

# Outsmarting killer bacteria: Next generation of antibiotics to combat drug-resistant 'superbugs'

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Antibiotics can work miracles, knocking out common infections like bronchitis and tonsillitis. But according to the Center for Disease Control, each year 90,000 people in the U.S. die of drug-resistant "superbugs" -- bacteria like *Staphylococcus aureus* (MRSA), a deadly form of staph infection resistant to normal antibiotics. Although hospital patients are particularly susceptible as a result of open wounds and weakened immune systems, the bacteria can infect anyone.

Dr. Micha Fridman of Tel Aviv University's Department of Chemistry is now developing the next generation of [antibiotics](#) designed to overcome this kind of bacteria. And the key, he says, is in the bacteria itself.

"We took the mechanism of [bacterial resistance](#) and used this mechanism itself to generate antibiotics," explains Dr. Fridman. "It's thanks to these bacteria that we can develop a better medication." Conducted in collaboration with Prof. Sylvie Garneau-Tsodikova from the University of Michigan at Ann Arbor, Dr. Fridman's research was highlighted recently in the journal *ChemBioChem*.

## Fighting from within

According to Dr. Fridman, certain bacterial strains include enzymes which help the bacteria to inactivate antibiotics. When the enzymes meet with these antibiotics, they chemically alter the drug, making the

antibiotic ineffective and unable to recognize its target.

Turning this powerful mechanism against the bacteria itself, the team isolated the antibiotic-inactivating enzymes from the bacteria, then integrated them into the drugs. With this alteration, the modified antibiotics proved to be effective against typically resistant [bacterial strains](#).

At the heart of this development, says Dr. Fridman, was the chemical modification of the parent drug. Once the researchers identified how the bacteria incapacitated the antibiotics, they were able to create a drug that could block bacterial resistance while maintaining the integrity of the antibiotic.

## **Killing bacteria, saving lives**

These new antibiotics will be a vast improvement on today's drugs, says Dr. Fridman. When fully developed, they could be used to treat infections that are now considered difficult if not impossible to treat with current antibiotics.

Dr. Fridman says that, while the new antibiotics are a few years away from the marketplace, the ability to beat [bacterial resistance](#) will be invaluable for the future of health care.

Provided by Tel Aviv University

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