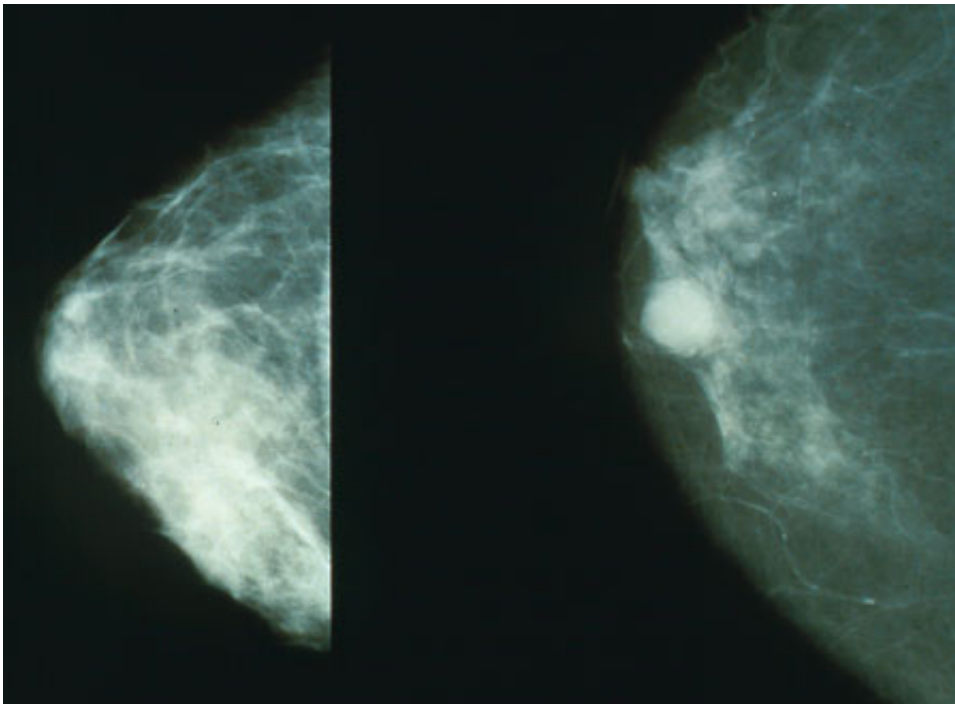


Beneficial bacteria may protect breasts from cancer

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Mammograms showing a normal breast (left) and a breast with cancer (right).
Credit: Public Domain

Bacteria that have the potential to abet breast cancer are present in the breasts of cancer patients, while beneficial bacteria are more abundant in healthy breasts, where they may actually be protecting women from cancer, according to Gregor Reid, PhD, and his collaborators. These findings may lead ultimately to the use of probiotics to protect women against breast cancer. The research is published in the ahead of print

June 24 in *Applied and Environmental Microbiology*, a journal of the American Society for Microbiology.

In the study, Reid's PhD student Camilla Urbaniak obtained breast tissues from 58 women who were undergoing lumpectomies or mastectomies for either benign (13 women) or cancerous (45 women) tumors, as well as from 23 healthy women who had undergone breast reductions or enhancements. They used DNA sequencing to identify bacteria from the tissues, and culturing to confirm that the organisms were alive. Reid is Professor of Surgery, and Microbiology & Immunology at Western University and Director, Canadian Centre for Human Microbiome and Probiotic Research at Lawson Health Research Institute in London, Ontario, Canada.

Women with breast cancer had elevated levels of *Escherichia coli* and *Staphylococcus epidermidis*, are known to induce double-stranded breaks in DNA in HeLa cells, which are cultured human cells. "Double-strand breaks are the most detrimental type of DNA damage and are caused by genotoxins, reactive oxygen species, and ionizing radiation," the investigators write. The repair mechanism for double-stranded breaks is highly error prone, and such errors can lead to cancer's development.

Conversely, *Lactobacillus* and *Streptococcus*, considered to be health-promoting bacteria, were more prevalent in healthy breasts than in cancerous ones. Both groups have anticarcinogenic properties. For example, natural killer cells are critical to controlling growth of tumors, and a low level of these immune cells is associated with increased incidence of breast cancer. *Streptococcus thermophilus* produces antioxidants that neutralize reactive oxygen species, which can cause DNA damage, and thus, cancer.

The motivation for the research was the knowledge that breast cancer decreases with breast feeding, said Reid. "Since human milk contains

[beneficial bacteria](#), we wondered if they might be playing a role in lowering the risk of cancer. Or, could other bacterial types influence cancer formation in the mammary gland in women who had never lactated? To even explore the question, we needed first to show that bacteria are indeed present in breast tissue." (They had showed that in earlier research.)

But lactation might not even be necessary to improve the bacterial flora of breasts. "Colleagues in Spain have shown that probiotic lactobacilli ingested by women can reach the mammary gland," said Reid.

"Combined with our work, this raises the question, should women, especially those at risk for breast cancer, take probiotic lactobacilli to increase the proportion of beneficial bacteria in the breast? To date, researchers have not even considered such questions, and indeed some have balked at there being any link between bacteria and breast cancer or health."

Besides fighting cancer directly, it might be possible to increase the abundance of beneficial bacteria at the expense of harmful ones, through probiotics, said Reid. Antibiotics targeting bacteria that abet cancer might be another option for improving [breast cancer](#) management, said Reid.

In any case, something keeps bacteria in check on and in the breasts, as it does throughout the rest of the body, said Reid. "What if that something was other bacteria—in conjunction with the host immune system? We haven't answered this question, but it behooves experts in the field to now consider the potential."

Provided by American Society for Microbiology

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