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#### Meet the Inventors

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#### Publication(s)

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#### External Link(s)

• [From the lab of Dr. Neil Surana](#)  
• [From the lab of Dr. Dennis Kasper](#)

## Strengthening a patient's immune functions to prevent infectious diseases without developing antibiotic resistance

### Unmet Need

Despite the development of numerous antibiotics over the years, the arms race between humans and emergent antibiotic-resistant microbes remains. More than 2.8 million antibiotic-resistant infections and 35,000 deaths occur in the U.S. each year, and the resulting economic costs are estimated to be \$2 billion annually. Although investigators in academia and industry are fervently working on designing new antimicrobials, real progress in these endeavors has been slow. Moreover, history indicates that any success in the development of novel antibiotics will probably continue to be short-lived because of the rapid generation of resistance. Ultimately, there is a need for a fundamentally different approach to the treatment of infections, particularly those involving antibiotic-resistant organisms.

### Other Applications

This technology could also offer a treatment strategy for patients with a variety of conditions including viral infections, obesity, colitis, graft-versus-host disease, and alcohol liver disease.

### Technology

Duke inventors have reported a method for preventing and treating bacterial infections that is intended to be given to patients as an alternative to traditional antibiotics. Specifically, the inventors report the use of beneficial bacteria and bacterial factors to strengthen the patient's immunity against infections. They have demonstrated that administration of bacterial species *Ruminococcus gnavus* and *Lactobacillus reuteri* induces the expression of critical antimicrobial peptides (e.g., Reg3 proteins, defensins) with both bactericidal and antiviral activities. The inventors have shown in preclinical models that this invention protected the host against the most urgent antibiotic-resistant bacterial infections, such as *Clostridioides difficile* and vancomycin-resistant enterococci.

### Advantages

- Reinforces the immune system to fight off a variety of pathogenic microbes without the problem of generating antibiotic resistance
- Effectively protects against the most clinically urgent microbes, including viruses and bacteria
- Does not require live organisms and can be delivered via a variety of methods including oral formulation, food additive, and topical delivery

