Innovations
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

Purine-Enriched Microbiota for the Treatment of Mucosal Disease

Category
Gastrointestinal Therapeutic (Next Generation Probiotic)

Problem
Current therapies for IBD lack the ability to encourage GI regeneration while risking serious side effects

Solution
Genetically engineered bacteria that overproduce hypoxanthine for local tissue regeneration

Intellectual Property
- National Stage US and EP applications; Available for Exclusive or Non-Exclusive Licensing

Value Proposition
- Localized tissue regeneration for patients with intestinal damage
- Oral delivery system
- Microbiome targeting agent with minimal risk of immunosuppression

Market Attractions
- $12 Billion—US IBD therapeutic market size (6.22% CAGR)
- 1.5 Million—The number of US individuals with IBD in 2020

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Background:

Inflammatory bowel disease (IBD), as well as other conditions that cause GI tissue damage, cause significant morbidity for millions of Americans each year. Unfortunately, current therapeutics risk serious side effects including immunosuppression while lacking the ability to encourage tissue regeneration. A significant amount of research has been done around the intersection of IBD and dysregulation of the microbiome[1], though few approved microbiome targeting therapeutics currently exist.

Technical Innovation:

University of Colorado researchers Dr. Colgan, Dr. Kao, and Dr. Lee have shown that the metabolite hypoxanthine is decreased by over 65% in murine colons with active colitis and hypoxanthine levels correlate strongly with colitis disease activity[2]. Their team hypothesized that hypoxanthine could be an effective treatment for GI mucosal injury. As a result, they successfully created a next-generation, oral probiotic therapeutic with bacteria that overproduce hypoxanthine. In-vitro data supports the therapy's ability to repair damaged intestinal cell barriers as well as encourage epithelial wound closure[2]. Murine in-vivo data has shown that the therapeutic increases intestinal hypoxanthine availability, with this probiotic significantly protecting against colon shortening and weight loss in murine models with dextran sodium sulfate induced colitis (Figure 1). Importantly, this therapeutic has the advantage of site-specific delivery, while avoiding many of the serious side effects of currently marketed drugs for IBD such as immunosuppression.

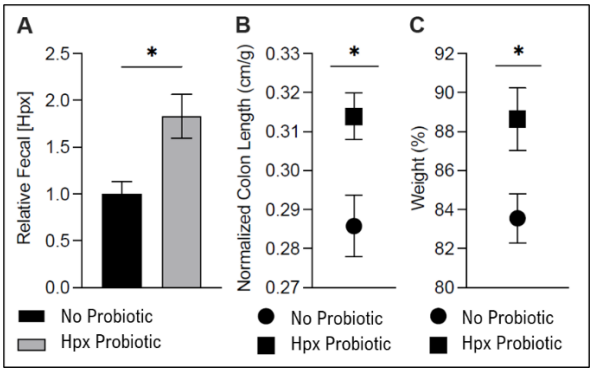

Figure 1. Fecal samples from DSS-colitis murine models before and after colonization with hypoxanthine (Hpx) producing GI bacteria. A) Fecal Hpx level. B) Colon lengths standardized to initial body weights. C) Weight loss as a percent of initial body weight.

Resources & Documents:

1. Lynch, S. V., & Pedersen, O. (2016). The Human Intestinal Microbiome in Health and Disease. New England Journal of Medicine, 375(24), 2369–2379. https://doi.org/10.1056/nejmra1600266

2. Lee, J. S., Wang, R. X., Alexeev, E. E., Lanis, J. M., Battista, K. D., Glover, L. E., & Colgan, S. P. (2018). Hypoxanthine is a checkpoint stress metabolite in colonic epithelial energy modulation and barrier function. Journal of Biological Chemistry, 293(16), 6039–6051. https://doi.org/10.1074/jbc.ra117.000269