

Slide 1: This slide set is an introduction on the basics of tuberculosis, often referred to as TB.

Slide 2: This Slide Deck Covers the Following Topics about Tuberculosis (TB):

1. What is Tuberculosis (TB)?
2. How TB spreads
3. Latent TB Infection and TB Disease
4. Risk Factors
5. TB Testing
6. Treatment
7. TB Elimination

Slide 3: What is Tuberculosis (TB)?

Slide 4: TB is an airborne disease that spreads from person to person through the air. When a person breathes in TB germs, the germs can settle in the lungs and begin to grow. From there, the germs can move through the blood to other parts of the body, like the kidney, spine, or brain. Pulmonary TB is TB in the lungs. Extrapulmonary TB is TB disease that occurs in places other than the lungs.

Slide 5: Tuberculosis is preventable and treatable but remains one of the world's deadliest infectious-disease killers. After decreasing considerably in 2020, TB cases have been increasing since 2021, with 2023 reporting the highest number of cases since 2013.

Slide 6: This graph shows the number of TB cases for each year from 1982 to 2023 (the most recent year for which TB data are available). In 1992, the U.S. had the highest number of reported TB cases during this period.

2023 saw a 15.6% increase in cases compared with 2022. There were 9,633 TB cases in the United States in 2023.

To reverse recent increases in TB and reach the goal of TB elimination in the United States, enhanced strategies to diagnose and treat inactive TB and TB disease are needed. The TB elimination threshold is <1 case per 1,000,000 population, which is approximately 335 cases per year for the current U.S. population.

Slide 7: TB is still a life-threatening problem in this country, and it impacts people across the United States. TB knows no borders, and people in the United States are suffering from TB. Anyone can get TB. CDC has worked with the We Are TB Survivors Network and the National TB Coalition of America to highlight the personal experiences of people who have been diagnosed with and treated for TB disease, as well as the work of TB control professionals. These stories provide insight into some of the challenges TB survivors have had to overcome regarding their diagnosis and treatment of TB.

Slide 8: In this video, TB disease survivors Renee, Greg, and RJ give advice to people recently diagnosed with TB disease.

Slide 9: How TB Spreads

Slide 10: This image shows how TB germs spread through the air. The TB germs are put into the air when a person with TB disease (on the left) of the lungs or throat coughs, speaks, or sings. People nearby may breathe in these germs (illustrated by the person on the right) and become infected. The person on the left has TB disease and is putting TB germs into the air. The person on the right is breathing in the TB germs into their lungs.

The best way to stop TB spread is to

- Identify people who have TB.
- Isolate those who are contagious.
- Provide treatment as soon as possible to anyone who is contagious.

People with TB disease are most likely to spread it to people they spend time with every day, including family members, friends, coworkers, or schoolmates.

Slide 11: TB is not spread by:

- Sharing toothbrushes
- Saliva from kissing
- Shaking someone's hand
- Touching bed linens or toilets
- Sharing food, drink, or utensils

Slide 12: Inactive TB and TB Disease

Slide 13: Not everyone infected with TB germs becomes sick. As a result, two TB-related conditions exist: Inactive TB (sometimes called latent TB infection, or LTBI) and TB disease.

TB germs can live in the body without making you sick. This is called inactive TB or latent TB infection. People with inactive TB have TB germs in their bodies, but do not have TB disease and cannot spread the infection to other people.

TB germs become active if the immune system can't stop them from growing. When TB germs are active (multiplying in your body), this is called TB disease.

On this slide, the lung with inactive TB (top) has a small amount of TB due to the immune system controlling the germs. The lung with TB disease (bottom) is full of TB because the immune system cannot stop the TB germs from growing and multiplying.

Slide 14: Not everyone who is infected with TB becomes sick.

Person with Inactive TB:

- Has a small amount of TB germs in their body that are alive but inactive
- Cannot spread TB germs to others
- Does not feel sick, but may become sick if the germs become active in their body
- Usually has a positive TB skin test or TB blood test result indicating TB infection
- Has a normal chest x-ray and a negative sputum smear
- Needs treatment for inactive TB infection to prevent TB disease

Person with TB disease:

- Has a large amount of active TB germs in their body
- May spread TB germs to others
- May feel sick and may have symptoms such as a cough, fever, and/or weight loss
- Usually has a positive TB skin test or TB blood test result indicating TB infection
- May have an abnormal chest x-ray, or positive sputum smear or culture
- Needs treatment for TB disease

Both inactive TB and TB disease usually result in a positive TB skin test or TB blood test.

