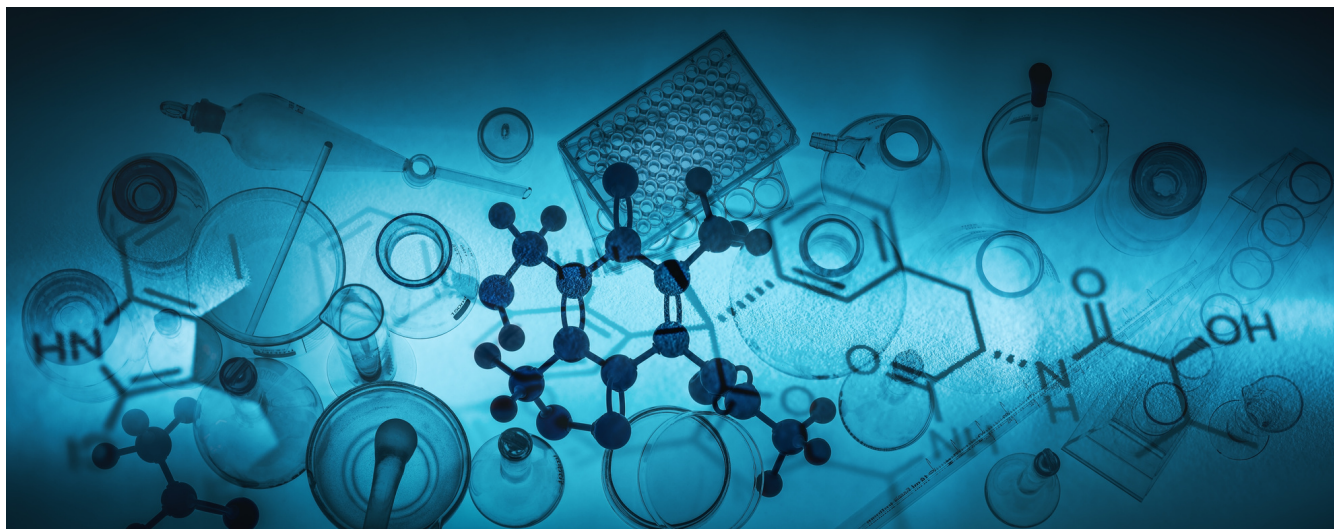


THE MONTHLY DOSE

Official Newsletter of The Mueller Health Foundation



WHAT'S NEW AT THE MUELLER HEALTH FOUNDATION:

In preparation for next month's World TB Day on March 24th, the Stop TB Partnership announced the theme for this year: **"Yes! We Can End TB."**

This year is going to be critical for all of us engaged in TB work and should be championed as the 'year of hope' to ensure that TB initiatives get full support and garner more attention.

Let's embrace this 2023 World TB Day theme together and continue to make a difference in the lives of those affected by tuberculosis.

Stay tuned for more updates!

LATEST NEWS: SHOWCASING STORIES OF TB SURVIVORS

We at The Mueller Health Foundation continue to be deeply committed to sharing personal stories and giving a voice to TB patients, TB survivors, TB practitioners, and all the friends and family members of the people who have been affected by the disease. The Center for Disease Control and Prevention (CDC) has put together a wonderful collection of stories and this month we would like to highlight Deo's story, who was diagnosed with latent TB. Deo was born in Bhutan, but lived in a refugee camp in Nepal alongside his family before being resettled to the United States after he finished his degree in medicine. Here is an excerpt from his journey:

Deo, along with other refugees from Bhutan, was scheduled for resettlement to the United States. A chest x-ray was required as part of Deo's overseas medical screening exam for immigrants and refugees applying to come to the United States. Deo's x-ray did not indicate TB or any other disease, and he was allowed to travel to the United States. Upon his arrival in Atlanta, Georgia, he had to undergo additional health screening and was given a QuantiFERON test to determine if he had TB infection, as well as another chest x-ray. The QuantiFERON test was positive for TB infection, but the chest x-ray did not show any signs of TB disease. Deo was diagnosed with latent TB infection and he received rifampicin for 4 months to treat the TB infection and prevent him from progressing to TB disease. He successfully completed his course of treatment and is now working in Atlanta as a research interviewer. He and his research team members are working to recruit other people coming to the United States into a study about TB diagnostic tests.

Deo has a message for others. He urges everyone who might have been exposed to TB bacteria to "Go see your doctor" and to be tested for TB infection and screened for TB disease, especially if they are having TB symptoms such as cough, fever, or significant weight loss. He wants people to know that while the idea of having latent TB infection or TB disease might be frightening, TB can be treated. He invites others to join him in his dream of a TB-free world. "It is up to you and me!" Deo says. To read his full story please follow the link to the Center for Disease Control and Prevention's website here: <https://www.cdc.gov/tb/topic/basics/nataliestory.htm>

For more news, please also take a look at our top 3 picks for February in this newsletter, where we highlight novel research findings and news around the prevention and treatment of tuberculosis around the world.

