

Gut microbiome analysis improved noninvasive colorectal cancer screening

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Analysis of the gut microbiome more successfully distinguished healthy individuals from those with precancerous adenomatous polyps and those with invasive colorectal cancer compared with assessment of clinical risk factors and fecal occult blood testing, according to data published in *Cancer Prevention Research*, a journal of the American Association for Cancer Research.

"A person's gut microbiome is the collection of all the bacteria in their gut," said Patrick D. Schloss, PhD, associate professor in the Department of Microbiology and Immunology at the University of Michigan in Ann Arbor. "The number of bacteria in the gut is huge; it outnumbers the number of cells in our bodies 10 to one, and the diversity of the bacteria present is critical to our health. By sequencing the V4 region of the 16S rRNA gene we were able to identify the bacteria present in each individual's gut microbiome.

"We found that the composition of the gut microbiome allowed us to identify who in our study had precancerous adenomatous polyps and who had invasive colorectal [cancer](#)," continued Schloss. "If our results are confirmed in larger groups of people, adding gut microbiome analysis to other fecal tests may provide an improved, noninvasive way to screen for colorectal cancer."

By analyzing stool samples from 90 individuals—30 healthy individuals, 30 patients with precancerous adenomatous polyps, and 30 patients with invasive colorectal cancer—Schloss and his colleagues established that

the composition of the gut microbiome was different for individuals in the three groups.

Using this information, they identified gut microbiome signatures for each group. Adding analysis of these signatures to assessment of age and race, which are clinical risk factors for precancerous adenomatous polyps, improved prediction of the presence of precancerous adenomatous polyps 4.5-fold. Adding analysis of the gut microbiome signatures to assessment of age, race, and [body mass index](#) (BMI), which are clinical [risk factors](#) of invasive colorectal cancer, improved prediction of the presence of invasive colorectal cancer 5.4-fold.

In addition, analysis of the gut microbiome signatures was better than fecal occult blood testing at distinguishing individuals with precancerous adenomatous polyps from those with invasive colorectal cancer (AUC=0.617 and AUC=0.952, respectively). Assessing BMI, [fecal occult blood](#) test results, and [gut](#) microbiome signatures together further improved the ability to distinguish between the two conditions (AUC=0.969).

"Our data show that [gut microbiome](#) analysis has the potential to be a new tool to noninvasively screen for colorectal cancer," said Schloss. "We don't think that this would ever replace other [colorectal cancer screening](#) approaches, rather we see it as complementary.

"The study involved not just microbiologists but also researchers skilled in statistics, genomics, and epidemiology," continued Schloss. "Its success shows just how important interdisciplinary science is."

Provided by American Association for Cancer Research

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