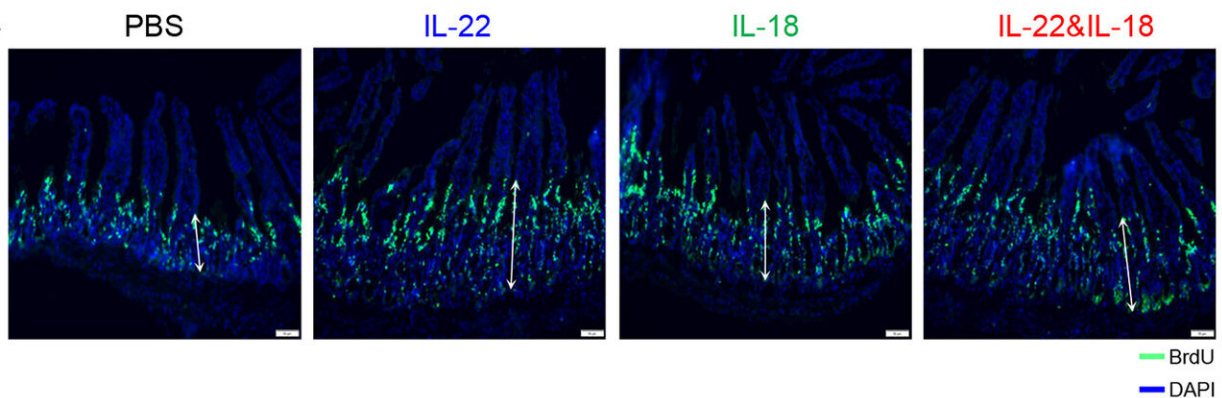


Researchers find new way to prevent and cure rotavirus, other viral infections

October 2 2020



Administration of IL-22 approximately doubled the rate at which rotavirus-infected cells of the intestinal wall migrated toward villus tips (second to left). Administration of IL-18 (second to right) and a combination of IL-18 and IL-22 (right) also increased the migration rate of these cells to a lesser extent. Credit: Zhang et al., *Sci. Immunol.* 5, eabd2876 (2020)

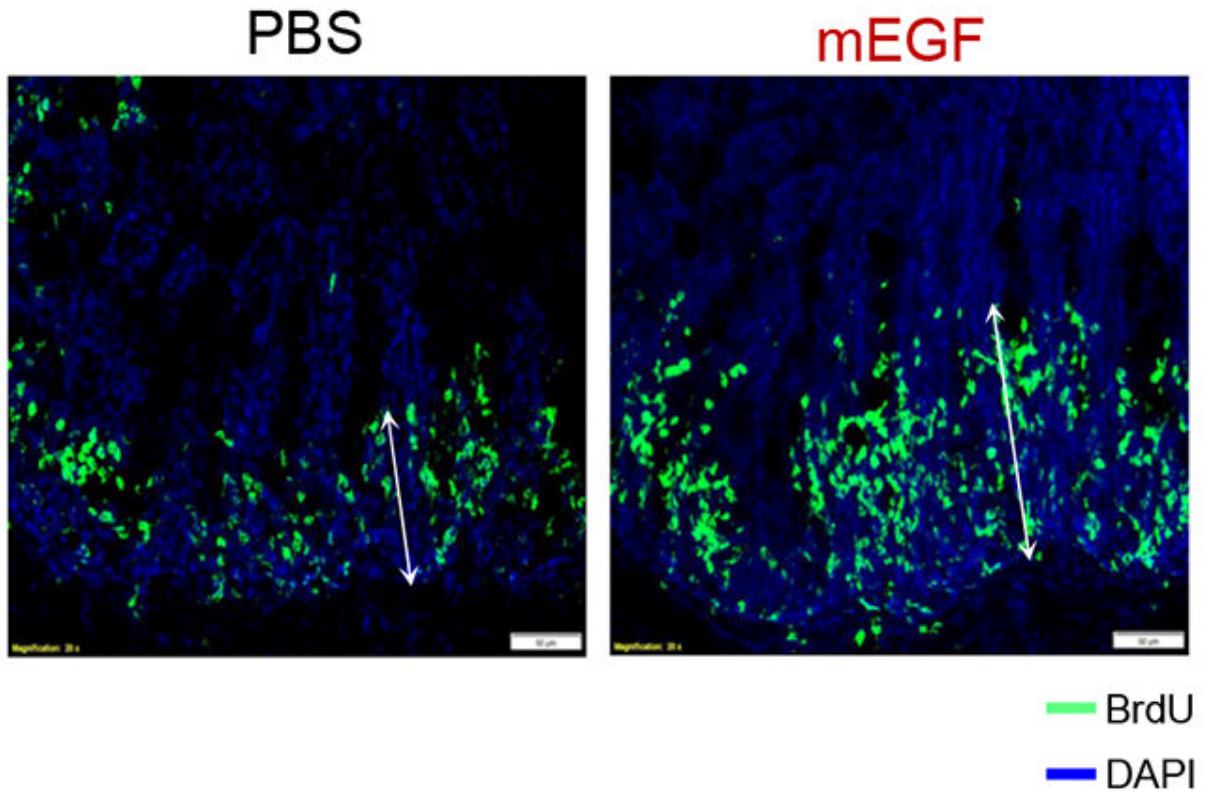
A combination of two substances secreted by the immune system can cure and prevent rotavirus infection, as well as potentially treat other viral infections that target epithelial cells, which cover body surfaces such as skin, blood vessels, organs and the urinary tract, according to researchers in the Institute for Biomedical Sciences at Georgia State University.

