Other TB diagnostic tests

Interferon Gamma release (Quantiferon Gold®) assay:
This is a blood test detecting the immune response to proteins of the TB bacterium. It provides similar information as the Mantoux test, but BCG vaccination and infection with other non-tuberculous mycobacteria do not cause a reaction and the patient does not have to return to the laboratory for the reaction to be read.

Microscopy
TB bacteria differ from other bacteria in that they are not decolourised by acid after they have been stained with a dye. An acid fast stain (Ziehl-Neelsen [ZN] or auramine stain) should be requested to visualize mycobacteria under the microscope.

Culture
TB bacteria can be cultured from various patient samples. They multiply very slowly and a culture is incubated for up to six weeks before it is considered negative. However, cultures often became positive after 2-3 weeks. Culture remains the most sensitive diagnostic test for tuberculosis and therefor is still considered to be the "gold standard" of diagnosis.

Molecular tests
Molecular tests, also known as PCR tests, detect the presence of genetic material or DNA of TB bacteria. These tests can be done directly on a patient sample, or on a specimen following culture. Molecular methods are also used to identify acid fast bacilli seen on microscopy or culture and to test for genes that indicate drug resistance. A direct molecular test result is usually available within 48 hours, but molecular tests done on cultured specimens can only be performed once cultures become positive.

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"Pathology that **Adds Value**"

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Laboratory tests for TB

Tuberculosis (TB) is caused by infection with a bacterium, *Mycobacterium tuberculosis*. Mycobacteria are shed by patients with TB when coughing and can remain viable in the environment for a long time. Infection is acquired through inhalation of mycobacteria in aerosol. After inhalation, mycobacteria multiply in the lung epithelium or macrophages. Most are destroyed by the immune system, but some survive and spread to other sites in the body.

The majority of infections are controlled by the immune system without the patient being aware of the infection. Viable organisms may remain dormant in the lesions and can reactivate to cause disease if the immune system becomes impaired. This state is referred to as latent TB. Approximately 10% of patients will develop symptomatic or active tuberculous disease. The lungs are the most common site of infection, but any organ can be affected.

Symptoms of TB disease include chronic productive cough, fever, night sweats and weight loss.

Several drugs are effective against TB. Strains resistant to a particular agent may arise during therapy and a combination of drugs is used to treat patients with TB for a minimum duration of 6 months.

TB diagnostic tests

Diagnostic tests for TB include chest X-ray, microscopic examination of sputum or other specimens for acid fast mycobacteria, culture of the organisms, molecular tests or tests detecting an immune reaction to mycobacterial proteins.

The Mantoux skin test

What is a Mantoux test?

The Mantoux test, also known as the tuberculin skin test (TST), determines if a patient's immune system recognises mycobacteria. This type of immune reaction is referred to as a delayed hypersensitivity reaction and develops 2 – 12 weeks after infection with *M. tuberculosis*.

When is a Mantoux test indicated?

The Mantoux test is performed to screen for TB infection e.g. a patient presenting with TB symptoms and patients who had contact with a person with TB even if they have no symptoms.

Who can receive a Mantoux test?

Most people can be tested, including infants, children, pregnant women and HIV-infected persons. Patients that had a severe reaction to a previous Mantoux test, e.g. blistering, anaphylactic shock or ulcerations, should not be tested.

Do you need to prepare for the test?

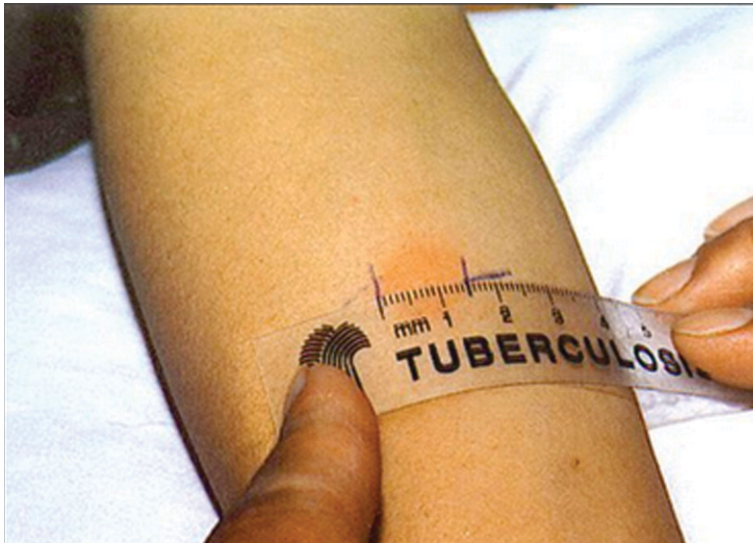
No preparation is necessary for the test. The patient, however, has to return to the laboratory or doctor for the test reaction to be documented after 48 - 72 hours.

How is the test performed?

The Mantoux test is performed by injecting 0,1 mL of purified protein derivative (PPD), into the skin of the forearm. The injection produces a pale elevation of skin (a wheal), about 6 - 10 mm in diameter for a few minutes. Do not rub, scratch or bandage the injection site.

How is the test interpreted?

The patient has to return to the laboratory or doctor after 48 hours to have the size of the reaction measured. The area of induration (palpable hardening and swelling) is read and not just the visible area of redness.



Induration peaks at 48 – 72 hours and disappears slowly over several days. Failure to read the result at this time may result in negative or smaller diameter results that may influence the interpretation.

Interpretation depends on the size of the reaction and the patient's risk factors for TB.
A reaction >15 mm is a positive reaction in any person regardless of risk factors, >10mm is considered positive in those with healthy immune systems and signs or exposure history of TB and >5 mm is considered positive in patients with immune suppression.

Positive reactions in the absence of TB infection can sometimes occur in patients after BCG vaccination or infection with other non-tuberculous mycobacteria. Negative reactions in the presence of infection sometimes occur in patients with severe suppression of the immune system, babies < 6 months, recent infection or with some viral infections or vaccination with live virus vaccines.

Are there any complications?

An allergic reaction to components of the test material can occur, usually shortly after the injection. A strong positive reaction can also present with vesicles or ulceration and sometimes fever and swelling of regional lymphnodes.