightly over 0.1 ml of 5 TU PPD while needle remains in vial to avoid wasting of antigen.
 12. Remove needle from vial.
 13. Return antigen vial to refrigerator immediately after filling.

Site Selection and Cleaning:

1. Select upper third of forearm with palm up ≥ 2 inches from wrist, elbow, or other injection site; if neither arm is available or acceptable for testing, the back of the shoulder is a good alternate site for testing.
 - a. Select site free from veins, lesions, heavy hair, bruises, scars, or muscle ridges

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.04 Administering the TST	Page 3 of 4

2. Traditionally the left arm is used for testing; or standard site for your institution. Clean arm site with antiseptic swab using a circular motion from center to outside.
 - a. Allow site to dry before administering antigen.

TST Administration:

1. Rest patient arm on firm, well-lit surface.
2. Stretch taut the skin between the thumb and forefinger or pull skin taut from under the arm.
3. Hold needle bevel up at 5 – 15 degree angle to skin.
4. Insert needle in first layer of skin with tip visible beneath the skin.
5. Advance needle until entire bevel is under the first layer of skin.
6. Release stretched skin.
7. Inject entire dose slowly.
8. Form 6 – 10 mm wheal.
9. Remove needle without pressing on area – do not apply bandage.
10. Activate safety feature of device per manufacturer’s recommendations, if applicable.
11. Immediately place used needle and syringe in sharps container; do not recap needle; or if necessary to recap needle, use one handed recapping technique to avoid needlestick injuries.
12. A 6 – 10 mm wheal (a pale, raised area with distinct edges) should appear (measure with mm ruler).
13. If a 6 – 10 mm wheal was not achieved, repeat TST. Apply the second TST on the other arm or in a different area on the same arm at least 2 inches from first site.
14. If blood or fluid is present, blot slightly with gauze or cotton ball, do not apply bandage.
15. Record the date, time, location, antigen, and signature of person administering the TST on the TBC-4 or other form per LPHA policy.
16. Use appropriate hand hygiene after placing TST.

Care Instructions for Injection Site:

1. The wheal (bump) is normal and will remain for about 10 minutes.
2. Do not touch the wheal; avoid scratching.
3. Avoid pressure or bandage on injection site.
4. Rare local discomfort and irritation does not require treatment.

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.04 Administering the TST	Page 4 of 4

5. May wash with soap and water after about 1 hour.
6. No lotions or liquids on site, except for light washing, as mentioned above.
7. Keep appointment for reading TST.

NOTE: In rare instances the reaction might be severe: vesiculation, ulceration, or necrosis of the skin. Report severe adverse events to the FDA MedWatch Adverse Events Reporting System (AERS), Telephone: 800-FDA-1078; <http://www.fda.gov/medwatch>.

CDC Podcast for administering and reading a TST:
<https://tools.cdc.gov/media library/index.aspx#/media/id/302210>

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised June 2017
	Subsection: 2.05 Reading the TST	Page 1 of 1

Reading the TST

Policy: Tuberculin skin tests will be read as outlined below.

Purpose: To provide standardization of reading of tuberculin skin test.

Preliminary:

1. Before starting, use appropriate hand hygiene methods and put on gloves.
2. Keep fingernails shorter than fingertips to avoid misreading TST result.
3. Keep TST reading materials at hand (ballpoint pen and ruler).
4. Inspect the site of injection.

Palpate:

1. Palpate with arm bent at elbow.
2. Lightly sweep 2 inch diameter from injection site in four directions.
3. Use zigzag featherlike touch.

Placing marks: (If induration present)

1. Use fingertips to find margins of the induration; when palpating for margins, be careful not to confuse a margin of induration with a margin of muscle. To check this, raise the patient's arm to a 45 degree angle and palpate again. You should still be able to palpate induration.
2. Mark the induration (firm swelling) by placing small dots with a pen or marker on both sides of the induration. Mark dots transverse (perpendicular) to long axis of forearm i.e. the direction in which a watchband would lie across the arm.
3. Inspect dots, repeat finger movements toward indurated margin, and adjust dots if needed.
4. Verify the positive TST by having a second reader immediately measure the same induration using the same procedure to confirm measurement.

