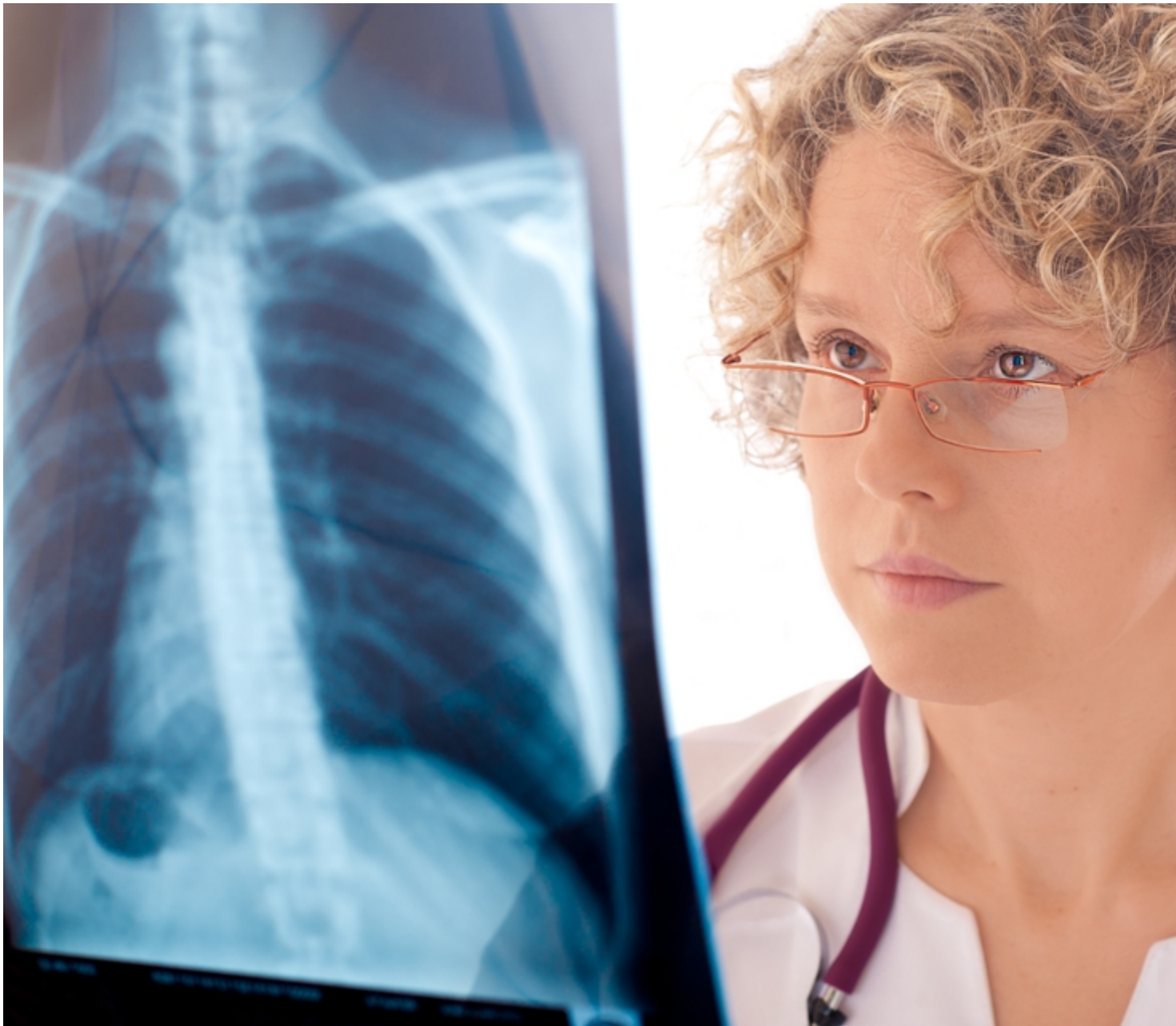


# Tuberculosis <sup>[1]</sup>

Submitted on Dec 14, 2016



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Tuberculosis (TB) is an infection of the lungs and respiratory system, which is the organ system that allows us to breathe. TB is caused by a bacterium called *Mycobacterium tuberculosis*. It spreads from person to person when an infected person coughs, sneezes, laughs, or spits. Tiny droplets of fluid from the lungs are carried in the air and can be breathed in by someone nearby. Although it can affect many parts of the body, TB usually occurs in the lungs.