Rotavirus, which causes severe, life-threatening diarrhea in young children and moderate gastrointestinal distress in adults, leads to thousands of deaths in children annually, particularly in developing countries where rotavirus vaccines are only moderately effective. Rotavirus is an RNA virus that primarily infects intestinal [epithelial cells](#).

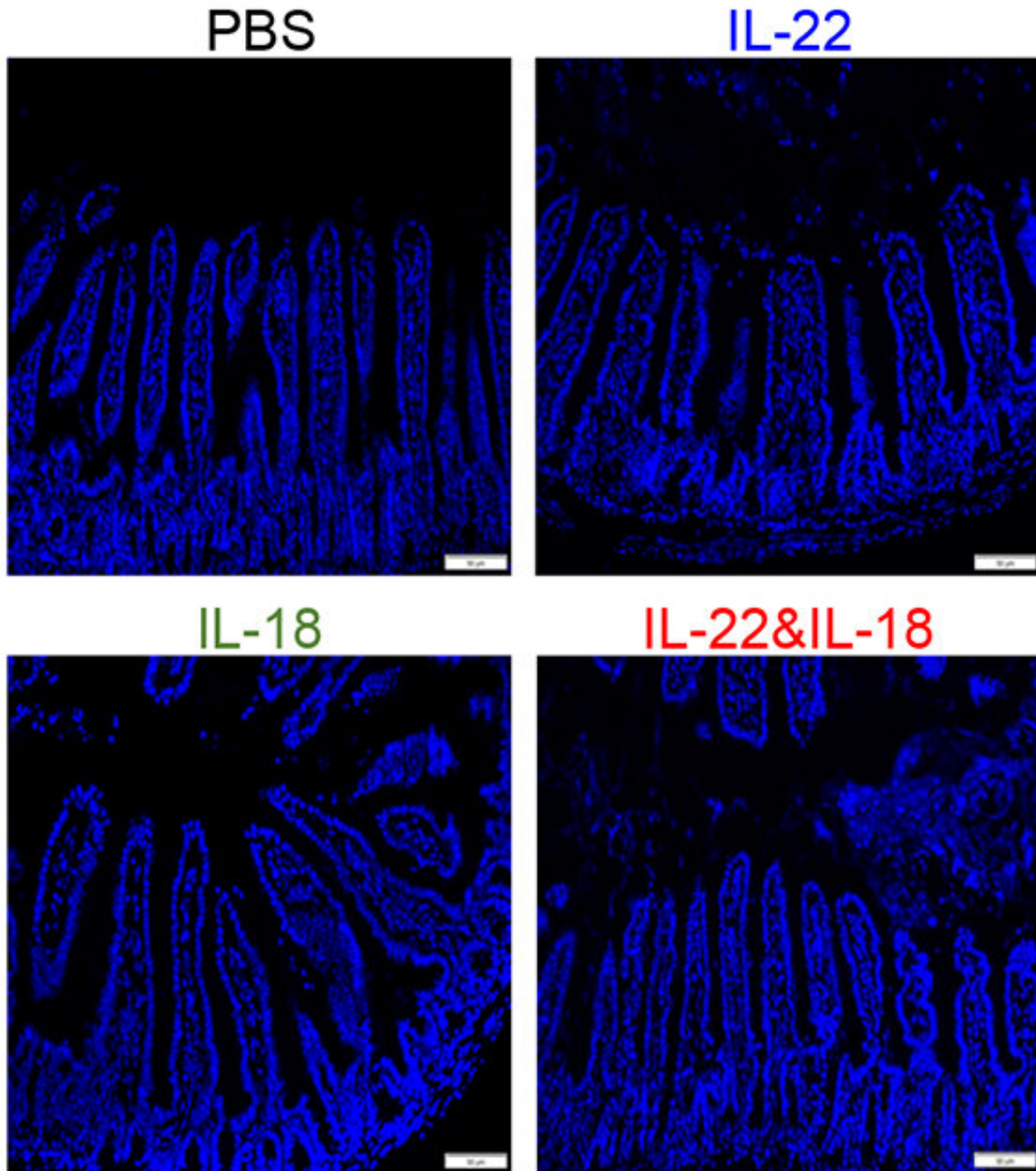
The substances identified in the study, officially known as cytokines, are interleukin 18 (IL-18) and interleukin 22 (IL-22). IL-18 and IL-22 are produced when the body detects a protein in the whip-like appendage of bacteria.

