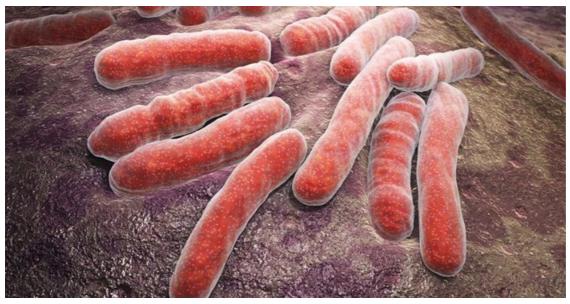# Study focuses on better approaches to interrupt TB transmission

Tuberculosis (TB) is ranked as one of the deadliest infectious diseases globally. According to the World Health Organisation's (WHO) *Global Tuberculosis Report*, which was released in October 2020, Africa hosts 25% of the world's TB burden, and 3.6% of these global cases are attributed to South Africa - with an estimated 360,000 people in the country having contracted TB in 2019.

123rf.com

Transmission, infection, disease is the successive cycle driven by *Mycobacterium tuberculosis* (M. tb) – the bacterium that causes tuberculosis (TB). However, the mechanisms behind the successful transmission of the bacterium have been poorly researched, mainly due to an inability to capture and identify live M. tb in the exhaled breath of TB patients.

This is changing – guided by collaborative efforts from scientists at the University of Cape Town's (UCT) Faculty of Health Sciences and the Institute of Infectious Disease and Molecular Medicine (IDM).

Of concern is the fact that fewer than one-third of new M. tb infections can be confidently linked to known TB cases, a deficiency reflecting the effects of the prolonged infectious period of TB and the potential for transmission from transient exposures.

"There is significant power in simply knowing when, by whom and how many M. tb organisms are produced in a community," says Professor Digby Warner of the IDM.

Study

A recent paper attempts to tackle this challenge. Led by joint first authors PhD candidate, Ryan Dinkele, and postdoctoral fellow, Dr Sophia Gessner, the work describes the development of the requisite microbiological and microscopy techniques. Through this study, scientists demonstrated the ability to detect live M. tb organisms in 90% of TB cases and were able to trap the captured organisms for serial microscopic imaging over several days.

"A core motivation of this research was the need to keep the TB-causing bacteria, bacilli, alive following detection, to ensure the potential that previously inaccessible features such as morphological and physiological characteristics of aerosolised M. tb could be investigated. This [is order to] better understand the factors that might contribute to the successful transfer of infectious organisms from one person to another," Gessner says.

This pipeline for detecting M. tb offers a uniquely sensitive way to identify who is transmitting M. tb and when, and for understanding what features of the bacterium might be critical to successful transmission. "Understanding transmission dynamics at this level will aid in targeting interventions to areas that serve as transmission hotspots," she says.

The hope is that this work might inform better approaches to interrupt transmission. Although it contributes to the anti-TB strategy, this line of action remains mostly underexplored, because of the poor understanding of the events surrounding transfer of M. tb between hosts.

"This technique may also assess the current TB-control strategy, which involves treating passively-identified TB patients to reduce infectiousness. These patients can be tracked over time to monitor the frequency at which they produce infectious bioaerosols and, importantly, to quickly ascertain the impact of anti-TB drug therapy on infectious aerosol release," Dinkele says.

Source: University of Cape Town