Placing and Reading Ruler:

1. Place the "0" marking on the ruler inside the edge of the left dot. Read the ruler line inside the right dot edge. Use lower reading if between two gradations on mm scale.
2. Use appropriate hand hygiene methods after reading the TST.

NOTE: Measure with a millimeter ruler only.

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.06 Classification of TST Reactions	Page 1 of 2

Classification of TST Reactions

Policy: Results of tuberculin skin tests will be classified according to the following criteria.

Purpose: To standardize classification of tuberculin skin test results.

A reaction of five (5) or more millimeters of induration is considered positive in:

1. HIV-infected persons.
2. Recent contacts of infectious tuberculosis (TB) case.
3. Persons with fibrotic changes on chest x-ray consistent with prior TB.
4. Organ transplant recipients.
5. Those who are immunosuppressed for other reasons:
 - a. Taking equivalent of 15mg/day or greater of prednisone for 1 month or more.
 - b. Taking Tumor Necrosis Factor – Alpha (TNF- α antagonists) i.e. Remicade, Enbrel, Humira, etc.

A reaction of ten (10) or more millimeters of induration is considered positive in:

1. Recent immigrants (within last 5 years) from high prevalence countries (Regardless of a history of vaccination with BCG).
2. Injection drug users.
3. Residents, employees, and volunteers of high risk congregate settings (correctional facilities, long-term care facilities, hospitals and other healthcare facilities, residential facilities for patients with HIV and homeless shelters).
4. Mycobacteriology laboratory personnel.
5. Persons with certain high risk clinical conditions.
6. Infants, children and adolescents exposed to adults at high risk for TB disease.
7. Children younger than 4 years of age.

A reaction of fifteen (15) or more millimeters of induration is considered positive in:

- Persons with no risk factors.

Note: Routine testing is not recommended for populations at low risk for LTBI.

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.06 Classification of TST Reactions	Page 2 of 2

Skin test conversion:

- For persons with negative TST reactions that undergo repeat TB skin testing (such as health care workers), an increase in reaction size of 10 or greater within a period of 2 years should be considered a skin test conversion indicative of recent infection with *M. tuberculosis*.

CDC Podcast for administering and reading a TST:

<https://tools.cdc.gov/media library/index.aspx#/media/id/302210>

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.07 Interferon Gamma Release Assay (IGRA)	Page 1 of 1

Interferon Gamma Release Assay (IGRA)

Policy: The IGRA is one method currently available for determining exposure to tuberculosis (TB). The Missouri State Public Health Laboratory does not offer IGRA testing.

Purpose: To inform the Local Public Health Agency (LPHA) of all testing methods available for diagnosing LTBI.

1. The IGRA tests are blood tests that measure a person's immune reaction to *Mycobacterium TB*.
2. In a person with LTBI, the blood cells recognize the tuberculin antigen and release interferon-gamma; results are based on the proportion of interferon gamma released.
3. There are different IGRA's currently available:
 - a. Quantiferon Gold
 - b. Quantiferon Gold plus
 - c. T Spot
4. Guidelines for using the Quantiferon – TB Gold Test for Detecting *Mycobacterium TB* Infection are found at:
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5415a4.htm?s_cid=rr5415a4_e

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised June 2017
	Subsection: 2.08 Diagnosing LTBI	Page 1 of 2

Diagnosing LTBI

Policy: To correctly diagnose and offer treatment for individuals classified as a positive diagnostic test.

Purpose: To rule out tuberculosis (TB) disease before treatment for LTBI is initiated; failure to rule out TB disease may result in inadequate treatment and development of drug resistance.

For persons with a diagnostic test classified as **positive** [see classification of TB Skin Test (TST)], IGRA, or those with negative diagnostic test that have symptoms suggestive of TB disease.

1. Obtain a chest x-ray (CXR) as soon as possible:

A chest x-ray helps to differentiate between LTBI and TB disease in persons with positive results. If the patient has had a prior CXR, it must have been performed within the last six months.

- The CXR may need to be repeated if the patient has developed any new risk factors or TB symptoms since the previous CXR. Consult with the state TB nurse.

