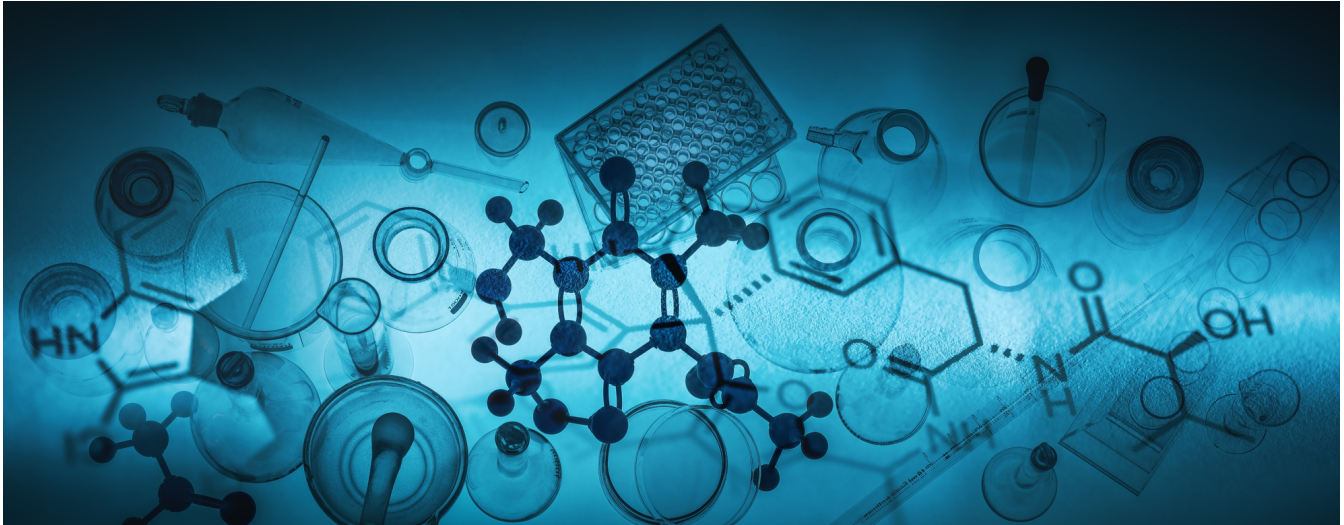


THE MONTHLY DOSE

Official Newsletter of The Mueller Health Foundation



WHAT'S NEW AT THE MUELLER HEALTH FOUNDATION:

We at The Mueller Health Foundation hope that everyone had a successful and healthy start to the New Year 2024.

Our MHF team is already working on numerous exciting new projects, particularly as we prepare for World TB Day on March 24th, 2024.

One exciting development is that we have rented a billboard in Times Square to help raise awareness for tuberculosis on World TB Day.

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. TB Alert, a charity focused on TB in the United Kingdom, has put together a wonderful collection of stories and this month we would like to highlight Tom's story:

When Tom was admitted to the hospital he had an excess of fluid around the lungs and inflammation around the heart. He dropped more than 30 pounds of his weight in two weeks. Tom was unable to get out of bed and did not want to eat. He also felt cold and shivery, despite sweating constantly. For Tom the normal treatment for inflammation around the heart, a condition known as pericarditis, was not working. The doctors were unsure of how to proceed and after a brain-storming session, the doctors and specialists decided to put Tom on treatment for TB even though the test was inconclusive. Tom recalls that doctors listened to his heart for signs of 'pericardial rub' – the sound of friction between the two inflamed layers of the pericardium. His chest was regularly drained of fluid. At this stage, he was unable to walk the few yards from his wheelchair to the x-ray equipment without help. Tom recalls: "I was put on Pethadin to stop the pain, so I was extremely euphoric when I got it and very scared and grumpy when I didn't. To help me gain weight, the nurses even brought in their home cooking to get me to eat again – bacon rolls and dumpling." Finally, the TB treatment began to work even though Tom had to suffer through the side effects. After 5 weeks in the hospital, Tom was able to get around quite well. He was discharged to recuperate at home. It was later discovered that Tom had been exposed to TB by a work colleague with active TB; though the medical team told him that the type of TB he himself suffered, pericardial TB, was very unusual. Tom states: "After 5 months I went back to my job as a painter although this was really too early. I had found the whole experience too much and felt quite isolated and depressed, therefore a return to work and real life felt absolutely necessary at that time." To read his full story please follow the link here: <https://www.thetruthabouttb.org/tb-stories/tom/>

For more news, please also take a look at our top 3 picks for **January** 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 JANUARY