Slide 15: If the immune system can't stop TB germs from growing, they become active (multiplying in your body); this is called TB disease.

Most people diagnosed with TB disease in the United States become sick after living with inactive TB for years.

It is estimated that up to 13 million people in the United States have Inactive TB. Inactive TB treatment is 90% effective in preventing the development of TB disease.

More than 80% of people who get sick with active TB disease in the United States each year get sick from untreated inactive TB.

Many people who have inactive TB never develop TB disease. Some people develop TB disease soon after becoming infected (within weeks) before their immune system can fight the TB germs. Other people may get sick years later when their immune system becomes weak for another reason.

While not everyone with inactive TB will develop TB disease, about 1 in 10 people will develop TB disease over their lifetimes if not treated. The progression from inactive TB to TB disease may occur at any time, but it is most common within the first two years of infection.

Slide 16: This graphic helps summarize TB disease and inactive TB in the United States. TB disease is just the tip of the iceberg that is visible above the water. TB disease can be seen because of the active germs in a person's body and the symptoms they experience. People with TB disease can spread TB to others.

However, the larger part of the iceberg that is hidden underwater represents inactive TB. Like the iceberg, inactive TB can be easily hidden because TB germs are inactive and people with inactive TB germs do not feel sick. Many people with inactive TB do not know they are infected with TB. There are up to 13 million people in the U.S. with inactive TB. Without treatment, they could develop TB disease.

Slide 17: Possible TB disease symptoms are night sweats, fever, chills, weakness or fatigue, weight loss, no appetite, cough lasting longer than 3 weeks, pain in chest, coughing up blood or sputum (phlegm inside the lungs). Pulmonary TB disease develops in the lungs while extrapulmonary TB disease can develop in other parts of the body. Symptoms can vary depending on the type of TB Disease.

Slide 18: People with TB disease feel sick and can spread TB germs, especially to people they

spend time with every day.

A person with TB disease will require at least 4 months of medication plus X-rays, lab tests, and follow-up and testing of contacts.

TB disease is a serious condition and can lead to death if not treated. TB disease can almost always be treated and cured with medicine. TB germs become active if the immune system can't stop them from growing. When TB germs are active (multiplying in your body), this is called TB disease.

Slide 19: Public Health Workers are Responsible for finding people who have been exposed to someone with TB. A person who was exposed to someone with contagious TB disease is considered a TB contact. Persons exposed to someone with TB can include family members, roommates or housemates, close friends, coworkers, classmates, and others. People with TB disease can spread TB germs to those around them. The local health department will conduct a contact investigation by following up and testing those who have been close to someone with TB. Conducting contact investigations is a priority for tuberculosis (TB) programs in the United States. The goals of a contact investigation are to successfully stop the spread of TB and prevent future cases and outbreaks of TB disease.

Slide 20: Risk factors

Slide 21: Who is at higher risk for becoming infected with TB germs? Anyone can get TB Some people have a higher risk of getting infected with TB:

- People who have contact with someone who has infectious TB disease
- People who were born in or who frequently travel to countries where TB disease is common, including some countries in Asia, Africa, or Latin America
- Health care workers and others who work or live in places at high risk for TB transmission, such as homeless shelters, jails, and nursing homes

Others at higher risk include:

- Employees of high-risk congregate settings
- Health care workers who serve patients with TB disease
- Populations defined locally as having an increased incidence of inactive TB or TB disease, including medically underserved populations, low-income populations, or people who use drugs or alcohol
- Infants, children, and adolescents exposed to adults who are at increased risk for latent TB infection or TB disease

Slide 22: TB disease in the United States is most common among people who were born in countries with high rates of TB.

Demographic characteristics of TB patients have remained fairly consistent over the last several years. For example, since 2010, the majority of reported TB disease cases in the U.S. occur among non-U.S.- born persons. The data on this slide is from 2023.

Slide 23: As seen on the previous slide, TB disease in the United States is most common among

people who were born in countries outside the U.S., usually countries with high rates of TB.

This pie chart shows the most common countries of birth among non-U.S.-born persons with TB disease reported in the U.S.

The most common countries of birth among non-U.S.-born TB patients remained fairly consistent over the last several years. This slide shows data from 2023 with Mexico (17%) the most frequently reported country of birth, followed by the Philippines (11%), India (8%), Vietnam (6%), and China (5%). Other countries represented 52% of cases.

