

MEDfacts

An Educational Health Series From National Jewish Health®



Tuberculosis

What is Tuberculosis?

Tuberculosis (TB) is an infectious disease caused by a germ (bacterium). The germ is called *Mycobacterium tuberculosis*. This germ often affects the lungs. It may involve any organ and may infect anyone at any age.

In the United States, the number of TB cases steadily decreased until 1986. Then an increase was noted. Since 1992, TB has been declining. In 2008, the case rate was 4.2 per 100,000 population. This is about 12,898 new cases of active disease each year. TB cases are primarily related to HIV/AIDS, homelessness, drug abuse and foreign-born persons.

How is TB Contracted?

TB is a contagious or infectious disease. It is spread from person-to-person. A person is often infected by inhaling the germs. These germs have been sprayed into the air by someone with the active disease who coughs.

However, inhaling the germ does not mean you will develop active disease. A person's natural body defenses are often able to control the infection so that it does not cause disease. In this case, the person would be **infected**, but does not have active disease. Only about 10% of those infected will develop TB disease in their lifetimes.

Active disease can occur in an infected person when the body's resistance is low or if there is a large or prolonged exposure to the germs that overcome the body's natural defenses. The body's response to active TB infection produces inflammation that can damage the lungs. The amount of damage may be quite extensive even though the symptoms may be minimal.

What are the Symptoms?

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The usual symptoms of TB disease include:

- Fever
- Night sweats
- Cough
- Loss of appetite
- Weight loss
- Blood in the sputum (phlegm)
- Loss of energy

How is TB Diagnosed?

To diagnose TB, your health care provider will gather **five** important pieces of information during the complete history and physical examination:

- Symptoms
- History of possible exposure and onset of symptoms
- Tuberculin skin test or blood test for TB
- Chest X-ray or Chest CT scan
- Sputum test to culture the organism

Why is the History so Important?

Getting an accurate history is important in diagnosing and treating TB. Like any disease, early intervention and treatment is very important.

What is the Tuberculin Skin Test?

The tuberculin skin test (or PPD) uses an extract of killed TB germs. The killed germs are injected into the skin. If a person has been infected with TB, a lump will form at the site of the injection. This is a positive test. This often means that TB germs have infected the body. It does **not** often mean the person has active disease. People with positive skin tests but without active disease cannot transmit the infection to others.

What is the Tuberculosis Blood Test?

There are two new blood tests that have recently been developed to test for exposure to tuberculosis germs. They are still used in research settings but some hospitals and clinics are using them in place of the Tuberculin Skin Test.

Why Have a Chest X-Ray?

If a person has been infected with TB, but active disease has **not** developed, the chest X-ray will often be normal. Most people with a positive PPD (skin test) or TB blood test have normal chest X-rays and continue to be healthy. For such people, preventive medication may be recommended.

However, if the germ has attacked and caused inflammation in the lungs, an abnormal shadow may be visible on the chest X-rays. For these people, diagnostic tests (sputum tests) and treatment often are appropriate.

What is a Sputum Test?

Samples of sputum coughed up from the lungs can be tested to see if TB germs are present. The sputum is examined under a microscope (a "sputum smear") to look for evidence of the TB organisms. The organisms are then grown in the lab to identify them as TB germs and to determine what medications are effective in treating them. These studies are referred to as culture and susceptibility testing. State health department labs and reference labs can perform such testing.

How is TB Treated?

People with a positive tuberculin skin test may or may not receive preventive medication therapy. This will depend on the exposure history, the timing of the skin test conversion (when the test changes from negative to positive) and other factors in the person's medical history. When it is known that a person has recently been in close contact with someone with active tuberculosis and has developed a positive tuberculin skin test or TB blood test, preventive treatment is advisable. This is due to a high risk of developing active disease. INH (Isoniazid) may be prescribed for nine months as preventive treatment.

Since the advent of anti-TB medications in the 1940s, the treatment of drug-susceptible TB has become highly effective if administered and taken properly. Treatment no longer requires prolonged hospital stays. In many cases, a person with a new case of TB can be treated at home. Others will enter the hospital to be placed on a medication program. They are isolated until the disease is controlled. When the person is no longer infectious, he or she can leave the hospital and continue on medication at home. Hospitalization, in such cases, may be a few weeks to several months depending on the severity of the disease and the effectiveness of the treatment program.