The following guidelines are recommended:

- A CXR is indicated with a positive TST or IGRA and treatment for LTBI should be considered, especially for those that are a contact to a recent case of TB or are at an increased risk for developing disease once they are infected (i.e. window prophylaxis in a young child or immunocompromised person).
- Children less than 5 years of age should have both an anterior-posterior and lateral views.
- All others should have at least posterior-anterior views.
- Other views or additional studies should be based on the physician's judgement.
- Persons with nodular or fibrotic lesions consistent with findings of prior TB and a positive TST or IGRA are high-priority candidates for treatment.
- Persons with calcified granulomas only are at low risk for progression to disease.
- For contacts with a documented prior positive TST or IGRA, with or without treatment, shall obtain a chest x-ray to rule out TB disease.
- Periodic follow-up CXRs are not indicated regardless of whether treatment is completed except in unusual circumstances. (Note: For

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.08 Diagnosing LTBI	Page 2 of 2

MDR-TB there is usually a follow-up CXR six (6) months and one (1) year after treatment completion.

2. A physical examination and medical history, including symptoms of TB disease, prior positive TSTs, family history, and risk assessment for liver disease, should be conducted. Written documentation of a previous positive TST or IGRA is required. A patient's verbal history is not adequate.
3. Sputum examination is indicated for persons with a positive result and either an abnormal CXR and/or the presence of respiratory symptoms. If TB disease has been ruled out by the above procedures, treatment for LTBI should be considered. If further assistance is needed regarding sputum collection, please notify the state TB nurse.

For details on the *Diagnostic Services Program*, see Chapter 6 of the *TB Case Management Manual* located at:

<http://health.mo.gov/living/healthcondiseases/communicable/TB/tbmanual/pdf/Chap6.pdf>).

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised June 2017
	Subsection: 2.08.1 Persons at Risk for Progression of LTBI to TB Disease	Page 1 of 1

Persons at Risk for Progression of LTBI to TB Disease

Persons at increased risk:

- Persons infected with HIV
- Children younger than five (5) years of age
- Persons who were recently infected with *M. tuberculosis* (within the past 2 years)
- Persons with a history of untreated or inadequately treated TB disease, including persons with fibrotic changes on chest radiograph consistent with prior TB disease
- Persons who are receiving immunosuppressive therapy such as tumor necrosis factor-alpha (TNF) antagonists, systemic corticosteroids equivalent to/greater than 15 mg of prednisone per day of immunosuppressive drug therapy follow organ transplantation
- Persons with silicosis, diabetes mellitus, chronic renal failure, leukemia, or cancer of the head, neck, or lung
- Persons who have had a gastrectomy or jejunioileal bypass
- Persons who weigh less than 90% of their ideal body weight
- Cigarette smokers and persons who abuse drugs and/or alcohol
- Populations defined as having an increased local incidence of disease due to *M. tuberculosis*, including medically underserved, low-income populations

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised June 2017
	Subsection: 2.09 Two Step Testing	Page 1 of 1

Two-Step Testing

Policy: Two-step tests are needed to establish a baseline for persons who will receive serial testing.

Purpose: To prevent misclassifying a positive skin test as a conversion.

Booster Phenomenon:

Some people with LTBI may have a negative reaction to the TB Skin Test (TST) if many years have passed since they became infected. They may have a positive reaction to a subsequent TST because the initial test stimulates their ability to react to the test. This is commonly referred to as the “booster effect” and may incorrectly be interpreted as a skin test conversion (going from negative to positive). For this reason, the “two-step method” is recommended at the time of **initial** testing for individuals who will be tested periodically (e.g., health care workers). If the first test result in the two-step baseline testing is positive, evaluate the patient for active disease. If active disease is ruled out then the patient should be considered to have LTBI and evaluate and treat the patient accordingly. If the first test result is negative, the second step of the two-step baseline testing should be repeated in 1 – 3 weeks. If the second test result is positive, evaluate the person for active disease. If active disease is ruled out then the patient should be considered to have LTBI and evaluate and treat the person accordingly. However, if both steps are negative, consider the patient uninfected and classify the TST as a negative baseline (see Figure 1).

To estimate the frequency of boosting in a particular setting, a four-appointment schedule of TST administration and reading (appointment for TST administration and reading of both TST results) is necessary, rather than a three-appointment schedule (appointment for the administration of both tests and reading of the second-step test only).

