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Mutant gut bacteria reverse colon cancer in lab models

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(Medical Xpress) -- A mutant form of a meek microbe deals a gutsy blow to colon cancer, University of Florida scientists have discovered. The special bacteria halted abnormal inflammation, reduced precancerous growths and reversed progression of severe cancerous lesions in the large intestines of mice. The findings appear June 11 in the *Proceedings of the National Academy of Sciences*.

“We have demonstrated that our bacterial treatment can take on established colon cancer,” said principal investigator Mansour Mohamadzadeh, a professor in the UF College of Veterinary Medicine department of infectious diseases and pathology and a faculty member in the UF College of Medicine division of gastroenterology, hepatology and nutrition in the department of medicine. “This is huge, because people don’t come to you 10 years before they have colon cancer saying, ‘I may get colon cancer, can you treat me?’ They come to you and say, ‘I have colon cancer.’”

For years researchers have understood that uncontrolled inflammation in the large intestine can result in various diseases, including colon cancer and inflammatory bowel diseases such as ulcerative colitis. The new study focused on understanding how to curb immune system processes in the gut that lead to harmful inflammation. Resulting treatments could work not just for diseases of the digestive tract, but also for other conditions such as diabetes and Sjögrens syndrome in which inflammation plays a major role.

Some inflammation in the gut is a good thing, as it serves to keep the body's immune system in tip-top, disease-fighting shape. But under stress, the immune system overreacts with a cascade of inflammation-causing reactions. That can lead to afflictions in which the immune system attacks instead of protects the body. It can even cause colon cancer, which kills more than 50,000 Americans every year and is one of the nation's leading causes of cancer deaths, according to the National Institutes of Health.

Mohamadzadeh, a member of the UF Shands Cancer Center and the UF Emerging Pathogens Institute, and colleagues previously demonstrated that a genetically modified form of the beneficial bacterium Lactobacillus acidophilus can bring overactive immune responses back to normal. They have now found that proteins on the surface of the bacteria can act on the immune system to either cause inflammation in the gut or tune it down.

The researchers removed an inflammation-causing gene from the bacterium, and the result was a form of the bacteria that was even better at controlling disease-causing inflammation. Moreover, mice with severe cases of polyps and cancerous intestinal lesions that were fed the modified bacteria had significantly reduced numbers of colon polyps compared with untreated mice, and showed no signs of active colon cancer or disease-causing inflammation.

"This is a major discovery that defines how 'healthy' microbes function in the gut," said Dr. Eugene B. Chang, the Martin Boyer professor of medicine at the University of Chicago Knapp Center for Biomedical Discovery. Chang was not involved in the UF study. "This has far-reaching implications for the development of therapies derived from microbes that can treat many types of complex immune and digestive disorders."

The modified bacteria are easy and cost-effective to produce. Mohamadzadeh anticipates that a treatment for humans could be a pill that can be taken by mouth. Patients could receive the beneficial bacterial treatment in combination with surgery or other therapies.

Provided by University of Florida

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