The study, which investigated how these cytokines inhibit [rotavirus infection](#), found when mice were treated with both IL-18 and IL-22, the cytokines promoted each other's expression, but also impeded rotavirus by independent, distinct mechanisms that involved activating receptors in [intestinal epithelial cells](#). These actions resulted in rapid and complete expulsion of rotavirus, even in hosts with severely compromised immune systems. The therapy was also found to be effective for norovirus, a contagious virus that causes vomiting and diarrhea. The findings are published in the journal *Science Immunology*.

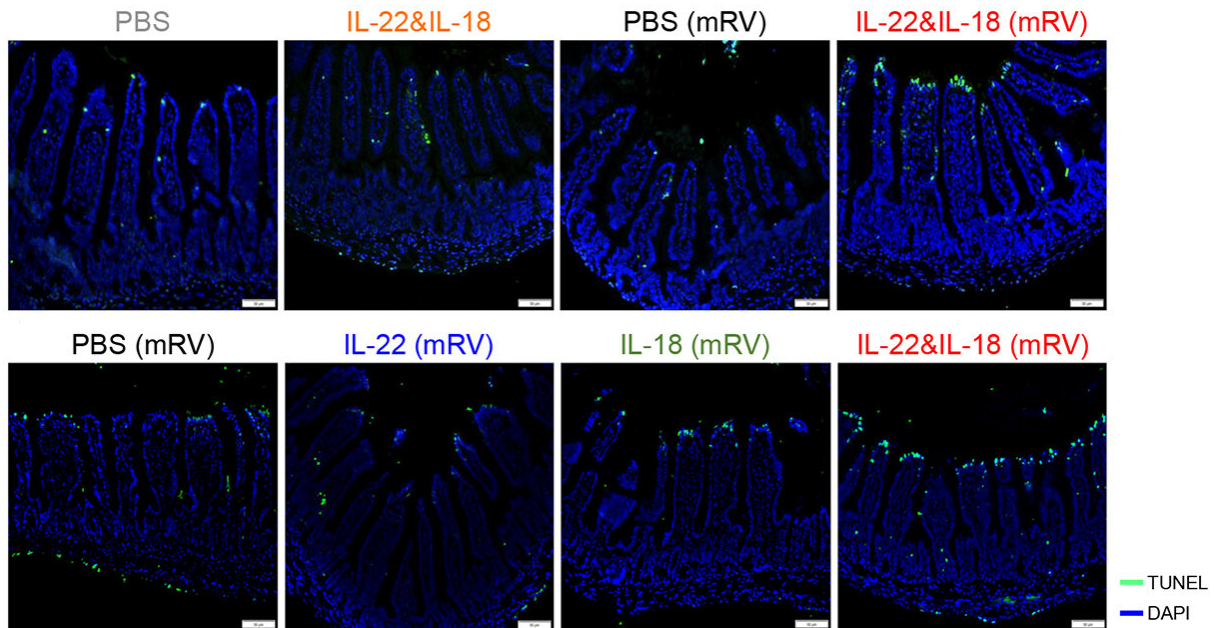
"Our study reports a novel means of eradicating a viral infection, particularly viruses that infect epithelial cells," said Dr. Andrew Gewirtz, senior author of the study and a professor in the Institute for Biomedical Sciences at Georgia State. "The results suggest that a cocktail that combines IL-18 and IL-22 could be a means of treating [viral infections](#) that target short-lived epithelial cells with high turnover rates."



Treatment of rotavirus-infected mice with another cytokine called EGF (right) induced migration of rotavirus-infected cells up the crypt villus axis, albeit not quite as robustly as IL-22. Credit: Zhang et al., *Sci. Immunol.* 5, eabd2876 (2020)



A DNA-staining approach suggested a greater presence of rotavirus-infected cells of the intestinal wall in the lumen of mice treated with cytokines, particularly IL-22 (top right). Credit: Zhang et al., *Sci. Immunol.* 5, eabd2876 (2020)



Visualization of cell death (green) in the intestinal wall. Treating control mice with both IL-18/22 (top, second to left) resulted in a modest increase in cell death, compared to controls. In contrast, treating rotavirus-infected mice with IL-18 (bottom, second to right) or the combination of IL-18 and IL-22 (bottom right), but not IL-22 itself (bottom, second to left), resulted in notable increases in cell death at the villus tips. Credit: Zhang et al., *Sci. Immunol.* 5, eabd2876 (2020)

More information: Z. Zhang et al., "IL-22 induced cell extrusion and IL-18-induced cell death prevent and cure rotavirus infection," *Science Immunology* (2020). [immunology.sciencemag.org/look ... 6/sciimmunol.abd2876](https://immunology.sciencemag.org/look/6/sciimmunol.abd2876)

Provided by Georgia State University

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