

Viruses that infect bacteria abound in bladder

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Phages—viruses that infect bacteria—are abundant in the bacteria that inhabit the female bladder. This is good news, because phage could be used as alternative treatment when antibiotics become resistant to pathogenic bacteria. The research is reported this week in the *Journal of Bacteriology*, a publication of the American Society for Microbiology.

"Phage have been used as an alternative to antibiotics for decades in eastern European countries, particularly for treatment of [urinary tract infections](#)," said corresponding author Catherine Putonti, PhD, Associate Professor of Bioinformatics, Loyola University, Chicago. "This first step in the characterization of the phages already present within the bladder has the potential to identify candidates for subsequent phage therapy clinical studies for urinary symptom treatment."

The investigators examined 181 bacterial genomes taken from the female urinary microbiome, which Dr. Putonti said were representative of that microbiome's phylogenetic diversity.

"We found that lysogenic phages [phages that insert their DNA into the genomes of their hosts] are abundant within the [bacteria](#) of the bladder," said Dr. Putonti. "In fact, they are more abundant than we expected," she said.

The investigators found a total of 457 mostly novel phage sequences in the urinary microbiome. "While there are now numerous studies surveying phages in the gut, the mouth, the vagina, the skin, etc., this is

the first large scale look at phages in the bladder," said Dr. Putonti.

However, viral sequences found in genomes are often fossils of long-ago infections that can no longer reproduce independent virus particles that can then infect additional bacteria. To test the viability of these sequences, the investigators selected one of the 181 bacterial genomes, and found that they were able to induce one of several phage sequences within that [genome](#) to reproduce.

The investigators also found that phages from different women were clearly related. "This suggests that, as in the gut, there may be a common set of phages that reside in the bladder—or at least the female [bladder](#)," said Dr. Putonti.

There was some variation in the abundance of phages from healthy bladders vs. those isolated from women with symptoms of urinary tract infections. "This suggests that phage may contribute to urinary health and is an exciting new avenue for future research," said Dr. Putonti.

"This is just the first in what will likely be numerous studies into the phage diversity of the urinary microbiome," said Dr. Putonti.

Until recently, urine in healthy individuals was believed to be sterile. Coauthor Alan Wolfe, PhD, Professor of Microbiology and Immunology at Loyola, overturned that dogma when his laboratory discovered the female urinary microbiome, and he has been at the forefront of isolating and characterizing individual bacterial species from this novel bacterial community.

Provided by American Society for Microbiology

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