Probiotic found to be effective treatment for colitis in mice

October 26 2009

The probiotic, *Bacillus polyfermenticus*, can help mice recover from colitis, a new study has found. Mice treated with *B. polyfermenticus* during the non-inflammatory period of the disease had reduced rectal bleeding, their tissues were less inflamed and they gained more weight than mice that did not receive the treatment.

Colitis is a disease in which the inner tissue of the colon, the mucosa, becomes inflamed and damaged and can result in painful sores. Ulcerative colitis and Crohn's disease are the two major types of Inflammatory Bowel Disease (IBD). It is not yet known what causes the diseases, but both are believed to be the result of altered intestinal immune responses in genetically predisposed individuals.

A probiotic is a live microorganism -- in this case, a bacterium -- that benefits its host. *B. polyfermenticus* is available in Japan and Korea to treat intestinal disorders such as diarrhea and constipation. The bacterium is quite hardy and can survive the hostile environment of the stomach and intestine.

The study not only provided evidence of *B. polyfermenticus*' usefulness in treating colitis during the non-inflammatory phase, but also showed that it works by healing intestinal wounds more quickly by encouraging the growth of new blood vessels, a process known as angiogenesis.

The study, "The angiogenic effect of probiotic *Bacillus polyfermenticus* on human intestinal microvascular endothelial cells is mediated by IL-8,"

appears in the online edition of the *American Journal of Physiology - Gastrointestinal and Liver Physiology*. The authors are Eunok Im, Yoon Jeong Choi, Cho Hee Kim, Charalabos Pothoulakis and Sang Hoon Rhee, all of the David Geffen School of Medicine, University of California at Los Angeles and Claudio Fiocchi, of the Cleveland Clinic Foundation Lerner Research Institute, Cleveland. The American Physiological Society published the research.

Study with live mice and human cells

The study occurred in two phases, one involving live mice with colitis and another that looked at human intestinal cells in a test tube. The mouse study showed that *B. polyfermenticus* facilitated the recovery of mice from colitis. The mice showed reduced rectal bleeding, less inflamed tissue and they gained more weight than the mice that did not receive *B. polyfermenticus*. The study also found that the colon tissue of the treated mice had greater angiogenesis, a process that is necessary for wounds to heal.

The test tube study allowed an in-depth look at what happens at the cellular level when human intestinal microvascular endothelial cells are exposed to *B. polyfermenticus*. This phase found that the probiotic treatment encouraged several steps that are part of the angiogenic process, including the migration of cells and the formation of new blood vessels.

The test tube studies also uncovered how this happens. The researchers found that *B. polyfermenticus* increases the production of Interleukin-8 (IL-8), a substance that enhances angiogenesis. The study also found that IL-8's receptor, CXCR2, and a cellular pathway, known as NF-κB, play a critical role in the angiogenic process.

Role of Angiogenesis

Ironically, the researchers noted that angiogenesis plays a part in causing inflammatory bowel diseases, including Crohn's disease and ulcerative colitis. Studies have shown that decreasing angiogenesis can alleviate symptoms of these diseases and promote healing during a flare up. However, this study suggests that once the flare up subsides, angiogenesis is necessary for proper healing to occur.

"Our findings suggest that the probiotic bacterium, when applied at the healing phase of experimental inflammatory bowel disease, increased angiogenesis and thus enhanced wound healing and facilitated recovery of mice from colitis," Dr. Rhee said. "Angiogenesis is essential for both inflammation and wound healing, and therefore it is important to apply angiogenic therapy when there is a requirement for wound healing and anti-angiogenic therapy when there is active inflammation," he said. Further studies are necessary before it is known whether these results can be applied to humans.

More information: To read the full study click here.

Source: American Physiological Society (news : web)