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Potential cholera vaccine target discovered

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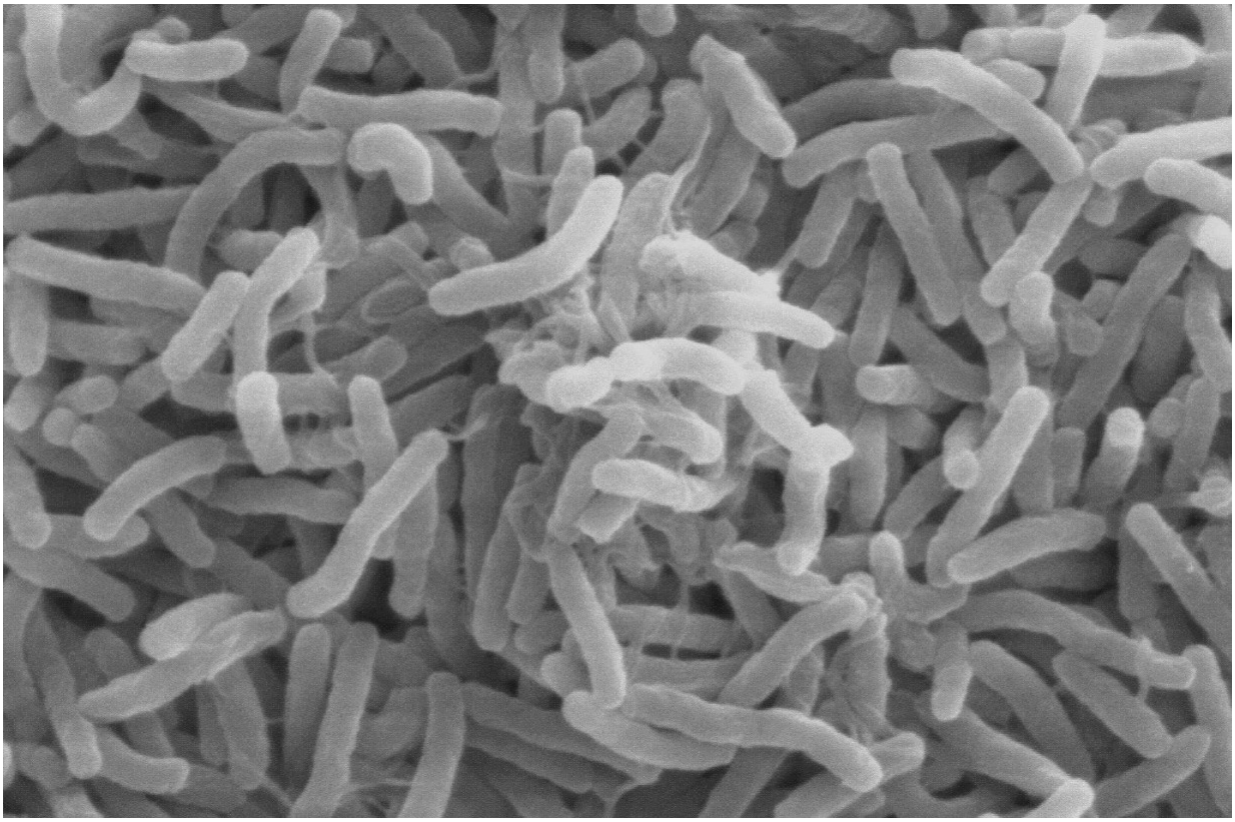

Scanning electron microscope image of Vibrio cholerae. Credit: Wikipedia

Findings from a team led by investigators at Massachusetts General Hospital (MGH), reported in the online journal *mBio*, may help scientists develop a more effective vaccine for cholera, a bacterial disease that causes severe diarrhea and dehydration and is usually spread through contaminated water.

The bacterium that causes cholera, called *Vibrio cholerae*, settles within the intestines after ingestion. There, it secretes a toxin that causes intestinal cells to secrete massive amounts of fluid, eventually leading to death from dehydration and shock if untreated. The disease is a significant problem in many impoverished regions of the world.

Interestingly, immune responses to the toxin do not protect against cholera, but previous research led by investigator Edward Ryan, MD, director of Global Infectious Diseases at MGH, has shown antibodies that bind *V. cholerae*'s sugar coating—called O-specific polysaccharide (OSP)—do offer protection.

"A big question is: How do these antibodies protect? The answer would help develop better vaccines," says Ryan, who is also a professor of Medicine at Harvard Medical School and a professor of Immunology and Infectious Diseases at the Harvard T.H. Chan School of Public Health. He notes current vaccines for cholera are not very protective in young children, who bear much of the global burden of cholera, and induce relatively short-term protection in recipients.

To investigate, Ryan and his colleagues analyzed antibodies recovered from humans who survived cholera. Experiments showed the antibodies block *V. cholerae* bacteria's motility. "*V. cholerae* are very mobile, and swimming is critical to their ability to cause disease," Ryan explains. "Interestingly, the tail-like flagellum in *V. cholerae* that propels swimming is coated with the OSP sugar." More detailed analyses demonstrated the human antibodies attached to this OSP coating to block the ability of *V. cholerae* to swim and cause disease.

"Our results support a unique mechanism of protection against a human pathogen. We are not aware of previous work demonstrating a comparable direct anti-motility effect of human antibodies," says Ryan.

More information: Richelle C. Charles et al, Humans Surviving Cholera Develop Antibodies against Vibrio cholerae O-Specific Polysaccharide That Inhibit Pathogen Motility, *mBio* (2020). DOI: 10.1128/mBio.02847-20

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