

# Researchers launch novel investigation into tuberculosis transmission

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(Medical Xpress)—Researchers at Colorado State University are launching the most realistic study ever conducted into how transmission of the tuberculosis pathogen triggers infectious disease, an investigation expected to yield new insights into a disease that attacks the lungs and kills some 1.5 million people worldwide each year.

The study is based at the Airborne Infection Research Facility, near Pretoria, South Africa, in one of the globe's [tuberculosis](#) hot spots. The investigation is starting as CSU hosts the first Front Range [Mycobacteria](#) Conference, focusing on tuberculosis and related infections, beginning Tuesday.

A grant of nearly \$1 million from the [Bill and Melinda Gates Foundation](#) is funding the research, led by Diane Ordway, Randall Basaraba and Ian Orme, who are part of CSU's world-renowned Mycobacteria Research Laboratories. The CSU team is working with colleague Edward Nardell at Harvard University.

In the next several weeks, infected patients coming to the Airborne Infection Research Facility for treatment will stay in a sealed tuberculosis ward. Air from the patient ward will be sucked through a specialized [ventilation system](#) and into an animal exposure room. Here, 360 [guinea pigs](#) – some vaccinated to protect against [tuberculosis infection](#) – will breathe air containing Mycobacterium tuberculosis from human patients.

In this unique study setting, which replicates how the airborne tuberculosis pathogen is passed from person to person, it is certain that some of the guinea pigs will become infected, while others will have an immune response that effectively battles back. In examining outcomes at a [genetic level](#), researchers will gain new understanding about exactly why some people become infected and develop disease, while others stave it off.

"Ethically, we would never expose people to *Mycobacterium tuberculosis* for a study, so this is the most realistic model for us to use as we try to establish novel vaccines and new [therapeutic drugs](#) for tuberculosis," said Ordway, a faculty member in the CSU Department of Microbiology, Immunology and Pathology.

Two other study elements help mimic *M. tuberculosis* transmission in the real world: The guinea pig pulmonary system is similar to the human system, making the rodent an ideal model; and, like human infants throughout the developing world, some research animals have been inoculated with the only tuberculosis vaccine now available, called BCG, a vaccine whose protective properties inexplicably wane over time.

"This is the first study looking at human transmission of *Mycobacterium tuberculosis* to guinea pigs, and then looking at the immune response and at correlates of protective immunity," Ordway said. "We are devising this study to further understand the genetic properties of the bacterium *M. tuberculosis* that enable it to transmit and cause disease in humans."

Those are the very insights needed to help develop effective vaccines and therapies for tuberculosis, a disease that has declined in the United States but remains an intractable health problem in the world's poorest countries, especially in sub-Saharan Africa. About one-third of the global population is infected with *M. tuberculosis*, and millions fall ill each year, according to the World Health Organization.

Worsening the epidemic is the alarming spread of multidrug-resistant tuberculosis, as well as the disproportionate impact of tuberculosis on people whose immune systems are weakened by HIV.

As the new Gates-funded study moves into full swing, the CSU Mycobacteria Research Laboratories will host the first Front Range Mycobacteria Conference starting Tuesday. The three-day conference is expected to draw about 170 top mycobacteria scientists from nine countries for presentations and discussions.

These researchers are experts on the pathogens that cause tuberculosis, leprosy and nontuberculous mycobacterial infections. The visitors represent research institutions including the Harvard School of Public Health, Johns Hopkins University, the Global Alliance for TB Drug Discovery and National Jewish Health.

No surprise they're coming to Colorado State University, one of the world's foremost tuberculosis research universities, with a brain trust of about 170 experts in all aspects of the disease.

"Colorado State University is proud to lead international scientific efforts to understand tuberculosis starting at the cellular level," CSU President Tony Frank said. "Our tuberculosis expertise is a clear example of our mission to solve problems and help people both close to home and around the world."

Provided by Colorado State University

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