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New findings on bacteria in female bladders

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Scientists and physicians at Loyola University Chicago and Loyola Medicine were the first to publish groundbreaking research that debunked the common belief that urine in healthy women is sterile.

Expanding on this finding, a new study published in *Nature Communications* has found that the bladder not only contains bacteria, but the microbes are similar to those found in the vagina. The new finding could lead to improved diagnostic tests and treatments for urinary tract infections and other urinary tract disorders.

Corresponding authors of the study are Loyola University Chicago microbiologist Alan J. Wolfe, Ph.D., and Trevor D. Lawley, Ph.D., of the Wellcome Sanger Institute in the United Kingdom.

Researchers sequenced the genes of 149 bacterial strains from 77 women. While the microbiota (community of microorganisms) found in the bladder and vagina were similar, they were markedly distinct from the microbiota found in the gastrointestinal tract.

It's not surprising the microbiota of the bladder and vagina are similar, since the organs are connected by the urethra. It appears that bacteria travel between the bladder and the vagina, effectively creating one microbiota niche. Urination provides an obvious way for bacteria to travel from the bladder to the vagina. But it's a mystery how bacteria could travel from the vagina to the bladder, especially since most of the bacteria examined in the study lack features such as flagella (whip-like structures) or pili (grappling hooks) that would enable them to move.

For more than 60 years, medical students were taught that urine is sterile in healthy women and that bacteria were found in the bladder only when there were infections. A landmark 2012 Loyola study by Dr. Wolfe and colleagues overturned this medical dogma.

"Now that we know the bladder is not sterile, we have to reevaluate everything we thought we knew about the bladder, and that is what we are doing," Dr. Wolfe said.

The new study found that the microbial sharing between the vaginal and bladder microbiota includes pathogens such as E. coli and S. anginosus as well as beneficial bacteria such as L. iners and L. crispatus.

Researchers suggested that beneficial bacteria residing in both the bladder and vagina could provide protection against urinary infections. This insight "should alter the way we view the bacteria of the female pelvic floor both by enabling further research and by providing new diagnostic and treatment options for urinary tract infections, urgency urinary incontinence and other associated urinary tract disorders," researchers wrote.

The research, a collaboration between Loyola University Chicago and Wellcome Sanger Institute, involved a clinical microbiology laboratory and multiple scientific and medical disciplines, including microbiology, urogynecology and bioinformatics.

"This is the way good science is done," Dr. Wolfe said.

The study is titled "Culturing of female bladder bacteria reveals an interconnected urogenital microbiota."

More information: Krystal Thomas-White et al. Culturing of female bladder bacteria reveals an interconnected urogenital microbiota, *Nature*

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