Slide 24: In 2023, Hispanic or Latino persons (36.8%) represented the largest proportion of TB patients, followed by Non-Hispanic Asian persons (30.0%), non-Hispanic Black or African American persons (17.6%), and non-Hispanic White persons (9.3%). American Indian or Alaska Native persons, Native Hawaiian or Other Pacific Islander persons, persons who identify with more than one race, persons who identify as Other race, and those with unknown or missing race/ethnicity information each represented 1–2% of patients.

Slide 25: People at higher risk for developing TB disease generally fall into two categories:

- Those who have been recently infected with TB germs
- Those with medical conditions that weaken the immune system, such as:
 - HIV Infection
 - Diabetes
 - Specialized treatment for rheumatoid arthritis or Chron’s disease
 - Organ transplants
 - Severe kidney disease
 - Head or neck cancer
 - Substance use
 - Medical treatments such as corticosteroids
 - Silicosis
 - Low body weight

While not everyone with inactive TB will develop TB disease, about 1 in 10 people will develop TB disease over their lifetimes if not treated. Progression from untreated inactive TB to TB disease is estimated to account for approximately 80% of U.S. TB cases.

Babies and young children are also at higher risk because they often have weak immune systems.

Slide 26: TB testing

Slide 27: Health care providers are encouraged to use newer TB blood tests to screen for TB infection. A positive TB skin test or TB blood test only tells that a person has been infected with TB germs. It does not tell whether the person has inactive TB or has progressed to TB disease. Other tests, such as a chest x-ray and a sample of sputum, are needed to see whether the person has TB disease.

Generally, it is not recommended to test a person with both a TB skin test and a TB blood test.

Slide 28: Blood tests measure a person's immune reactivity to TB germs. White blood cells from most people that have been infected with TB germs will release interferon-gamma (IFN-g) when mixed with antigens (substances that can produce an immune response) derived from TB germs.

Results for blood tests can be read as positive or negative. If the result is not a clear positive or negative, the test can be repeated.

Positive: Inactive TB likely

Negative: Inactive TB unlikely, but cannot be excluded, especially if the person has signs and symptoms consistent with TB disease or the person has a high risk for developing TB disease once infected with TB germs

Blood tests are the preferred test for people who have received the bacille Calmette-Guerin (BCG) vaccine. See slides 30 and 31 for more info on BCG.

Slide 29: The TB skin test, also called the Mantoux tuberculin skin test (TST), requires two visits with a health care provider.

On the first visit, the skin test is placed by injecting a small amount of fluid (called tuberculin) into the skin on the lower part of the arm. The skin will react if there are TB germs in the body.

A person given the tuberculin skin test must return within 48–72 hours to have a trained health care worker look for a reaction on the arm. The result depends on the size of the raised, hard area where the skin reacted.

Positive skin test: This means the person's body is infected with TB germs. Additional tests are needed to determine if the person has inactive TB (LTBI) or TB disease.

Negative skin test: This means the person's body did not react to the test, and that inactive TB or TB disease is not likely.

The image on the left shows a TB skin test being administered into a patient's arm. The image on the right shows the test being read by measuring the reaction at the test injection site.

A skin test is NOT a vaccine for TB disease.

Slide 30: BCG is a vaccine for preventing TB disease. It is a weak form of bacteria that is closely related to the germs that cause TB. This vaccine is not widely used in the United States, but it is often given to infants and small children in other countries where TB is common. BCG vaccine does not always protect people from getting TB and protection goes away as people get older.

Slide 31: Many people born outside of the United States have received the TB vaccine.

The TB vaccine may cause a false-positive reaction to the TB skin test, which can complicate decisions about treatment. The presence or size of a TB skin test reaction in those who have been vaccinated with BCG does not predict whether the vaccine will provide protection against TB disease.

TB blood tests, unlike the TB skin test, are not affected by prior TB vaccination and are easier to interpret in people who have received the TB vaccine.

Slide 32: Treatment

Slide 33: People with inactive TB do not have symptoms, and they cannot spread TB germs to others. However, if inactive TB germs become active in the body and multiply, the person will go from having inactive TB to being sick with TB disease. For this reason, people with inactive TB should be treated to prevent them from developing TB disease. Treatment of inactive TB is essential to controlling TB in the United States because it substantially reduces the risk that inactive TB will progress to TB disease.

