

Bridging the gender gap: Combined technologies offer promise for detecting colon cancer in women

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A team led by a Northwestern University biomedical engineer has found that combining novel optical technologies with a common colon cancer screening test may allow doctors to more accurately detect the presence of colon cancer, particularly in women.

The study, led by Vadim Backman, professor of biomedical engineering at Northwestern's McCormick School of Engineering, in partnership with colleagues at NorthShore University HealthSystem (led by Hemant K. Roy, M.D.), combined a polarization-gating optical probe alongside traditional [flexible sigmoidoscopy](#) to measure the early increase in blood supply in rectal tissue as a marker for [colon cancer](#). The results are published this month in the journal Cancer Prevention Research.

Flexible sigmoidoscopy is a widely available [screening technique](#) that is approved by major guideline organizations. During a flexible sigmoidoscopy exam, doctors use a thin, flexible tube to examine the lower third of the colon. The procedure is an attractive screening mechanism for colon cancer because the test is quick and affordable, can be conducted by a primary care physician and requires simpler bowel preparation than that of a colonoscopy.

However, the test isn't as widely used for colon cancer screening because it only examines a third of the colon, compared to the full colon examination conducted during colonoscopy.

While colon cancer strikes roughly as many women as men, there are significant differences in how the disease presents itself. Women are more likely to have cancerous lesions in the proximal colon, the section of the colon furthest away from the rectum - and the part of the colon that isn't examined during flexible sigmoidoscopy. Due to this discrepancy, previous studies found that flexible sigmoidoscopy alone detected only one-third of colon cancer in women.

A 2009 study in the [Annals of Internal Medicine](#) called into question the effectiveness of colonoscopy in detecting proximal colon cancer, which raises concern about the disparity between the effectiveness of colon cancer screening techniques for men and women. Given women's proclivity toward proximal tumors - the hardest to detect using current technologies - researchers are seeking to develop even stronger screening techniques for women.

"Because women are particularly likely to develop cancer in the proximal colon - the hardest to detect - there is a disparity in screening for colorectal cancer in women," says Roy, director of gastroenterology research at NorthShore University HealthSystem. "This study is one of several efforts to apply new technologies to improve our ability to detect cancer, specifically in women."

The researchers hoped that by combining the test with an optic probe that measures how light scatters through tissue would provide a way to measure very subtle changes in the tissue that can indicate the presence of cancer in the organ. The technology makes use of a biological phenomenon known as the "field effect," a hypothesis that suggests the genetic and environmental milieu that results in a neoplastic lesion in one area of an organ should be detectable throughout the organ and even in neighboring tissue. Backman's group has applied a suite of optical technologies to identify signs of the field effect in colon, pancreatic and lung cancers.

"Using these optical techniques, we can identify very subtle changes in tissue that appears to be normal when examined using traditional techniques," says Backman. "This increased level of detail allows us to discover new markers for disease, which we hope will provide new methods to identify cancer in its earliest stages."

In the study of 366 male and female patients, researchers found the performance characteristics of the test to be very promising. The technique identified with 100 percent accuracy each person who had a neoplasia in the proximal colon. Some people were identified who did not have a tumor; it is uncertain whether this is a false finding or if it means those people could be at risk for developing cancer and need to be watched closely.

When comparing the results for each gender, researchers found that the early increase in blood supply was a particularly robust marker for proximal neoplasia in women. This result provides hope that the technique could provide a mechanism to improve possible discrepancies in the accuracy of colon cancer screening between men and women.

"Our hope is not to replace the colonoscopy, but to develop better screening techniques to determine who needs a [colonoscopy](#)," says Backman. "If we can develop something that can be used by a primary care physician, we can vastly increase the number of people who are screened, and ultimately treated, for this disease."

Provided by Northwestern University

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