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

1. Discovery of Dual-active Ethionamide Boosters Inhibiting the Mycobacterium Tuberculosis ESX-1 Secretion System

The research team utilized host-cell-based high-throughput methods to test the ability of molecules to inhibit the multiplication of bacteria in human immune cells: From a total of 10,000 molecules, this procedure allowed them to isolate a handful whose properties they scrutinized more closely in the course of the study. The researchers identified virulence blockers that utilize target structures that are fundamentally distinct from those targeted by classical antibiotics. The researchers also discovered that some of the newly identified chemical substances are dual-active molecules. Thus, they not only attack the pathogen's virulence factors, but also enhance the activity of monooxygenases—enzymes required for the activation of the conventional antibiotic ethionamide. Ethionamide is a drug that has been used for many decades to treat TB. It is a so-called prodrug, a substance that needs to be enzymatically activated in the bacterium to kill it. Therefore, the discovered molecules act as prodrug boosters, providing another alternative approach to the development of conventional antibiotics. To learn more, you can access the full paper at: <https://pubmed.ncbi.nlm.nih.gov/38181799/>

2. Brazilian Researchers Create Cutting-edge Nanoparticle Weapon against Tuberculosis

A low-cost technology involving nanoparticles loaded with antibiotics and other antimicrobial compounds that can be used in multiple attacks on infections by the bacterium responsible for most cases of tuberculosis has been developed by researchers at São Paulo State University (UNESP) in Brazil. The study analyzed the antitubercular activity of nanoparticles comprising N-acetylcysteine (an over-the-counter supplement), chitosan (a natural compound derived from the outer skeleton of shellfish), an antimicrobial peptide originally isolated from the skin of a Brazilian frog species, and rifampicin (an antibiotic commonly used to treat tuberculosis). The results showed that the nanoparticles significantly inhibited progression of the disease and overcame resistance to the drug without causing cell damage. This approach also has the potential to shorten treatment time. The next step will be to confirm the in vitro findings by means of in vivo trials. To learn more, you can read the paper here: doi.org/10.1016/j.carbpol.2023.121449.

3. Second Nationwide Tuberculosis Outbreak in the US Caused by Bone Allografts Containing Live Cells

The CDC learned of the TB outbreak in July 2023, when two state health agencies reported tuberculosis infections in two patients who had undergone spinal surgeries. Both patients had been exposed to a bone-repair product made by Elutia, and the contaminated batch came from one tissue donor. Both patients subsequently died of tuberculosis. The CDC launched an investigation and the product's manufacturer issued a voluntary recall. The part of the batch that had already been distributed had been shipped to eight hospitals and five dental offices in seven states. Federal health officials contacted those facilities and learned that, including the two previously reported cases, 36 total patients had undergone procedures in which the product was used. Five of the 36 people were diagnosed with tuberculosis based on laboratory testing, while additional people showed less-definitive signs of infection. Regardless, the CDC recommended that all exposed patients receive prompt tuberculosis treatment, and no additional people died. Going forward, additional safety testing procedures should be implemented and tissue donors' medical records should be carefully combed for signs of possible tuberculosis infection. You can the full report here: <https://www.cdc.gov/mmwr/volumes/72/wr/mm725253a1.htm>

DID YOU KNOW?

The United States is continuing to see an unprecedented influx of migrants and asylum seekers from all over the globe. Because of the substantially greater risk of exposure to TB outside of the United States, origin of birth remains a prominent risk factor for TB in the United States. While data for 2023 has not yet become available, the CDC has collected some important data points from 2022 that are presented below:

- In 2022, 73.8% of reported TB cases occurred among non-U.S.-born persons. The number of TB cases diagnosed among non-U.S.-born persons within the first year after arrival in the United States nearly doubled compared with 2021 and reached the highest level since 2016.
- During 2022, the incidence rate (cases per 100,000 persons) was 17.1 times higher among non-U.S.-born persons, who had a 13.0 incidence rate, than U.S.-born persons who had a 0.8 incidence rate.
- Among non-U.S.-born persons with TB disease during 2022, the twelve most common countries of birth included:
 - Mexico, 18.9%
 - Philippines, 10.9%
 - India, 8.8%
 - Vietnam, 8.2%
 - China, 6.0%
 - Guatemala 4.6%
 - Honduras 3%
 - Haiti 2.6%
 - Peru 2%
 - Afghanistan 2%
 - El Salvador 1.7%
 - Ecuador 1.7%
- In 2022, small but noteworthy increases in tuberculosis occurred among persons born in several Central and South American countries. For example, there was an increase of TB of 41.1% among persons born in El Salvador and a 98.4% increase among persons born in Peru. Further, TB also increased by 53.7% for people born in Afghanistan.
- Given the increased prevalence of TB in the non-US born populations, it is of highest importance to foster learning and awareness about the diseases and provide information on how to get tested and treated within these communities. It is crucial to provide access to learning materials and resources in various languages including but not limited to Spanish, Mandarin, Tagalog, and Arabic.