

**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 the world's deadliest infectious-disease killer. 2019 saw the United States' lowest number of TB cases on record, but too many people still suffer from TB.

**Slide 6:** This graph shows the number of TB cases for each year from 1982 to 2019 (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.

2019 saw the lowest number of US TB cases and lowest incidence rate on record, continuing a trend of declining cases and incidence since 1992. There were 8,916 TB cases in the United States in 2019

Reaching the goal of TB elimination in the United States requires maintaining and strengthening current TB control priorities, while increasing efforts to identify and treat latent TB infection (LTBI) among high-risk populations. The TB elimination threshold is <1 case per 1,000,000 population, which is approximately 330 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 Controllers Association 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:** This video shares a personal story of a TB survivor in the United States.

Tenzin's treatment for multidrug-resistant TB lasted for over 2 years. With the help of his local and state TB programs, Tenzin began the long and challenging treatment process.

**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:** Latent TB Infection and TB Disease

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

TB germs can live in the body without making you sick. This is called latent TB infection, or LTBI. People with latent TB infection 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 latent TB infection (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:** Note everyone who is infected with TB becomes sick

Person with Latent TB Infection:

- Has a small amount of TB germs in his/her 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 his/her body
- Usually has a positive TB skin test or TB blood test result indicating TB infection
- Should consider treatment for latent TB infection to prevent TB disease

Person with TB disease:

- Has a large amount of active TB germs in his/her 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

- Needs treatment for TB disease

Both latent TB infection 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 latent TB infection for years.

It is estimated that up to 13 million people in the United States have latent TB infection.

Latent TB infection treatment is 90% effective in preventing the development of TB disease.

Progression from untreated latent TB infection to TB disease accounts for approximately 80% of U.S. TB cases. People can have latent TB infection for years and not know it.

Many people who have latent TB infection 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 latent TB infection will develop TB disease, about 5–10% will develop TB disease over their lifetimes if not treated. The progression from latent TB infection to TB disease may occur at any time, but it is most common within the first two years of infection.

**Slide 16:** TB disease is only the tip of the iceberg. This graphic helps summarize TB disease and latent TB infection 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 latent TB infection. Like the iceberg, latent TB infection can be easily hidden because TB germs are inactive and people with latent TB germs do not feel sick. Many people with latent TB infection do not know they are infected with TB. There are up to 13 million people in the U.S. with latent TB infection. Without treatment for latent TB infection, 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 typically requires 180 days 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 TB Contacts. A TB contact is persons exposed to someone with contagious TB disease. Contacts 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 Mexico, the Philippines, Vietnam, India, China, Haiti, Guatemala, and other countries with high rates of TB
- 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 latent TB infection or TB disease, including medically underserved populations, low-income populations, or people who abuse 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 2019.

**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 2019 with Mexico (18.6%) the most frequently

reported country of birth, followed by the Philippines (12.5%), India (9.1%), Vietnam (7.9%), and China (6.1%).

There are countries other than those you see here (grouped as Other Countries for this chart) with much higher rates of TB (i.e., cases per 100,000 people) for people who now live in the U.S., but a smaller number of people born in those countries now live in the U.S.

**Slide 24:** In 2019, non-Hispanic Asian persons continue to represent the largest proportion of TB patients (35.3%), followed by Hispanic persons (30.2%), non-Hispanic Black persons (19.7%), non-Hispanic White persons (11.4%), Native Hawaiian/Other Pacific Islander persons (1.2%), American Indian/Alaska Native persons (0.9%), and persons of multiple races (0.8%).

**Slide 25:** People at high 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:
  - o HIV Infection
  - o Substance abuse
  - o Specialized treatment for rheumatoid arthritis or Chron's disease
  - o Organ transplants
  - o Sever kidney disease
  - o Head or neck cancer
  - o Diabetes
  - o Medical treatments such as corticosteroids
  - o Silicosis
  - o Low body weight

While not everyone with latent TB infection will develop TB disease, about 5–10% will develop TB disease over their lifetimes if not treated. Progression from untreated latent TB infection 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 latent TB infection 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: Latent TB infection likely

Negative: Latent TB infection unlikely, but cannot be excluded, especially if  
Patient has signs and symptoms consistent with TB disease  
Patient 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 healthcare 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.

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.

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

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

Treating latent TB infection is less costly than treating TB disease: \$400-\$600 to treat latent TB infection vs. \$19,000 to treat TB disease.

**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:** TB Elimination

**Slide 37:** 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 latent TB infection.

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 38:** 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 39:** 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 40:** Resources:

- CDC TB website: [www.cdc.gov/tb/](http://www.cdc.gov/tb/)
- State & Local TB Control Offices: [www.cdc.gov/tb/links/tboffices.htm](http://www.cdc.gov/tb/links/tboffices.htm)
- Find TB Resources: <https://findtbresources.cdc.gov>

- Facebook: [www.facebook.com/CDCTB](http://www.facebook.com/CDCTB)
- Twitter: [www.twitter.com/cdc\\_tb](http://www.twitter.com/cdc_tb)