# Scientists discover, treat new variant of antibiotic-resistant E. coli bacterium

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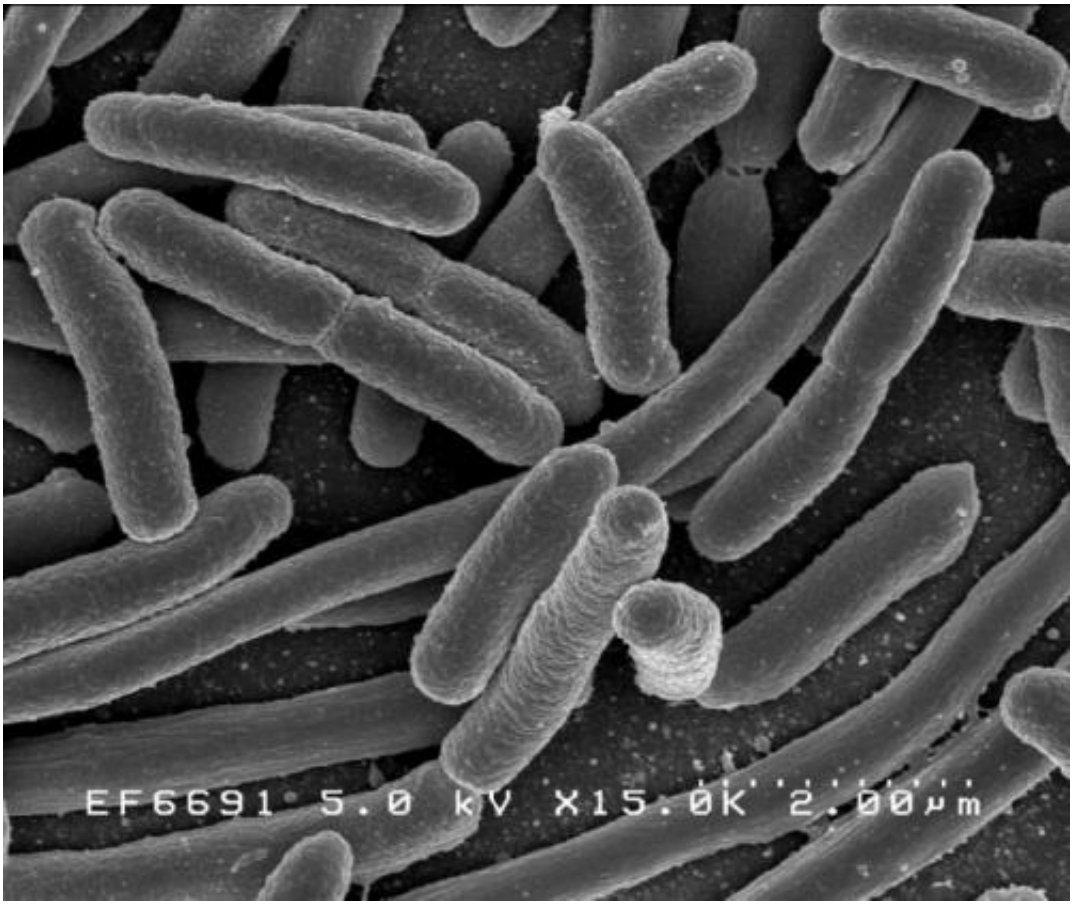


Escherichia coli. Credit: Rocky Mountain Laboratories, NIAID, NIH

Researchers at Massachusetts Eye and Ear have discovered a new mutation in a highly antibiotic-resistant strain of E. coli that resists clearance by the body's own immune system by inhibiting white blood

cells that ordinarily kill and remove bacteria. In a paper published online today in *JAMA Ophthalmology*, the researchers describe the case that led them to discover the mutation, and offer suggestions for how to recognize and address this particular microbe if encountered in the future.

"We found that, in addition to its elevated resistance to antibiotics, this bacterium produced a layer of slime on its surface that prevented white blood cells from trapping and killing the microbe – something we've not seen before in this type of E. coli," said senior author Michael S. Gilmore, Ph.D., an investigator at Mass. Eye and Ear and the Sir William Osler Professor of Ophthalmology and Director of the Infectious Disease Institute at Harvard Medical School. "Antibiotic-resistant microbes are continuing to evolve, with some of these strains becoming very virulent, taking on new abilities to cause disease."

Antibiotic-resistant bacteria are emerging faster than new antibiotics are being discovered. This trend has led groups from the World Health Organization to the White House to issue directives to solve this problem. Since 2011, Massachusetts Eye and Ear has been the recipient of over $20 million in grant funding from the National Institutes of Health to form the Harvard-wide Program on Antibiotic Resistance to discover new ways to treat and diagnose antibiotic-resistant infections. This funding was recently renewed for an additional 5 years.

In the *JAMA Ophthalmology* report, the researchers describe the case in which a patient was recently diagnosed with a severe infection of the cornea (the clear surface of the eye), and the underlying bacterium was determined to be "ESBL E. coli," a type of microbe that has the ability to resist the action of a wide range of antibiotics. Several factors made antibiotic-resistant infection more likely in this particular case, including the patient's residence in an extended care center, prior use of antibiotic eye drops, and recent extended antibiotic treatment in a hospital. The

patient was prescribed two types of antibiotic eye drops—to which the microbe was still sensitive, and the eye infection resolved.

Recognizing the unusually high antibiotic resistance of this microbe and its unusual link to cornea infection, Dr. Daria Van Tyne from the research team led by Dr. Gilmore used state-of-the-art genomics sequencing capabilities in the Ocular Genomics Institute to analyze the DNA of the microbe. They found the new mutation in an already aggressive type of ESBL E. coli termed ST131. This variant had never been seen before—the bacterium produced a layer of slime on its surface that inhibited the ability of white blood cells to trap the microbe.

"The development of resistance to white blood cell killing on top of resistance to most antibiotics is cause for concern," said Dr. Gilmore. "To help physicians in other hospitals quickly identify this type of bacteria and to limit its spread, we're sharing our experience on how we treated this infection, as well as a test we developed to identify future cases."

**More information:** Novel Phagocytosis-Resistant Extended-Spectrum β-Lactamase–Producing Escherichia coli From Keratitis, *JAMA Ophthalmol*. Published online September 15, 2016. DOI: 10.1001/jamaophthalmol.2016.3283 , archopht.jamanetwork.com/artic … px?articleid=2552682

Provided by Massachusetts Eye and Ear Infirmary