

Imagine sitting in a crowded room with someone who has active tuberculosis in the lungs. The person coughs, speaks, or sings, releasing extremely small droplets into the air. Those droplets contain a slow-growing bacterium called *Mycobacterium tuberculosis*. If the room has poor ventilation and the exposure lasts long enough, another person may breathe the bacteria deep into the lungs. That is where tuberculosis begins.

Tuberculosis, usually shortened to TB, is an infectious disease caused by bacteria. It most often attacks the lungs, but it can also reach the brain, kidneys, spine, lymph nodes, bones, and other parts of the body. TB is preventable and curable, yet it remains one of the world's deadliest infectious diseases because many people are never diagnosed, cannot obtain treatment, or develop bacteria that resist common medicines.

TB is airborne, but it does not spread as easily as a cold or the flu. Infection usually requires spending considerable time near someone with contagious TB, especially inside a poorly ventilated area. Family members, roommates, coworkers, and others who share enclosed spaces face greater risk than someone who briefly passes an infected person outside.

TB is not normally spread by shaking hands, sharing food, touching a toilet seat, using the same dishes, kissing someone's cheek, or handling an object they touched. The danger comes mainly from breathing contaminated air near a person with active TB in the lungs or throat.

Once the bacteria enter the lungs, the immune system reacts. White blood cells surround the invaders and attempt to destroy them. TB bacteria are unusually difficult to kill because of their tough, waxy outer covering. If the immune system cannot eliminate them completely, it may build a defensive wall around them. This collection of immune cells is called a granuloma.

The granuloma acts like a biological prison. The bacteria remain alive inside, but they are contained and unable to cause noticeable damage. This condition is called latent TB infection, also known as inactive TB.

Someone with latent TB does not feel sick, has no TB symptoms, and cannot spread TB to anyone else. However, the bacteria have not completely left the body. They may remain trapped for years or even decades. Most people with latent TB never develop active disease, but without preventive treatment, roughly five to ten percent eventually will.

This hidden stage is one reason TB has survived for so long. A person can become infected in one country, move somewhere else, live normally for years, and then become sick much later. The new illness may look sudden, even though the original infection happened long ago.

The situation changes if the immune system can no longer hold the bacteria in place. The bacteria escape, multiply, and begin destroying tissue. Latent infection has now become active TB disease.

This can happen shortly after the original infection or many years later. The risk rises when the immune system is weakened by HIV, cancer, serious kidney disease, certain immune-suppressing medicines, malnutrition, or older age. Diabetes, smoking, and heavy alcohol use can also increase the danger. Infants and very young children are at greater risk because their immune defenses are still developing.

When active TB attacks the lungs, the illness often develops slowly. The person may begin with a cough that refuses to leave. At first, it may seem like a cold, allergies, or an ordinary chest infection. As the bacteria damage more lung tissue, the symptoms become harder to ignore.

A cough lasting three weeks or longer is an important warning sign. The person may cough up mucus and, in more advanced cases, blood. Chest pain, weakness, loss of appetite, unexplained weight loss, fever, chills, and heavy night sweats may follow. The night sweats can be severe enough to soak clothing or bedding.

Historically, tuberculosis was called consumption because it appeared to consume the body. People gradually became thinner, weaker, paler, and more exhausted. Before effective antibiotics existed, families sometimes watched loved ones decline over months or years without having a reliable way to stop it.

TB does not always remain in the lungs. If the bacteria enter the bloodstream or lymphatic system, they can travel throughout the body. TB in the spine may cause severe back pain and damage the bones. TB in the kidneys may cause blood in the urine. TB in the lymph nodes may create swelling, often around the neck. TB meningitis attacks the protective tissues surrounding the brain and spinal cord, potentially causing headaches, confusion, seizures, brain damage, or death.

A widespread form called miliary TB occurs when bacteria scatter through the bloodstream and create many tiny areas of infection. The name comes from the spots' resemblance to millet seeds. Miliary TB is especially dangerous because several organs may become infected at once.

