

# Team develops novel method to prevent, cure rotavirus infection

November 13 2014

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Dr. Andrew Gewirtz Credit: Georgia State University

Activation of the innate immune system with the bacterial protein flagellin could prevent and cure rotavirus infection, which is among the

most common causes of severe diarrhea, says a Georgia State University research team that described the method as a novel means to prevent and treat viral infection.

The team's findings are to be published in *Science* on Nov. 14.

Rotavirus is most problematic in infants and young children, who can become severely dehydrated and require hospitalization. Rotavirus causes about 500,000 deaths annually worldwide in children younger than five years of age, according to the Centers for Disease Control and Prevention.

The research, performed in mice, was led by Dr. Andrew Gewirtz and Dr. Benyue Zhang of the Institute for Biomedical Sciences at Georgia State, and included collaborators at Emory University School of Medicine, Baylor College of Medicine, Vanderbilt University School of Medicine, Genentech Inc. and the Pennsylvania State University.

Flagellin stopped rotavirus by rapidly inducing an [immune response](#) that would normally be activated by select bacteria rather than a virus. Flagellin triggered the innate [immune system](#), which provides an immediate response to pathogens, to produce two proteins: Interleukin-22, which prevented the virus from entering cells, and Interleukin-18, which removed existing rotavirus from infected cells. Consequently, the antiviral effect of the [bacterial protein](#) was fully recapitulated by use of the interleukin proteins.

"We've described a completely novel way to combat a viral infection by use of a bacterial-derived activator of the immune system," Gewirtz said. "It's analogous to equipping an NFL defense with baseball bats. Blatant violation of all the rules but yet, at least in this case, very effective."

Some [viral infections](#) can be prevented by vaccines, which "teach" the

adaptive immune system to recognize specific viruses. Some viral infections are managed by use of select drugs that directly attack the virus. Such approaches typically require years of research and development and are generally applicable to a single target virus.

"What we've done is to broadly activate the [innate immune system](#) in a manner that will likely impede a wide range of viruses," Gewirtz said.

The researchers expect the specific method used in their work, using flagellin or the IL-22 and IL-18 proteins it elicits, might be effective against a range of [chronic viral infections](#) of the digestive system such as norovirus and hepatitis C virus. The team is now planning studies in humans to test this hypothesis. The general model of activating innate immunity to combat viral infection should prove an effective means of slowing down most any virus and could be a temporary means to deal with a broad range of viral infections until more specific solutions could be developed, Gewirtz said.

**More information:** "Prevention and cure of rotavirus infection via TLR5/NLRC4–mediated production of IL-22 and IL-18," by B. Zhang et al. *Science*, [www.sciencemag.org/lookup/doi/ ... 1126/science.1256999](http://www.sciencemag.org/lookup/doi/10.1126/science.1256999)

Provided by Georgia State University

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