

Anti-diabetic drug springs new hope for tuberculosis patients

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A more effective treatment for tuberculosis (TB) could soon be available as scientists have discovered that Metformin (MET), a drug for treating diabetes, can also be used to boost the efficacy of TB medication without inducing drug resistance.

This discovery was made by a team of international scientists led by the Singapore Immunology Network (SIgN), a research institute under the Agency for Science, Technology and Research (A*STAR), Singapore.

TB is an air-borne infectious disease caused by a bacterium called *Mycobacterium tuberculosis* (Mtb), which often infects the lungs. Even though drugs are available to treat the disease, TB continues to be a major threat to public health, killing close to 1.5 million people every year .

Conventional drugs used to treat TB usually adopt a pathogen-targeted strategy which attacks and kills bacteria directly. This approach has caused Mtb strains to acquire [drug resistance](#), making existing treatments become increasingly ineffective and resulting in a pressing need to design new therapeutic strategies for the disease.

MET as an adjunct treatment for TB

The team of scientists led by SIgN began searching for drugs that could control Mtb replication indirectly. They screened FDA-approved drugs

and identified MET, an old anti-diabetic drug that could defend Mtb invasion without targeting the bacteria directly. Instead, MET targets the host cells to trigger the production of a chemical which then damages Mtb and stops its replication. Such indirect, host-targeted approach is less likely to engender drug resistance. The team also discovered that MET improves the efficacy of conventional anti-TB drugs when used in combination with them.

The scientists then validated the findings with patient data provided by the Tuberculosis Clinical Unit at the Tan Tock Seng Hospital, and consequently verified that the use of MET is indeed associated with improved TB control and decreased disease severity. This anti-diabetic drug is therefore a promising adjunctive therapy that could enhance the effectiveness of existing TB treatments. As it is a drug that is currently in use, another benefit of using MET as an adjunct treatment for TB is that it is likely to shorten the time required for clinical trials.

"Using MET as an adjunct treatment for TB is very promising since this drug interferes with the biochemical pathway essential for the bacteria's survival and does not promote the development of drug resistance. MET is also a very cheap and safe drug with no adverse effect on non-diabetic patients. This would likely shorten clinical trials and we are confident that a better and affordable TB treatment will be made available soon," said lead scientists Dr Amit Singhal, Project Leader and Prof Gennaro De Libero, Principal Investigator at SIGN.

Prof Wang Yee Tang, Senior Consultant of Tan Tock Seng Hospital's Tuberculosis Control Unit, added, "Today, we are using the same standard TB treatment which was introduced more than 40 years ago. New and better treatment strategies such as this MET adjunctive therapy will definitely be welcomed by TB physicians and patients. It is also important that we continue to protect the few TB drugs we have and prevent [drug](#) resistance from emerging."

Professor Laurent Renia, Executive Director of SIGN, said, "The use of old drugs for new therapies is exciting. This study is an excellent example of innovation, made possible because of the closely knitted scientific and clinical communities in Singapore. By collaborating with our clinical partners, we are able to translate our research findings from the bench-to-bedside and ultimately impact the lives of people."

More information: *Science Translational Medicine:*
stm.sciencemag.org/content/6/263/263ra159

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