One third of the world's people are infected with TB, and along with HIV, TB is one of the world's leading causes of death due to disease. The World Health Organization (WHO) estimates that over three million women became sick with TB in 2014.

Of the almost ten million new cases of tuberculosis in 2014, over one million occurred in people living with HIV (HIV+). The risk of developing TB is estimated to be 26 to 31 times greater for people living with HIV than for those who are HIV-negative. The largest numbers of TB infection occur in southeast Asia and the Western Pacific (58 percent of global total), while Africa had the most severe TB burden in relation to its population. The good news is that the number of people living with TB across the globe in 2015 was 42 percent lower than in 1990.

In the US, the number of new TB cases reported declined each year from 1993 to 2014; there was a slight increase in the number of cases in 2015 (1.6 percent more than in 2014). According to the Centers for Disease Control and Prevention (CDC), the number of TB cases reported in 2014 was the lowest that is has been since reporting began in 1953.

Worldwide, TB is the leading cause of death in people living with HIV in Africa, and a leading cause of death elsewhere. The WHO estimates that one third of the 35 million people living with HIV worldwide are infected with TB. The CDC recommends that people living with HIV be screened for TB when they are first diagnosed with HIV; in addition, yearly screening is recommended for people living with HIV who have repeated exposure to others with active TB (see "Diagnosing TB," below).

## Forms of TB

Being infected with TB does not mean a person is contagious or able to spread TB. This is because not everyone who is infected with TB bacteria shows signs of TB infection or develops "active" disease.

- **Latent/Inactive TB** - Most people with healthy [immune systems](#) [2] can fight off TB bacteria, even after they breathe them in and are infected. This is called latent TB, which means it is inactive. People with latent or inactive TB are infected with TB yet have no symptoms. They do not feel sick and cannot spread the disease to other people. In

some people, TB stays latent or inactive for their entire lives. But in other people, latent TB turns into active disease if their immune system is damaged or weakened, through things like HIV infection, [cancer](#) [3], or transplant surgery that requires taking drugs to suppress the immune system.

- **Active TB** - Some people infected with TB develop active disease. Active TB usually causes symptoms like coughing and weight loss. People with active TB can spread it to others. Active TB may develop either soon after infection or years later when a person's immune system becomes weaker.

## TB and HIV

People with weakened immune systems are more likely to develop active TB disease. This includes people living with HIV, children, elderly people, and people who take drugs that suppress the immune system. Research shows that, among those with inactive TB, people living with HIV are three to 12 times more likely to develop active TB disease than HIV-negative people. Treating latent TB can greatly reduce your chances of developing active TB. Treatment of latent TB protects your health as well as keeps you from spreading TB to others. You can develop active TB with any [CD4 count](#) [4].

## Preventing TB

TB is spread through the air when an infected person coughs, sneezes or spits. Family members of people with TB, people living in the same house, health-care workers, and people who live in residential facilities like homeless shelters and prisons are most likely to get TB. People with latent (inactive) TB do not spread the disease. Once a person with active TB starts treatment (see "TB Treatment" below), they usually cannot spread the disease after two to three weeks on treatment.

People with active TB should be separated from others until they can no longer spread the disease. If you have TB or spend time around people with TB, it is important to wear a disposable face mask. Certain types of air filters can trap the TB bacteria, and ultraviolet light can kill it.

## TB Symptoms

After TB bacteria are inhaled, they settle in the lungs. People with healthy immune systems can usually fight the bacteria and keep it from multiplying. The [immune system](#) [2] may build structures that wall off or contain the bacteria. These structures can burst, leaving scars in the lungs. If a person's immune system is too weak and the structures burst, the bacteria can get out and enter the bloodstream. Once in the bloodstream they travel to other parts of the body including the brain, kidneys, bones, and reproductive organs, where they can cause infertility. This is called "extrapulmonary TB" because it has spread outside the lungs. Extrapulmonary TB is more likely in people with advanced HIV disease.

