Gut bacteria could be key indicator of colon cancer risk

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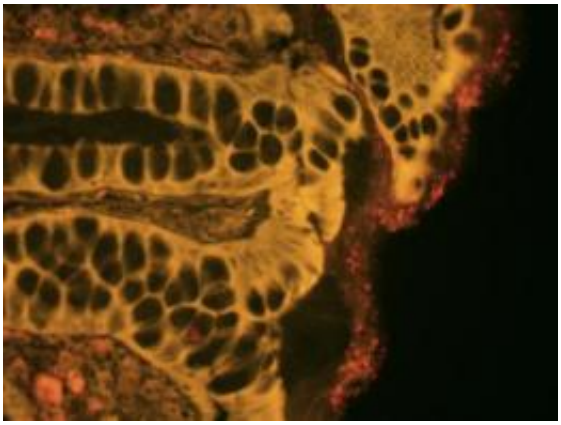

This is bacteria (in red) localized to the intestinal mucus layer. Credit: Image provided by the Keku laboratory, UNC School of Medicine.

The human body contains more bacteria than it does cells. These bacterial communities can have a positive effect on our health, by training our immune systems and helping to metabolize the foods we eat. But they can also set us up to develop digestive disorders, skin diseases, and obesity.

Now a new study by researchers at the University of North Carolina at Chapel Hill School of Medicine suggests that a shift in the balance between the "good" bacteria and the "bad" bacteria that populate our gut could be a harbinger of colon cancer.

The findings, which will appear online in the May/June 2010 issue of the journal *Gut Microbes*, could lead to strategies to identify people who are at high risk as well as ways to manipulate the microbiota to prevent colon cancer.

"We think something happens to tip the balance away from the beneficial bacteria and in favor of microbes that make toxic metabolites and are detrimental to our health," said senior study author Temitope Keku, PhD, research associate professor of medicine at UNC.

"By pinpointing these bacterial culprits, we can not only identify people at risk, but also suggest that they include the good bacteria in their diet," added Keku. "And what a great way to address colon cancer - you could know your risk and lower it by eating your yogurt every day."

Researchers have known for decades that the bacteria harbored in our bodies are not innocent bystanders but rather active participants in health and disease. Yet only recently have molecular methods evolved to the point that they can identify and characterize all of our microbial residents.

Keku and her colleagues used these methods to determine the different bacteria groups contained within biopsies from 45 patients undergoing colonoscopies. They uncovered a higher bacterial diversity and richness in individuals found to have adenomas than in those without these colorectal cancer precursors. In particular, a group called Proteobacteria was in higher abundance in cases than in controls, which was interesting considering that is the category where *E. coli* and some other common pathogens reside.

It is still not clear whether alterations in bacterial composition cause adenomas, or if adenomas cause this altered balance. In order to tell if it is the chicken or the egg, Keku plans to conduct more mechanistic

studies, such as testing whether certain groups of bacteria promote cancer growth in animal models. She is also expanding the study to analyze samples from 600 patients using next-generation sequencing technology.

The ultimate goal may be to determine if the differences found in the mucosa lining the colon also exist in the luminal or fecal matter that passes through the colon. If so, it could mean less invasive screening for cancer and even more cancers being caught earlier, when survival rates are higher.

"We have come a long way from the time when we didn't know our risk factors and how they impact our chances of getting colon cancer," said Keku. "But now that we can look at bacteria and their role, it opens up a whole new world and gives us a better understanding of the entire gamut of factors involved in cancer - diet, environment, genes, and microbes."

Provided by University of North Carolina School of Medicine