Slide 34: Treating inactive TB is effective in preventing TB disease. There are several options for the treatment of inactive TB. There have been advances in shortening the length of inactive TB infection treatment from 6–9 months to 3–4 months. Short-course inactive TB treatments are effective, safe, and have higher completion rates than longer treatments. Shorter regimens help patients finish treatment.

Slide 35: It is very important that people who have TB disease are treated, take the medicine exactly as prescribed, and finish all the medicine. If they stop taking the medicine too soon, they can become sick again; if they do not take the medicine correctly, the TB germs that are still alive may become resistant to those drugs. Resistance means that the drug can no longer kill the TB germs. Drug-resistant TB can occur when the drugs used to treat TB are misused or mismanaged. Examples of misuse or mismanagement include when

- People do not complete a full course of TB treatment.
- Health care providers prescribe the wrong treatment (the wrong dose or length of time).
- Drugs for proper treatment are not available.

Slide 36: Directly observed therapy (DOT) for tuberculosis treatment involves observing a patient ingest medication, monitoring the patient for side effects, and providing support. DOT is typically conducted in person; however, scheduling in-person DOT can present logistical challenges.

DOT can reduce the development of drug resistance, treatment failure, or relapse after the end of treatment. DOT can be given anywhere the patient and health care worker agree upon, provided the time and location are convenient and safe. It is important that the location is convenient for the patient.

Slide 37: vDOT can assist TB programs meet the U.S. standard of care for patients undergoing tuberculosis treatment, while using resources efficiently. It facilitates patient monitoring outside of normal clinic hours, during an emergency, or when patients are traveling. vDOT allows persons undergoing TB treatment the opportunity to use video-enabled phones, tablets, or computers to remotely interact with health care workers in real time (synchronous) or through recorded videos (asynchronous).

Slide 38: TB Elimination

Slide 39: Current TB control measures, including early identification of TB disease, prompt and appropriate treatment for persons with TB disease, and ensuring that TB patients complete treatment, continue to be critical. Identifying and treating persons with latent TB infection is also paramount to TB elimination. Eliminating TB in the U.S. will require this dual approach which includes strengthening existing systems to track and stop transmission of infectious TB disease and expanding efforts to address inactive TB.

The TB elimination threshold is <1 case per 1,000,000 population, which is approximately 335 cases per year for the current U.S. population.

The increase in reported cases of TB disease in 2023 highlights the need to regain the momentum lost toward the United States' goal of eliminating TB. United States continues to maintain one of the lowest TB incidence rates in the world even with the recent increase in cases.

It's Time to End TB, meaning

- It's time to test for and treat latent TB infection.
- It's time to strengthen TB education and awareness among health care providers.
- It's time to find, cure, and prevent all forms of TB in the United States and around the world.
- It's time to end stigma.
- It's time to speak up.

Slide 40: The key to diagnosing TB is for clinicians to “think TB” when they see a patient with signs and symptoms of TB disease. Because TB is not as common as it was years ago in the United States, many clinicians do not consider the possibility of TB when evaluating patients who have symptoms of TB. When this happens, the diagnosis of TB may be delayed or even overlooked, and the patient will remain ill and possibly infectious.

Slide 41: TB control and prevention is a complex undertaking that requires the collaborative efforts of a broad range of individuals, organizations, and institutions in both the public and private health sectors.

State and local health departments have the primary responsibility for preventing and controlling TB. This includes the essential role of planning, coordinating, and evaluating program activities.

Health care workers in doctors' offices and hospitals, community health centers, and academic institutions implement TB control efforts such as testing, treating, and reporting to health departments.

Slide 42: CDC's Think. Test. Treat TB campaign aims to reach those most at risk for latent TB infection and their health care providers to encourage TB testing and get closer to the elimination of TB. Think. Test. Treat TB is the first national multilingual communications campaign to increase testing for inactive TB, a major health disparity among Asian Americans.

Slide 43: Resources:

- CDC TB website: www.cdc.gov/tb/
- State & Local TB Control Offices: <https://www.cdc.gov/tb/php/tb-programs/index.html>
- Find TB Resources: <https://findtbresources.cdc.gov>
- TB Centers of Excellence: <https://www.cdc.gov/tb-programs/php/about/tb-coe.html>
- Facebook: www.facebook.com/CDCTB
- X (formerly Twitter): www.twitter.com/cdc_tb