People with active TB disease may develop symptoms including:

- Cough lasting more than two to three weeks
- Coughing up sputum (phlegm) or blood
- Unexplained weight loss

- Fever or chills
- Night sweats
- Fatigue (unusual tiredness)
- Loss of appetite
- Chest pain

## **Finding and Diagnosing TB**

### **Screening**

It is recommended that people living with HIV get screened for TB using a skin or blood test. The skin test is called a TST (tuberculin skin test) or PPD (purified protein derivative; this is the substance used to do the test). A small amount of "tuberculin" (a TB protein) is injected under the skin of the arm, and the test is checked or "read" two to three days later by a health care worker who looks at the spot on the arm and measures any swelling. The test is positive if the area develops a hard swelling under the skin that is bigger than 5mm (5mm is a little smaller than a standard pencil eraser).

There is also a blood test that screens for TB called an interferon-gamma release assay (IGRA) that measures your immune response to TB. With the IGRA test, there is no need to return to a health clinic; results are usually available within 24 hours and can be communicated by phone.

Because people living with HIV sometimes do not develop a positive TB skin test reaction even if they are infected, the TB blood or sputum tests are now the preferred tests for those living with HIV. A positive TB skin or blood test shows that you have been exposed to TB, but it does not mean you have active TB disease.

### **Diagnosis**

For people who are suspected of having active TB because they have symptoms, providers will often suggest a TB test called the Xpert MTB/RIF test. This test uses sputum (mucus or phlegm you cough up from your lungs) and takes less than three hours to give results. It tests for the genetic material of TB (TB's DNA) and for resistance to rifampin (a drug used to treat TB; see more below) at the same time.

Your health care provider will look at your symptoms as well as other tests, such as chest X-rays and sputum tests, before diagnosing you with active TB disease.

## **TB Treatment**

There are two types of treatment for TB:

### **Preventive Treatment**

If you have latent or inactive TB (infected but no symptoms), your health care provider will likely suggest that you start treatment to help your body get rid of the TB germ. This treatment is intended to prevent active TB (TB with symptoms) from developing. Treatment typically involves nine months of an antibiotic called isoniazid (INH) plus vitamin B6 supplements.

Although it is recommended that all people living with HIV begin taking HIV drugs as soon as possible, there may still be rare instances in which people living with HIV and TB are not yet taking HIV drugs. Those people living with HIV who are not taking HIV drugs may be treated with INH and B6 plus rifapentine or rifampin for only three months. The INH, B6, and rifapentine or rifampin treatment combination is not recommended for people on HIV treatment because rifapentine and rifampin can interact <sup>[5]</sup> negatively with some HIV drugs. Your health care provider will help you decide which treatment option is best for you.

During INH and B6 treatment, your provider will draw lab tests to check for any side effects <sup>[6]</sup> from the INH medication, such as liver inflammation. The first set of lab tests will be done after you have taken the medication for one month. Also, your provider will question you regularly about any side effects you may be having from the INH. Possible side effects from INH include:

- loss of appetite
- nausea and/or abdominal pain
- jaundice (yellowing of the skin, eyes, and mucous membranes)
- dark urine
- rash
- numbness and tingling of your hands and/or feet (peripheral neuropathy)
- fever and weakness for more than three days
- muscle soreness
- long-lasting fatigue (extreme tiredness)

The pyridoxine or B6 medication is taken to prevent the peripheral neuropathy <sup>[7]</sup> symptoms that INH can cause. It is important not to drink alcohol while you are taking INH, or your liver may become badly damaged.

## **Treatment of Active Disease**

Treatment of active TB requires combination therapy. The usual regimen is:

- Isoniazid (INH)
- Rifampin (also known as rifampicin, Rifadin, or Rimactane)
- Pyrazinamide
- Ethambutol (Myambutol)

These four drugs are taken daily for two months. Tests can be done to see how well the drugs are fighting the TB. If the drugs are fighting the TB well, then the treatment changes to just two drugs: isoniazid plus rifampin for four more months. Sometimes the treatment will last longer, depending on whether or not the TB is resistant <sup>[8]</sup> to these drugs, or if the TB disease has spread through the bloodstream to other parts of the body.

