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Adrian Vega

Brennan Heath

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A Look Into Tuberculosis

By Adrian Vega and Brennan Heath

Mycobacterium tuberculosis



Tuberculosis is a *Mycobacterium* which is a genus classified in the phylum Actinobacteria. This genus is known to cause diseases in mammals. Tuberculosis' scientific name is *Mycobacterium tuberculosis*. Robert Koch discovered pathogenic bacterial species discovered in 1882 by *M. tuberculosis* has a waxy coating on the cell's surface which makes it unable to be Gram stained.(Brennan, 2003). Gram staining is a method to differentiate bacterial species into two groups. This bacterium is Gram-negative because the waxy coating will not absorb the stain. When *M. tuberculosis* is in the lungs it is engulfed by macrophages trying to eradicate the disease, but the cell wall is coated in mycolic acid which blocks the fusion of the phagosome and lysosome so the *M. tuberculosis* bacterium survives being “eaten” by the macrophage. *M. tuberculosis* is can also withstand weak disinfectants. The *M. tuberculosis* bacterium divides every 15 – 20 hours which is very slow compared to *Escherichia coli* which divides every 20 minutes (Havli, 1991).

Tuberculosis in History



Research suggests that tuberculosis has been around since about 5,000 years ago. Hippocrates identified what we believe to be Tuberculosis in patients of ages 18 to 32. In August, 2014 during a study on over 1,000 year old mummies a new hypothesis came about on how tuberculosis spread around the world. The hypothesis is that less than 6,000 years ago in Africa the disease was carried across the Atlantic Ocean by seals (CDC, 2014).

Why care?



There are an estimated 10 to 15 million people living in the United States with a form of tuberculosis called latent tuberculosis. This number is about the equivalent of about 457 times the population of Nacogdoches. Latent tuberculosis is a form of tuberculosis that can stay within the body without actually being contagious, but once latent TB becomes active then it gets harmful and able to spread. It is important to be wary of this disease so that we can prevent people from contracting it in the future (CDC, 2014).

Prognosis for Tuberculosis

You may not know if you have latent TB because you will not have any symptoms. If you have active TB though, you will have to take many different medicines to become well again any you will live a normal life both while treatment and after. Tuberculosis, when not treated, can lead to cavities in the lungs that cause bleeding or can be infected. A hole can form in between airways in the lungs leading to difficulty breathing and in worst cases death. In the long term you can develop permanent lung damage and other organs it is possible for your central nervous system and circulatory system, lymph nodes, skin, joints and bones to become damaged as well. Some of the initial effects of tuberculosis are skin rashes, itching, blistering and peeling of the skin (CDC, 2014).

Symptoms of Tuberculosis



If you have active TB then you will have symptoms and they can include: a cough with thick, cloudy, and bloody mucus from the lungs for more than 2 weeks, fever, chills, and night sweats, fatigue and weakness, loss of appetite and unexplained weight loss, shortness of breath and chest pain (CDC, 2012).

Different types of TB

There are two different types of TB, active and latent. If you have active TB then you will have symptoms and they can include: a cough with thick, cloudy, and bloody mucus from the lungs for more than 2 weeks, fever, chills, and night sweats, fatigue and weakness, loss of appetite and unexplained weight loss, shortness of breath and chest pain. If you do not have any of these symptoms, you could still have latent TB. Most people who have latent TB can live their life normally and may not even know that they have tuberculosis. If you have active TB however, then you will have some if not all of the symptoms mentioned in the prognosis (Mayo Clinic, n.d.).



Life with Tuberculosis

The human body's reaction to Tuberculosis is it will fight the infection by closing off the disease into tiny pockets called tubercles. The bacteria will stay alive but cannot spread to other tissue and is not contagious. This stage is called latent TB, and most people never go farther than this stage. Some people who get past latent TB get what is called Active TB. This is when the bacterium starts to spread and symptoms like coughing, night sweats are evident (Nursing Link, 2014).

How we can treat different types of TB

If you catch Tuberculosis then you have two options. You can take your preferred medicine once for six months and then be free of TB however; if you stop taking your medicines before your six months are over, you will have to take a different group of medicine because your tuberculosis is immune to the medicines that you took initially. (CDC, 2011)

How treatment works

1. Ethambutol works by stopping the bacteria that cause this disease from growing and increasing in numbers (Net Doctor, n.d.).
2. Isoniazid is an antibiotic and works by stopping the growth of bacteria (WebMD, n.d.).
3. Pyrazinamide kills or stops the growth of certain bacteria that cause tuberculosis (MedicinePlus, n.d.).
4. Rifabutin works by killing the bacteria that are causing the infection (RxList, n.d.).
5. Rifampin prevents bacteria from spreading in your body (RxList, n.d.).
6. Rifapentine is an antibiotic that fights bacteria (RxList, n.d.).



Emerging Treatments

A new alternative “treatment for tuberculosis may be vitamin D, studies have shown vitamin D to prevented cure tuberculosis because white blood cells convert vitamin D into an active form that helps make a protein that kills tuberculosis bacteria (Mercola, n.d.).