A Probiotic-derived Peptide for the Prevention and Treatment of intestinal injury and inflammatory diseases

VANDERBILT UNIVERSITY
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Summary

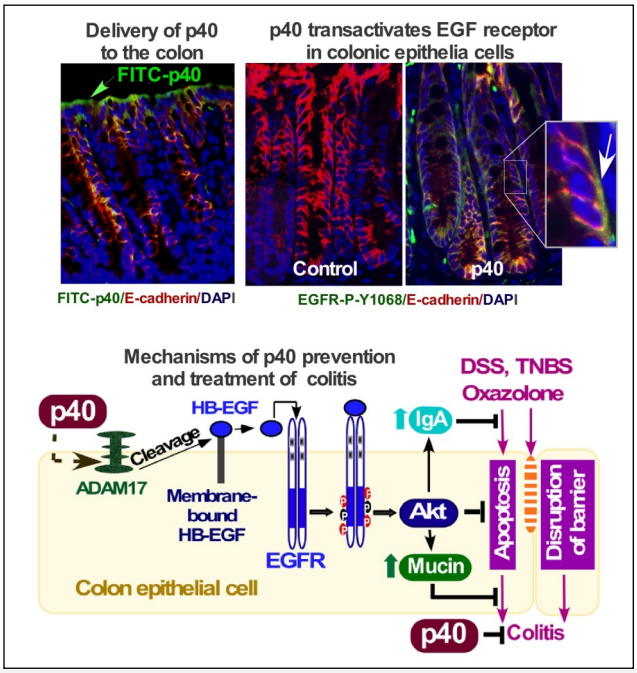
Vanderbilt researchers have discovered a novel peptide, p40, derived from one of the best-studied probiotic bacteria in clinical trials, *Lactobacillus rhamnosus* GG (LGG). This peptide transactivates EGF receptor signaling in intestinal epithelial cells. As a consequence, p40 is capable of maintaining intestinal homeostasis by decreasing epithelial cell injury and inhibiting inflammatory responses in intestinal epithelial cells. Vanderbilt University Medical Center is seeking commercial partners to develop clinical application of p40 for preventing and treating intestinal inflammatory disorders associated with epithelial injury and increased proinflammatory production.

Advantages and Clinical Applications

Although probiotics show beneficial effects on several animal models of diseases, the uncertain bioavailability and biopharmacology of probiotics in the gastrointestinal tract has posed challenges in assessing the beneficial effects of probiotics in prior clinical trials. Application of probiotic-derived factors, such as p40, may address these concerns. Furthermore, Intestinal epithelial cells provide the frontline response to the gut microbiota in maintaining intestinal homeostasis. Disruption of the integrity of this monolayer is the key pathological factor for intestinal inflammation. p40 directly participates in fostering the functions of intestinal epithelial cells, thus dampening the destructive effects by proinflammatory cytokines and other pathological factors. p40 is suitable for prevention and treatment of intestinal diseases with characteristics of increased proinflammatory cytokine production and damage of intestinal integrity. Inflammatory bowel disease (IBD), including Crohn's disease and ulcerative colitis, is clearly associated with interruption of the symbiotic relationship between the gut microbiota and host, and characterized by proinflammatory cytokine-induced disruption of intestinal barrier function. Thus, p40 is suitable for prevention of IBD in individuals at risk of developing this disease and benefits treatment of patients with IBD.

Unique Features

- p40 levels in sera of patients with IBD are decreased, indicating the clinical relevance of p40 to IBD.
- p40 protects intestinal epithelial integrity through multiple mechanisms, such as suppressing apoptosis, stimulating production of mucus, maintaining tight junctions, and increasing production of factors for IgA production.
- p40 has the potential for protection of intestinal epithelial cells against proinflammatory cytokine-induced insult, thus, could be used for prevention and treatment of multiple intestinal injury and inflammatory disorders.
- p40 could be safely used in early developmental stage of life and under disease status.



Technology Development Status

The process for large-scale isolation of p40 from LGG culture supernatants and characterization of p40 activity has been developed. Experiments have been conducted demonstrating the efficacy of p40, including preventing and treating colitis in mice induced by different mechanisms, and verifying the mechanisms of p40 action. Currently researchers are attempting to improve scalability of the peptide.

Intellectual Property Status

Four issued US Patent No. 8,748,381; 9,133,249; 9,682,120; and 10,092,623. One EP patent 2424885 and another EP pending patent.

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