

First look at breast microbiota raises tantalizing questions

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The female breast contains a unique population of microbes relative to the rest of the body, according to the first-ever study of the breast microbiome. That study sought to lay the groundwork for understanding how this bacterial community contributes to health and disease, says first author Camilla Urbaniak, a PhD student at the University of Western Ontario. The research was published ahead of print in *Applied and Environmental Microbiology*.

"Proteobacteria was the dominant phylum in healthy breast tissue," says Urbaniak, noting that it is found only in small proportions at other sites in the body. That may reflect the fact that breast tissue produces high concentrations of fatty acids, and these bacteria are fatty acid metabolizers. Proteobacteria is also the predominant phylum in human milk.

"The fact that beneficial bacteria, such as *Lactobacillus* and *Bifidobacteria*, were also detected makes us wonder whether their presence might be protective for both mother and child," says principal investigator Gregor Reid of the University of Western Ontario. Breast milk is one of the initial sources of gastrointestinal (GI) bacteria for newborns, and their GI microbiota are different if they are formula fed, says Urbaniak.

Conversely, *Escherichia* and *Bacillus* predominated in cancerous breasts.

"Strains of *Escherichia* have been shown to have mutagenic and

carcinogenic activity in the gut and the bladder," says Urbaniak.

In the study, the investigators collected [breast tissue](#) from 81 women. Ten of these had undergone [breast reduction](#), and their breast microbiota served as controls. The remaining women had had benign or cancerous tumors. The tissue collected from these women was taken from about five centimeters from the tumor, from what is known as "normal adjacent" tissue. Bacterial censuses were taken using a molecular technique known as 16S ribosomal sequencing, and with cultures.

Studies of the microbiome in other parts of the body, most notably the gastrointestinal tract, have shown that certain changes in bacterial populations can lead to a variety of ills, from obvious gastrointestinal conditions such as inflammatory bowel disease to those more unexpected, such as diabetes, obesity, cancer and even neurological conditions.

"Future studies will examine how this breast microbiome is established, why no infections accompany colonization, despite the fact that some of these bacteria cause infections elsewhere in the body, what impact these organisms have on the host, and whether external factors such as diet, antibiotics, and illness affect this [bacterial community](#), and what consequences that has for women and their offspring," says Urbaniak.

The manuscript can be found online at <http://aem.asm.org/content/early/2014/03/03/AEM.00242-14.full.pdf+html>. The final version of the article is scheduled for the May 2014 issue of *Applied and Environmental Microbiology*.

Provided by American Society for Microbiology

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