

Personalized therapeutics for treating Inflammatory Bowel Disease

LEAD INVENTOR: Sridhar Mani

THERAPEUTIC

BACKGROUND/UNMET NEED

The CDC estimates that inflammatory bowel disease (IBD) affects upwards of 3 million Americans every year, leading to painful symptoms and disrupted lifestyles. Current diagnosis and treatment options for intestinal inflammation in IBD can be time-consuming, costly, invasive and discouraging for patients. Although the standard approach of fecal transplant can be effective, it is highly unappealing and potentially toxic to patients. Thus, alternative cost-effective, efficient and safe approaches are needed to treat this condition.

SOLUTION

Dr. Mani and colleagues discovered the presence of bacteria with novel properties in fecal samples of mice and humans with IBD. These bacteria, referred to as "swarmers," appear in response to intestinal inflammation, and exhibit a synchronized flagellar movement, which can serve as a reliable biomarker for intestinal inflammation. Subsequent studies by Dr. Mani demonstrated that swarming bacteria during IBD is a protective response of the intestine. These seminal observations formed the basis for developing a therapeutic approach to combat IBD using swarming bacteria. These inhibitors are orally bioavailable, are built on three unique scaffolds, have novel composition of matter, and exhibits excellent drug-like properties.

The technology provides a method to isolate beneficial swarming bacteria from a patient that can then be reintroduced as a personalized probiotic that has mechanistic and scientific evidence of treatment efficacy, the first of its kind in the field of probiotic therapy. Methods have been successfully executed in vivo (Figure 1a), where administering swarming bacteria (isolated from colitic mouse feces) in a mouse model of colitis abrogated intestinal inflammation. The technology has immense prospect for treating the human condition related to intestinal inflammation. The team has further developed means for a faster and more efficient method to identify and isolate swarming bacteria from fresh/frozen fecal and colonoscopy wash samples from human patients.

In summary, this technology has significant potential to provide a more agreeable and personalized form of non-invasive medical treatment that provides a solution to intestinal inflammation with minimal side effects.

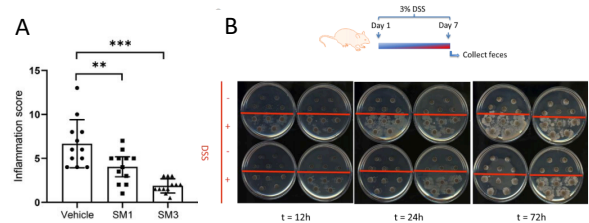


Figure: (A) SM3 is a swarming bacterial strain isolated from a mouse model of colitis. SM1 is a similar swarming bacterial strain, but from a healthy mouse. SM3 swarming bacterial treatment significantly reduced colonic inflammation score in a mouse model of colitis. (B) C57BL/6 mice (8-week old) were exposed to water (control) or DSS water (to model colitic mouse) for 7 days (n = 4 per group). Fecal samples of control group (above red line) and DSS group (below red line) were collected for swarming assay. Swarming plates were scanned at 12, 24 and 48 hours. Pure strain of swarming bacteria are detected/isolated from the leading edge of the colony derived from a mix of bacteria after 72 hours of incubation.

APPLICATIONS

- Isolation of swarming bacterial strain from fecal or colonoscopy samples.
- Personalized probiotic to treat IBD and other types of intestinal inflammation
- Potential replacement for fecal transplants.

ADVANTAGES

- Personalized probiotics treatment makes it more appealing and acceptable to patients.
- Minimal side effects compared to the current treatment options.
- Ability to detect from fresh, frozen fecal and colonoscopy-wash samples.

STAGE OF DEVELOPMENT

- Preclinical stage
- Proof of concept studies completed on human clinical samples & mouse model

RELEVANT LITERATURE

- Weijie C., et al. *BioRxiv* 759886,(2020)
- Weijie C. et al. *bioRxiv* 274316 (2020)

INTELLECTUAL PROPERTY

- Issued US Patents:
- [10857190](#)

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