Two-step testing should be used only for baseline screening, not in contact investigations. In a contact investigation, for persons with a negative TST, a follow-up test should be administered 8 – 10 weeks after the end of the exposure (rather than 1 – 3 weeks later, as in two-step testing). In this instance, a change from negative to positive TST result suggests that recent exposure; transmission and infection occurred and should not be interpreted as a booster response. For more information see <http://www.cdc.gov/tb/publications/LTBI/diagnosis.htm#7>.

Figure 1: Two-Step Tuberculin Skin Test (TST) Method

1st TST	If negative →	Repeat TST in 1 – 3 weeks (2 nd TST)
	Positive	Refer to medical provider for evaluation
2nd TST	If negative →	Person probably does not have infection.
	If positive →	Boosted reaction due to infection in the past.

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.10 Special Consideration When Testing for LTBI	Page 1 of 2

Special Considerations When Testing for LTBI

Policy: All persons will receive testing for LTBI as indicated.

Purpose: To be aware of special conditions while testing for LTBI.

Bacille Calmette-Guerin (BCG) Vaccine:

BCG vaccine is currently used in many parts of the world where tuberculosis (TB) is commonly used to protect infants and young children from serious, life-threatening disease, specifically miliary TB and TB meningitis. The WHO (World Health Organization) recommends BCG vaccine once in infancy in TB endemic countries.

The effect of BCG vaccine on TB Skin Test (TST) results often causes confusion. TST reactivity caused by BCG vaccine generally wanes with the passage of time, but periodic skin testing may prolong (boost) reactivity in vaccinated persons. There is no reliable method for distinguishing between vaccine-related reactions and reactions caused by mycobacterial infections. However, the Interferon Gamma Release Assay (IGRA) tests, which use M. TB specific antigens, are designed to not cross react with BCG and may cause fewer false positive reactions in BCG-vaccinated individuals.

A history of BCG vaccine is not a contraindication for tuberculin skin testing or treatment for LTBI in persons with positive TST results. TST reactions should be interpreted regardless of BCG vaccination history.

HIV Infection:

The risk of progression from LTBI to TB disease is 7% to 10% EACH YEAR for those with both LTBI and Human Immunodeficiency Virus (HIV) infection. Those with LTBI and who are HIV-negative only have a 10% risk over their lifetime. HIV-infected persons may have a compromised ability to react to the TST because of cutaneous anergy associated with progressive HIV immunosuppression; however, the usefulness of anergy testing in tuberculin-negative HIV-infected persons who might benefit from treatment of LTBI has not been demonstrated. These persons should be tested for LTBI as soon as their HIV status becomes known. A negative TST reaction does not rule out LTBI. Annual repeat TST should be considered for HIV-infected persons who are TST-negative on initial evaluation.

Contacts to TB Cases:

- For contacts of an infectious TB case, retesting in 8 – 10 weeks is indicated when the initial TST result is negative.

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.10 Special Consideration When Testing for LTBI	Page 2 of 2

- Children under the age of 5 years and immunosuppressed persons who have a negative TST result should be treated (window prophylaxed) and another TST performed 8 – 10 weeks after contact has ended.
- If a repeat TST result is positive, treatment should be continued. If a repeat TST is negative, treatment can be discontinued unless the child is less than 6 months of age when the repeat test is completed. The child will need to remain on window prophylaxis until another TST is complete and documented as negative after the child is 6 months of age or older. For HIV positive persons, it may be indicated to treat for LTBI even with a negative TST.
- The second test is needed in case infection occurred but was too early in onset at the time of the first test.

Pregnancy:

- The TST has no adverse effects on the pregnant mother or fetus.
- If a TST is positive, obtain a chest x-ray using proper shielding.
- Consider delay of treatment after 3 months postpartum unless the mother is at higher risk for developing (HIV –infected or recent contact) as there is increased risk of hepatotoxicity during pregnancy and the postpartum period.

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.11 Diagnostic Services Program (DSP)	Page 1 of 2

Diagnostic Services Program (DSP)

Policy: To provide a medical evaluation for individuals with no health insurance or are underinsured that have been identified as infected with or suspected of having tuberculosis (TB).

Purpose: To ensure that all individuals have access to medical services to rule out active TB disease.