MHF TOP PICKS FOR FEBRUARY

Every month, we at the Mueller Health Foundation like to showcase interesting news and updates in the field of tuberculosis. Below are our top **3** picks for **February**:

1. Scientists Reveal Flaws in Tuberculosis Bacterium by Studying Ferredoxins

A team of researchers has studied the structures of ferredoxins from the tubercle bacillus and their complexes with partner proteins. Small proteins called ferredoxins play a pivotal role in the main metabolic pathways, the series of chemical reactions occurring within a cell. Looking at *Mycobacterium tuberculosis*, which has five ferredoxins encoded in its genome, the researchers noticed that two 3Fe-4S-ferredoxins are located next to the genes of P450 cytochromes, proteins involved in important intracellular reactions and emerging as potential targets for new anti-tuberculosis drugs. Such gene proximity might indicate a functional relationship between ferredoxins and cytochromes. The research confirmed that to function properly, cytochromes do need electrons delivered by protein partners, ferredoxins. With additional research, the team's findings could help to find targets for new anti-tuberculosis drugs. To learn more about the research, you can access the full paper at: <https://www.frontiersin.org/articles/10.3389/fmolb.2022.1100032/full>

2. Common Heartburn Drugs Could Speed Up Tuberculosis Treatment

Researchers have discovered that over-the-counter drugs commonly used to treat heartburn could shorten the treatment of tuberculosis (TB). These drugs could also reduce the chances of the bacteria that causes TB from becoming drug resistant. The scientists tested if a cardiac and blood pressure drug called verapamil, which blocks human cell membrane pumps, could also block the bacterial cell membrane pump. To do this, they used a neat approach in which they tagged an antibiotic typically used to treat TB, rifampicin, with a fluorescent marker so they could track exactly how the bacteria process the antibiotic. The researchers were able to see that verapamil does indeed stop the bacteria ejecting rifampicin. Additionally, the researchers also identified a set of additional proton pump inhibitors that showed even better results than verapamil and are among the most widely used, over the counter drugs for heartburn, reflux, and gastritis. These include omeprazole, pantoprazole, lansoprazole, and rabeprazole. The potential for repurposing cheap and easily accessible drugs to accelerate TB treatment could have enormous health impact worldwide. Given that this work has only been carried out in cells, more research will be needed before eventually moving onto clinical trials to look at potential treatment regimes for drug combinations in patients. To learn more, you can read the paper here: <https://www.pnas.org/doi/10.1073/pnas.2215512120>

3. Research Suggests that Gaucher Disease Protects Against Tuberculosis

New research conducted by Cambridge scientists in collaboration with colleagues in the Netherlands, Spain, and Pennsylvania, USA, shows that the same biological mechanisms that underlie Gaucher disease are also effective at clearing TB infection. When the researchers genetically engineered zebrafish with genetic variants causing Gaucher disease that are common among Ashkenazi Jews, as anticipated their macrophages became enlarged and unable to break down the toxic materials. But when the team exposed the fish to TB, they discovered unexpectedly that the fish were resistant to infection, not susceptible. The reason for this resistance to infection was because of the fatty chemical that accumulates within the macrophages in Gaucher disease, called glucosylsphingosine, found to act as a detergent that kills TB mycobacteria within minutes by disrupting their cell walls. You can learn more and access the full paper here: <https://www.pnas.org/doi/10.1073/pnas.2217673120>

DID YOU KNOW?

Public health emergencies have inspired innovations in education. Starting in 1910, Thomas Edison's lab, which had invented one of the first motion picture devices in the 1890s, partnered with anti-TB activists to produce short films on tuberculosis prevention and transmission—some of the first educational movies ever created.

Between 1910 and 1915, Thomas Edison's film company made six films about tuberculosis in collaboration with the National Association for the Study and Prevention of Tuberculosis. They're often called the Red Cross Seal films. The six films are:

1. The Red Cross Seal, 1910
2. The Awakening of John Bond, 1911
3. Hope: A Red Cross Seal Story, 1912
4. The Price of Human Lives, 1913
5. The Temple of Moloch, 1914
6. The Lone Game, 1914

Screened in public places in rural areas, the TB movies were also the first films, of any type, that viewers had ever seen. The anti-tuberculosis crusade was also a model for later efforts to combat polio that relentlessly put that disease at the front of public agenda until an effective vaccination was developed and implemented. It also set a standard for future public health campaigns.



Scene from *The Temple of Moloch*, 1914

Information and Picture Source:
<http://miriamposner.com/tuberculosis.html>
<https://www.smithsonianmag.com/history/how-epidemics-past-forced-americans-promote-health-ended-up-improving-life-this-country-180974555/>