

Phage In The Time Of Cholera



By Julianna LeMieux — February 8, 2017



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Although they don't generally make headlines, *Vibrio cholerae* infections wreak havoc in areas of the world with poor sanitation, causing millions of cases of cholera and over 100,000 deaths each year.

A cholera infection can range from mild to a severe diarrheal disease with profuse watery diarrhea and vomiting, rapid loss of fluids, dehydration, shock and death within a few hours.

When these outbreaks occur, there is a rapid increase in the number of cases, and transmission is frequently seen among people sharing a household. Therefore, a drug that could quickly and easily be administered to people living in close proximity to a cholera outbreak, to contain the spread of the bacteria, would be incredibly useful in the fight against cholera.

A team at Tufts Medical School recently [reported](#) ^[1], in *Nature Communications*, that using viruses (phages) that infect the bacteria may be able to do just that. They found that giving animals (mice and rabbits) a cocktail of three phages that infect *V. cholerae*, before infecting with live bacteria, resulted in protection of the mice from the bacterial infection. When these viruses, or phages, infect a bacterial cell and replicate, they kill the bacterial cell in the process.

In order to test this, between 1 and 10 million phages were put into the mice's stomachs by orogastric inoculation (into the stomach through a tube.) Three hours later, a large dose of *V. cholerae* (500,000 bacteria) were administered the same way. After 24 hours, the mice were killed and the number of bacteria in the small intestine were counted.

One hallmark of a cholera outbreak is how quickly it spreads. For example, when the UN peacekeepers started a cholera epidemic in Haiti in 2010, the first cholera case was confirmed on October 21, 2010. Just one month later, during the week of November 27--December 3, the [median daily number of deaths](#) [2] was 41. That's *per day*.

That's not an outbreak - that's an explosion. With this level of transmission, antibiotics don't work quickly enough. What is needed to quell outbreaks is a therapy that can stop transmission in its tracks. And, although phage therapy is not going to stop outbreaks from occurring, it may make them smaller, acting as an important stop gap in the burden that cholera is on certain communities.

Notes:

Conflict of Interest: Dr. Andrew Camilli, the lead author of this study, was my PhD thesis advisor. Although it is a pleasure to highlight the work coming out of a lab that I worked in, I chose this topic based solely on its scientific merit.

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Links

[1] <http://www.nature.com/articles/ncomms14187>

[2] <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5948a4.htm>