Some TB drugs can interact with HIV drugs <sup>[9]</sup>. Rifampin, for example, can interfere with protease inhibitors and non-nucleoside reverse transcriptase inhibitors. This can make it difficult to treat both diseases at the same time. If you are taking a protease inhibitor, your health care provider may make changes to your TB drugs. Your provider may also adjust your drug doses when you are being treated for both TB and HIV. Some people living with HIV may need longer TB treatment than people without HIV.

As with HIV, taking your TB drugs exactly as prescribed (good adherence [10]) is very important. Even though symptoms usually improve after three to four weeks and you feel better before you have finished taking all your drugs the full course of treatment must be completed. This helps prevent TB from coming back and becoming resistant to drugs.

## Drug Resistant TB

Like HIV, TB can change to become resistant [8] to drugs, especially if a drug is used alone or all the medication is not taken exactly as prescribed. This can cause the drugs to stop working. Therefore, it is important for your provider to test your TB for drug resistance. Drug-resistant tuberculosis (DR TB) must be treated with a combination of drugs. Some TB strains are now resistant to several different drugs. These strains are called multiple-drug resistant tuberculosis (MDR TB) and extensively-drug resistant tuberculosis (XDR TB). XDR TB is resistant to almost all medications used to treat TB. As a result, many more people with XDR TB die or have treatment failure. It is estimated that almost half a million new cases of MDR TB occurred in 2014.

## TB and Pregnancy

According to the CDC, untreated TB is a greater threat to pregnant women and their babies than TB treatment. Therefore, it is important for pregnant women to be screened and treated for TB. The TB skin test, the TB blood test, and the TB sputum test are safe during pregnancy [11]. As with anyone who is not pregnant, additional tests are needed to determine if someone who tests positive for TB has active TB disease.

For pregnant women with latent or inactive TB, INH taken daily or twice weekly at a higher dose for nine months is the usual treatment. In pregnant women with active TB disease, the usual treatment is INH, rifampin, and ethambutol daily for two months followed by INH plus rifampin for seven months (for a total of nine months of treatment). It is important for pregnant women taking INH to take pyridoxine (vitamin B6) daily to help prevent nerve damage.

Pregnant women [11] should not take streptomycin because it can cause deafness in babies. Pyrazinamide is most often not recommended during pregnancy, as its effects on the developing baby are not yet known. Other TB drugs that should be avoided during pregnancy include: kanamycin, amikacin, capreomycin, and fluoroquinolones (an entire group or type of antibiotics).

## The Bottom Line

TB is a serious disease that is a leading cause of death in people living with HIV worldwide. Many people can keep TB under control and have latent, or inactive, disease. But people with weakened immune systems, including some people living with HIV, are much more likely to develop active TB disease that needs treatment. In many ways, TB and HIV treatment are similar. Both diseases must be treated with a combination of drugs, since using only one drug can lead to resistance. With both TB and HIV, good adherence is a very important factor in successful treatment. But unlike HIV, TB can usually be completely cured after less than a year of treatment.

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## Additional Resources

Select the links below for additional material related to tuberculosis.

[TB and HIV ? Co-infection, Diagnosis & Treatment \(TBFacts.org\)](#) [23]

[Tuberculosis in Women \(WHO\)](#) [24]

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[Considerations for Antiretroviral Use in Patients with Coinfections \(TB & HIV; AIDSinfo\)](#) [37]

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- [25] [http://www.stoptb.org/wg/tb\\_hiv/](http://www.stoptb.org/wg/tb_hiv/)
- [26] <http://www.action.org/resources/item/tuberculosis-an-unchecked-killer-of-women>
- [27] <http://www.lung.org/lung-health-and-diseases/lung-disease-lookup/tuberculosis/>
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- [36] <http://www.whatworksforwomen.org/chapters/19-Preventing-Detecting-and-Treating-Critical-Co-Infections/sections/51-Tuberculosis>
- [37] <https://aidsinfo.nih.gov/guidelines/html/1/adult-and-adolescent-arv-guidelines/27/tb-hiv>
- [38] [http://www.who.int/tb/publications/global\\_report/gtbr2015\\_executive\\_summary.pdf](http://www.who.int/tb/publications/global_report/gtbr2015_executive_summary.pdf)