In most cases, a treatment program for drug-susceptible TB involves taking two or four medications for a period of time ranging from six to nine months. Medications may include:

- Isoniazid
- Rifampin
- Pyrazinamide
- Ethambutol
- Streptomycin

Multiple medications are often needed. It is important to take all of the doses prescribed. Often all of the TB germs cannot be destroyed with one medication.

It is important to realize that hospitalization for a person with TB, when necessary, represents only the beginning of treatment. Since active TB is slow to respond completely to therapy, prescribed medications must be taken every day for a long period of time. This may be at least 6 months, and in some cases for a year or more. If the TB medications are not taken regularly, serious complications may develop:

- The organisms may become resistant to one or more of the drugs.
- There may be an increased risk of toxic reactions from the medications.
- There is a high risk of disease relapse or recurrence.

Given the many effective medications available today, the chances are great that a person with TB can be cured. It is important, however, for the person to understand the disease and to cooperate fully in the therapy program.

What is Multi-Drug Resistant TB?

In a small percentage of cases, the initial treatment does not go as planned. The medication program may not be sufficient for a certain infection. The medications may not be absorbed properly. It may be that the person is not taking the medications regularly. In these people, there is a tendency for the germs to become resistant to some of the medications. Multi-drug resistant TB means the TB germ has become resistant to at least two of the first-line medicines used to treat TB. These medicines are isoniazide and rifampin. Sometimes a person has initial multi-drug resistant disease. In other words, the TB germs they contracted were from a person with multi-drug resistant TB.

Multi-drug resistant TB is very difficult to treat. It often requires more and different medications for a longer period of treatment. Sometimes, surgery is needed to remove areas of destroyed lung that contain germs that are inaccessible to antibiotics. A person with multi-drug resistant TB should be treated by a specialist with considerable experience in managing the disease. This treatment should be initiated in a hospital setting.

What is Extensively Drug-Resistant TB?

When a person has extensively drug-resistant TB, there is the same tendency for the germs to become resistant to medications, but the germ is resistant to even more of the medications. Extensively-drug resistant TB means the TB germ has become resistant to at least three of the first-line medicines used to treat TB. These medicines are isoniazide, rifampin and fluoroquinolone. In addition the TB germ is resistant to a second line medicine given as a shot. Extensively drug-resistant TB is much more difficult to treat.

TB and National Jewish Health

Since 1899, the National Jewish Medical and Research Center in Denver has treated people with TB. The hospital was established to care for the thousands of people who flocked to Colorado's high altitude and dry climate, seeking the elusive cure for their TB.

In 1919, a research department was established at the hospital. When anti-TB drugs became available in the late 1940s, National Jewish was one of the first institutions to base its TB treatment program on the new chemotherapy, contributing refinements and developing combinations of drugs to overcome the problems of drug toxicity and resistance.

Today, National Jewish Health is one of the world's leading centers for the diagnosis and treatment of TB. Research continues at the Center to define new approaches to treat difficult TB infections. Our world-renowned doctors are backed by state-of-the-art laboratories that help them select the most effective drug combinations and dosages.

For drug-resistant TB, the *New York Times* wrote that National Jewish Health provides "the most sophisticated and aggressive treatment the world has to offer." National Jewish Health offers a comprehensive evaluation for TB, multi-drug resistant TB and extensively drug-resistant TB. It is important to have a referral from the doctor along with previous medical records, chest X-rays and recent TB drug susceptibility testing before scheduling a TB evaluation at National Jewish Health. Doctors may refer a patient for our highly specialized in-patient program or day program. To refer a patient for a TB evaluation, a doctor can call 1-800-423-8891, x1353. In addition, doctors and other health-care professionals can use this number to obtain consultations regarding current diagnosis and treatment information. Consultation is available for health-care professionals only.

Also, through our educational programs, we are training public health workers and clinicians from around the world in TB control.

Note: This information is provided to you as an educational service of LUNG LINE® (1-800-222-LUNG). It is not meant to be a substitute for consulting with your own physician.

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