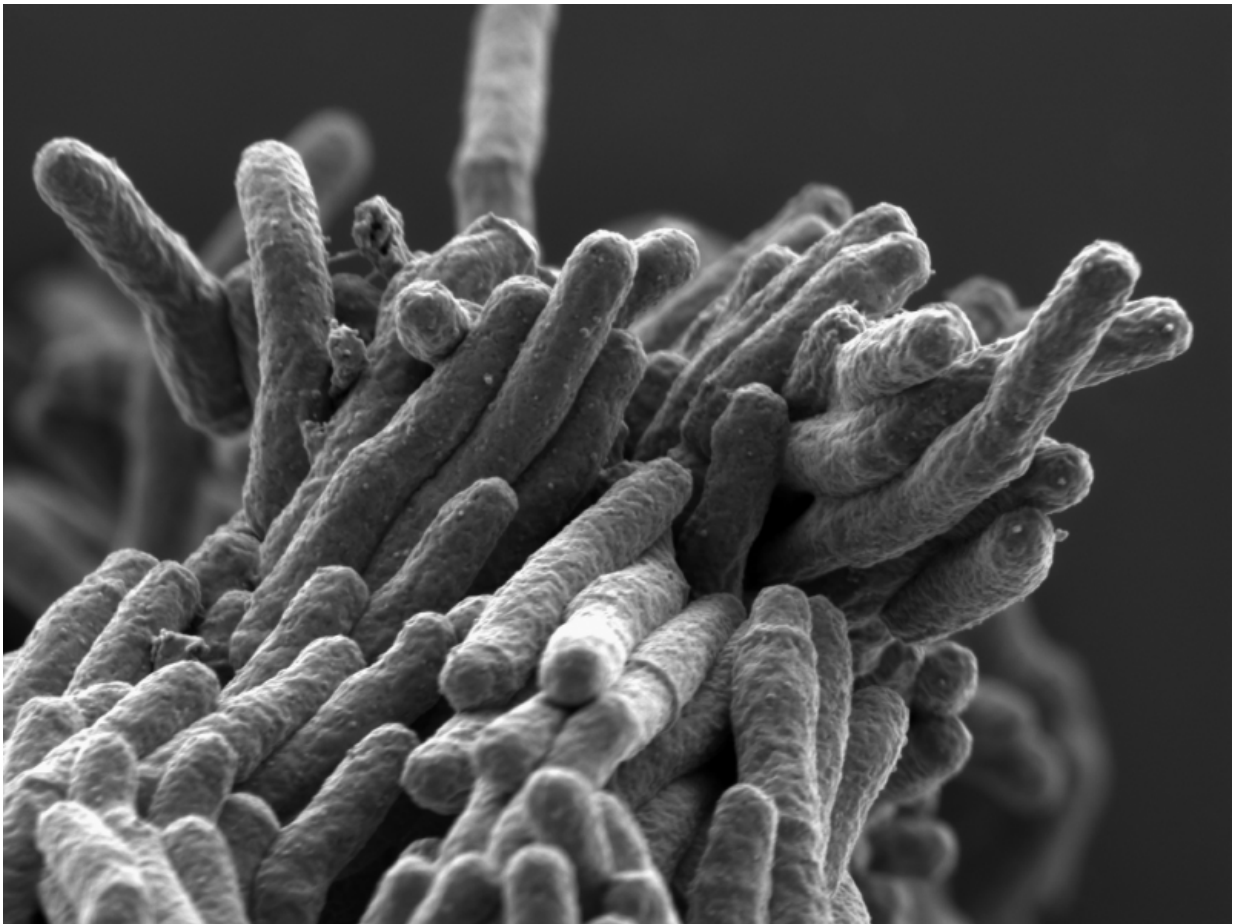


The next anti-tuberculosis drug may already be in your local pharmacy

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A scanning electron micrograph of *Mycobacterium tuberculosis* bacteria. Credit: Stewart Cole/EPFL

Testing thousands of approved drugs, EPFL scientists have identified an unlikely anti-tuberculosis drug: the over-the-counter antacid lansoprazole (Prevacid).

Tuberculosis continues to be a global pandemic, second only to AIDS as the greatest single-agent killer in the world. In 2013 alone, the TB bug *Mycobacterium tuberculosis* caused 1.5 million deaths and almost nine million new infections. Resistance to TB drugs is widespread, creating an urgent need for new medicines. EPFL scientists have now identified lansoprazole, a widely used, over-the-counter antacid, as an excellent candidate against tuberculosis. The study is published in *Nature Communications*.

It takes well over ten years for a new tuberculosis [drug](#) to complete these trials and be approved for human use. Meanwhile, traditional antibiotics have led many strains of [tuberculosis bacteria](#) to evolve multi-drug resistance. Millions of new chemical compounds have been tested for their ability to disrupt the growth of *M. tuberculosis* in the test tube, but discouragingly few are currently in clinical trials.

But we can speed this process up. Compounds that have already been approved for use in humans could be repurposed as anti-tuberculosis medications, and cut down both the time and cost of new drug development.

Screening against tuberculosis

This is the strategy adopted by Stewart Cole's lab at EPFL. The assay uses a robotized system that gives candidate drugs to cultured lung cells that have been infected with *M. tuberculosis*. Robotized "high-throughput screens" like this are a growing trend in [drug development](#) as they can work through massive libraries of candidate drugs quickly and accurately in a day, as opposed to the months required by manual methods.

The EPFL researchers used a method they had previously developed, which can reflect what happens when the bacterium infects a lung much better than conventional screening assays used in tuberculosis research. The scientists screened a large panel of already [approved drugs](#), and identified the blockbuster antacid lansoprazole, known commercially as Prevacid, as a potential anti-tuberculosis medication.

A new use for an old drug

Lansoprazole was found to be effective against *M. tuberculosis* but only when the bacterium grows inside cells. The researchers investigated the underlying biology and found that lansoprazole kills the bacterium after the human cells convert it into a sulfur-containing metabolite. This metabolite targets a particular enzyme that is crucial for the bacterium to produce energy, thereby killing it off. In addition, when the scientists tested lansoprazole against a wide range of other bacteria, it proved to be highly selective for *M. tuberculosis*.

Lansoprazole belongs to a class of drugs known as "proton-pump inhibitors" that keep the stomach from pumping too much acid, thus preventing heartburn and ulcers. "Proton-pump inhibitors are both safe and widely sold around the world," says Stewart Cole. "Being highly active against drug-resistant strains of *M. tuberculosis*, this novel class of drugs provides us with an excellent opportunity to treat [tuberculosis](#)."

More information: Rybniker J, Vocat A, Sala C, Busso P, Pojer F, Benjak A, Cole ST. Lansoprazole is an antituberculous prodrug targeting cytochrome bc1. *Nature Communications* 07 July 2015. [DOI: 10.1038/ncomms8659](#)

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