

New device quickly detects harmful bacteria in blood

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Bacterial cells trapped in a 3D microbead matrix. Credit: Wenrong He/Rochester Institute of Technology.

Engineers have created a tiny device that can rapidly detect harmful bacteria in blood, allowing health care professionals to pinpoint the cause of potentially deadly infections and fight them with drugs.

The Rutgers coauthored study, led by researchers at Rochester Institute of Technology, is published in the journal *ACS Applied Materials & Interfaces*.

"The rapid identification of drug-resistant bacteria allows [health care providers](#) to prescribe the right drugs, boosting the chances of survival," said coauthor Ruo-Qian (Roger) Wang, an assistant professor in the Department of Civil and Environmental Engineering in the School of Engineering at Rutgers University-New Brunswick.

Drug-resistant bacteria, or super-bugs, are a major public health concern. Globally, at least 700,000 people die each year as a result of drug-resistant infections, including 230,000 deaths from multidrug-resistant tuberculosis. That number could soar to 10 million deaths a year by 2050 if no action is taken, according to a 2019 report.

Based on a new approach, the tiny new [device](#) rapidly isolates, retrieves and concentrates target bacteria from bodily fluids. It efficiently filters particles and bacteria, capturing about 86 percent of them. The nano-device has magnetic beads of different sizes that are designed to trap, concentrate and retrieve *Escherichia coli* (*E. coli*) bacteria. The small spaces between the beads are used to isolate [bacteria](#) in the device.

The inexpensive, transparent device is easy to fabricate and operate, making it ideal for detecting disease-causing organisms in laboratory and health care settings, according to the study. The research team is working to perfect the device and plans to add multiple devices onto a small chip and explore scaling up testing in the field.

More information: Xinye Chen et al, Rapid *Escherichia coli* Trapping and Retrieval from Bodily Fluids via a Three-Dimensional Bead-Stacked Nanodevice, *ACS Applied Materials & Interfaces* (2020). [DOI: 10.1021/acsami.9b19311](#)

Provided by Rutgers University

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