

Could a tampon one day help predict endometrial cancer? Researchers says yes

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Researchers at Mayo Clinic have shown that it is possible to detect endometrial cancer using tumor DNA picked up by ordinary tampons. The new approach specifically examines DNA samples from vaginal secretions for the presence of chemical "off" switches—known as methylation—that can disable genes that normally keep cancer in check.

The finding is a critical step toward a convenient and effective screening test for endometrial [cancer](#), which is the most common gynecologic malignancy in the United States. The results are published in the journal *Gynecologic Oncology*.

"Unfortunately, there is no equivalent to a Pap smear or a mammogram for endometrial cancer," says Jamie Bakkum-Gamez, M.D., a gynecologic oncologist at Mayo Clinic and lead author of the study. "We know that the earlier a woman is diagnosed, the better the likelihood is that she is going to have a positive outcome from cancer treatment. Our goal is to use our findings to develop a tool for the early detection of endometrial cancer that women could use in the comfort of their own homes."

The American Cancer Society estimates that over 50,000 new cases of endometrial cancer will be diagnosed in 2015. Though the malignancy is more common in white women, blacks are usually diagnosed at a later stage and are more likely to die from the disease. In most cases, women discover they have endometrial cancer only after abnormal vaginal bleeding prompts a visit to the doctor. However, more insidious

molecular changes take place long before such symptoms appear.

Before a cell can turn cancerous, it has to subvert the genetic checks and balances that normally keep it from growing out of control. Thousands of different genes likely play a role in suppressing the development of tumors. In cancer, these [tumor suppressor genes](#) are often mutated outright or simply masked with chemical tags or methyl groups known as methylation. Previous research has shown that a wide variety of genes are turned "off" by such methylation in different types of cancer, leading many investigators to explore how these molecular markers could be used to diagnose or even treat the disease.

A small study published in 2004 showed that DNA samples collected from tampons was excessively methylated or hyper-methylated in women with endometrial cancer compared to women without the disease. However, in the years since then little progress has been made in turning the approach into a practical screening test.

"No one really took that idea and ran with it," says Dr. Bakkum-Gamez. "We wanted to take this initial study one step further, and use advances in technology to see if we could develop a better method of differentiating between cancerous and benign cells."

First, Dr. Bakkum-Gamez and her colleagues obtained samples from 66 women who were about to undergo a hysterectomy, 38 because of endometrial cancer and 28 due to other indications. Each woman used an intravaginal tampon to collect vaginal secretions and also underwent endometrial brushing, a procedure that uses a wire brush to scrape cells from the inner lining of the uterus.

The researchers isolated DNA from the samples and then analyzed 97 methylation sites along 12 different genes, half initially discovered by members of the research team and half previously reported by other

researchers. They found that methylation was higher in specimens from women with endometrial cancer for 9 of the 12 genes analyzed. The results were similar regardless of whether DNA was acquired through a tampon or endometrial brushing.

Despite the encouraging results, the researchers say they need to further refine their method before it can be used clinically. Now, Dr. Bakkum-Gamez and her colleagues are looking for additional genes that are mutated or methylated in the earliest stages of endometrial cancer. Once they have the final lineup of genes to use in the test, they plan to validate the test using samples obtained through a clinical trial that is currently accruing 1,000 women at higher risk of endometrial cancer.

The final product may look very similar to Cologuard, an at-home screening kit recently approved by the FDA. Cologuard was co-developed by Mayo Clinic and Exact Sciences, and analyzes DNA from stool samples for alterations associated with colon cancer.

"Cologuard could revolutionize [colon cancer screening](#), and our test has the potential to do the same for [endometrial cancer](#)," says Dr. Bakkum-Gamez. "At the heart of this approach is a desire to make cancer screening patient-centered, by using a product that is already widely accepted and readily available, even in resource-poor settings."

Provided by Mayo Clinic

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