Procedure:

1. The patient is identified by the Local Public Health Agency (LPHA) as being tuberculin skin test or IGRA test positive or is suspected of having active TB **AND:**
 - a. Has no medical insurance or is underinsured
 - b. Is not eligible for Medicare
 - c. Is not eligible for Veteran Affairs (VA) benefits
 - d. Has no other means to pay
2. A physician is chosen from the list of DSP providers. If there is not a DSP provider listed for the county or community the patient may be referred to a non DSP provider with the understanding that the DSP program will only pay the DSP rates for services received. The patient may receive a bill from the provider of service for any remaining balances.
3. The LPHA completes the Diagnostic Service Eligibility/Authorization Form (**see the *TB Case Management Manual; Appendices/Sample Forms* located at: <http://health.mo.gov/living/healthcondiseases/communicable/TB/tbmanual/pdf/Appendices.pdf>**.) selecting the type of service(s) requested from the list below, and faxes it to the DSP Manager at: (573) 526-0234.

The available services are:

- First Office Visit (99205)
- Subsequent Office Visit (99215)
- Chest X-Ray (71046)
- Chest X-Ray Interpretation (71046A)
- Induced Sputum collection (89220)

NOTE: Diagnostic services CANNOT pay for Computerized Axial Tomography (CAT or CT) scans. The DSP Program will only pay for Liver Function Tests (LFTs) on a case by case basis, with prior approval by the Department of Health and Senior Services (DHSS) TB Elimination Program.

4. TB Elimination Program staff will review for eligibility and assign an authorization number and indicate services authorized, as funding allows. **For more details on the**

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.11 Diagnostic Services Program (DSP)	Page 2 of 2

DSP Program, see the TB Case Management Manual located at:

<https://health.mo.gov/living/healthcondiseases/communicable/tuberculosis/tbmanual/pdf/Chap6.pdf>

5. The TB Elimination Program will fax the authorization form back to the LPHA with the authorization number included.
6. The LPHA contacts the DSP Provider and schedules the appointment. An authorization number **MUST** be obtained prior to scheduling the appointment.
7. The DSP Provider invoices DHSS directly.

 [Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.12 Anergy Testing	Page 1 of 1

Anergy Testing

Policy: Anergy testing in conjunction with a Tuberculin Skin Test (TST) is not recommended.

Purpose: To discourage the use of anergy testing when administering TSTs.

1. Anergy testing is a diagnostic procedure used to obtain information regarding the competence of the cellular immune system.
2. The use of anergy testing in conjunction with TST is no longer recommended routinely for screening programs for *M. tuberculosis* infection conducted among HIV–infected persons in the United States.
3. For more information go to: <http://www.cdc.gov/mmwr/PDF/rr/rr4615.pdf>

Annual Statement for Tuberculin Reactors Form: (see *TB Case Management Manual; Appendices/Sample Forms* located at:
<http://health.mo.gov/living/healthcondiseases/communicable/TB/tbmanual/pdf/Appendices.pdf>.



[Back to Top](#)

	Division of Community and Public Health	
	Section: 2.0 Testing for Latent Tuberculosis Infection (LTBI)	Revised May 2020
	Subsection: 2.13 References	Page 1 of 1

References

References:

1. Guide for Primary Health Care Providers: Targeted Tuberculin Testing and Treatment of Latent TB Infection, CDC 2005 <https://npin.cdc.gov/publication/guide-primary-health-care-providers-targeted-tuberculin-testing-and-treatment-latent>
2. Targeted Tuberculin Testing and Treatment of Latent TB Infection, MMWR, June 9, 2000/Vol.49/No. RR-6 <http://www.cdc.gov/mmwr/PDF/rr/rr4906.pdf>.
3. Guidelines for Using the Quantiferon Gold TB Test for Detecting Mycobacterium TB Infection, United States; MMWR December 2005
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5415a4.htm?s_cid=rr5415a4_e
4. Interferon Gamma Release Assay (IGRA) Fact sheet:
<https://www.cdc.gov/tb/publications/factsheets/testing/igra.htm>
5. Anergy Skin Testing and Preventive Therapy for HIV I-Infected Persons: Revised Recommendations, MMWR September 5, 1997/Vol46/No. RR-15
<http://www.cdc.gov/mmwr/PDF/rr/rr4615.pdf>
6. TB Associated with Blocking Agents against Tumor Necrosis Factor – Alpha California, 2002 – 2003 <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5330a4.htm>

 [Back to Top](#)