

# Researchers develop antibiotic alternative for wound infections

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Washington State University researchers for the first time have discovered how electrical stimulation works for the treatment of bacterial infections, paving the way for a viable alternative to medicinal antibiotics.

The [researchers](#) passed an electric current over a film of bacteria and in 24 hours killed almost all of a multi-drug resistant bacterium that is often present in difficult-to-treat infections. The remaining [bacterial population](#) was 1/10,000th of its original size.

The researchers also tested the method on pig tissue, where it killed most of the bacteria and did not damage surrounding tissue.

The research appears in *Nature Scientific Reports*, an open-access online journal from the publishers of Nature.

Researchers have tried treating infected wounds with [electrical stimulation](#) for more than a century but with mixed results. For obvious reasons, antibiotics have been the preferred and most effective treatment for infections, but their widespread use has led to drug-resistant strains. In the U.S. at least two million infections and 23,000 deaths are attributable to [antibiotic-resistant bacteria](#) each year, according to the Centers for Disease Control.

Electrical stimulation has had mixed results against bacteria, but this is probably due in part because people didn't have a clear understanding of

how it works electrochemically, said Haluk Beyenal, co-author of the paper and a professor in WSU's Gene and Linda Voiland School of Chemical Engineering and Bioengineering.

The WSU researchers for the first time demonstrated the [electrochemical reaction](#) produces hydrogen peroxide, an effective disinfectant, at the electrode surface.

"We have been doing fundamental research on this for many years, and finally, we are able to transfer it to technology," said Beyenal. "It's really exciting."

The researchers optimized the reaction and developed an "e-scaffold," a sort of electronic Band-Aid made out of conductive carbon fabric. By running electrical current through the fabric, they produced a low and constant concentration of [hydrogen peroxide](#) to kill the bugs. The [bacteria](#) are unable to develop resistance to such an electrochemical treatment.

"Many people tried this simple method," said Beyenal. "Sometimes it worked, and sometimes it didn't. We controlled the electrochemical reactions. That's the reason it works."

The researchers have applied for a patent and are now working to increase the e-scaffold's effectiveness and test it with a variety of bacterial species.

**More information:** Sujala T. Sultana et al. Electrochemical scaffold generates localized, low concentration of hydrogen peroxide that inhibits bacterial pathogens and biofilms, *Scientific Reports* (2015). [DOI: 10.1038/srep14908](#)

Provided by Washington State University

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