Not everyone with active TB is contagious. The greatest risk comes from untreated active TB in the lungs or throat because bacteria can escape into the air. TB located only in another organ, such as the kidney or spine, usually does not spread through ordinary breathing. Once effective treatment has reduced the bacteria, the person generally becomes much less likely to infect others, but a healthcare professional must determine when that point has been reached.

Finding TB requires more than recognizing a cough. A skin test or blood test can show that the immune system has encountered TB bacteria. The skin test involves placing a

small amount of testing material beneath the skin and checking the reaction two or three days later. It is not judged by redness alone; the raised, firm area must be measured.

The blood test measures how the immune system responds to proteins connected with TB. It is especially useful for people who received the BCG tuberculosis vaccine because that vaccine can sometimes interfere with the skin test.

A positive skin or blood test does not automatically mean someone has active or contagious TB. It shows that TB infection may be present. Doctors then use a chest X-ray, medical history, physical examination, and laboratory testing to determine whether the bacteria are inactive or causing disease. Sputum—the mucus coughed up from deep inside the lungs—can be examined for TB bacteria. Laboratory testing can also reveal which medicines are likely to kill that particular strain.

The distinction is important:

Inactive TB infection	Active TB disease
Bacteria are alive but contained	Bacteria are multiplying and damaging the body
No symptoms	Symptoms may be present
Cannot spread TB	Lung or throat TB may spread through the air
Chest X-ray is usually normal	Chest X-ray may show lung damage
Treatment prevents future disease	Treatment cures the present disease and stops transmission

Latent TB can be treated before it awakens. Depending on the person's health and the medicines selected, preventive treatment may last several months. Treating someone who feels perfectly healthy may seem unnecessary, but the purpose is to kill the hidden bacteria before they can escape and cause active disease.

Active TB requires several antibiotics because one medicine alone may not kill every bacterium. Common treatment may include medicines such as isoniazid, rifampin, pyrazinamide, and ethambutol. The exact combination and treatment length depend on the type of TB, the patient's health, the affected body parts, and whether the bacteria resist any medications.

Treatment usually lasts for months because TB bacteria grow much more slowly than the bacteria responsible for many ordinary infections. Some bacteria are actively multiplying, while others remain nearly dormant. Medicine must continue long enough to destroy both groups.

This is also why someone must not stop treatment simply because the cough disappears or the body feels better. Feeling better does not prove that every bacterium is dead. Stopping too early can allow the strongest surviving bacteria to multiply. The returning infection may then resist medicines that previously worked.

This leads to drug-resistant TB. Multidrug-resistant TB resists at least isoniazid and rifampin, two of the most powerful TB medicines. It can develop when treatment is incomplete or improperly prescribed, but a person can also catch a resistant strain directly from someone else. Drug-resistant TB is harder, more expensive, and often longer to treat.

Because every dose matters, some health departments use directly observed therapy. A healthcare worker watches the patient take the medicine in person or through video. This is not punishment. It protects the patient from treatment failure and protects the community from the development and spread of resistant bacteria.

TB medicines can also cause serious side effects. Depending on the drug, warning signs may include yellowing of the skin or eyes, dark urine, severe nausea, loss of appetite, numbness, tingling, unusual vision changes, or persistent weakness. These problems should be reported promptly rather than handled by silently stopping the medicine.

The BCG vaccine is given in many countries where TB is common, particularly to protect young children from severe forms such as TB meningitis. It is not routinely used in the United States because TB is less common here, its protection against adult lung disease varies, and it can affect skin-test results. The vaccine offers useful protection, but it does not guarantee that someone will never become infected.

Preventing TB depends on finding active cases quickly, treating them completely, testing people who had close contact with them, and treating latent infection when appropriate. Fresh airflow, good ventilation, respiratory protection in healthcare settings, and temporary isolation of contagious patients can help stop airborne spread.

The most important fact to carry away is that TB has two very different lives. In one life, the bacteria hide silently behind the immune system's walls. In the other, they break free, multiply, damage organs, and may travel through the air to another person. Understanding that difference explains why a healthy-looking person may still need preventive treatment—and why a long-lasting cough, night sweats, unexplained weight loss, or coughing blood should never be ignored.