



SCIENCE FOR THE BENEFIT OF HUMANITY

# Probiotic Expressing SagA as an Anti-Infective Against Intestinal Pathogens

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## Technology Summary

The use of antibiotics has been shown to be problematic due to their tendency to kill both harmful and helpful enteric bacteria. For example, long-term antibiotic therapy heightens the risk of developing enteric pathogenic infections from bacteria such as *C. difficile*, which can lead to severe gastrointestinal disorders and, in some cases, death. In addition, treatment of *C. difficile* infections with antibiotics can often lead to relapse. Recent studies have shown the potential of probiotic bacteria as therapeutics for enteric infections, including *C. difficile* infections (CDI), where antibiotics have failed. However, the broad use of probiotics in treatment has not been adopted due to a lack of understanding of their mechanism of action and the difference in efficacy of different probiotic bacteria.

Dr. Howard Hang, Dr. Daniel Mucida and colleagues at the Rockefeller University have recently identified, SagA, an enzyme secreted by the common intestinal bacteria *Enterococcus faecium*, as an anti-infective against enteric pathogens. Their studies demonstrate that giving mice probiotic bacteria (*Lactobacillus plantarum*) expressing SagA, protects them against CDI and significantly enhances recovery and survival. These studies also suggest that SagA's protective activity is transferrable to other probiotic bacteria and thus could be developed as an engineered probiotic to prevent or potentially treat enteric infections. In addition, SagA was shown to protect against *Salmonella Typhimurium* pathogenesis, demonstrating that this probiotic factor is also effective against other enteric pathogens that could intestinal diseases in humans and livestock. Therefore, development of the SagA as a probiotic can be further expanded to protect against diverse enteric pathogens as an alternative to antibiotic treatment.

## Applications

Prophylactic against *C. difficile*, *S. Typhimurium* or other enteric bacterial pathogens.

## Advantages

- Prevent intestinal tissue damage and inflammation during infection
- Easy delivery through expression in common probiotic bacterial strains
- Does not modulate host microbiome

## Stage of Development

Preclinical/In Vivo

## Lead Inventors

Dr. Howard Hang and Dr. Daniel Mucida.

## Patent Information

PCT Pending

## References

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