

Urine of kidney disease patients contains diverse mix of bacteria

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Credit: Loyola University Health System

The urine of kidney disease patients contains a diverse mix of bacteria such as *Staphylococcus* and *Streptococcus*, according to a study by researchers at Loyola Medicine and Loyola University Chicago.

The bacteria diversity generally was higher among [kidney patients](#) who also experienced urinary urgency (sudden, urgent need to urinate). The study findings could lead to new approaches to treating lower urinary tract problems such as urinary urgency and incontinence.

The study by corresponding author Michael J. Zilliox, PhD, first author Holly Kramer, MD, MPH, and colleagues is published in the journal *International Urology and Nephrology*. The paper is the latest in a series of groundbreaking Loyola studies on the microbiome (community of microorganisms) found in [urine](#).

Urine in healthy patients generally has one or two dominant bacteria, while in kidney disease patients there are many different types of bacteria. It's somewhat like the difference between a manicured lawn and a lawn overrun by dandelions, clover, thistle and other weeds.

The findings are consistent with other research showing microbiome diversity may influence a person's health. For example, low microbiome diversity in the gut has been associated with inflammatory bowel disease while high vaginal microbiome diversity has been linked to bacterial vaginosis.

Physicians traditionally were trained to believe that urine does not contain bacteria. But an earlier [Loyola study](#) disproved the common belief that urine is sterile. The new study expanded on these earlier findings.

Researchers examined the urine of 41 women and 36 men who had Stage 3 to Stage 5 kidney disease but were not on dialysis. Patients were age 60 or older and had less than 60 percent of kidney function, with an average of 27 percent of function. Sixty-nine percent of the men and 70 percent of the women also had diabetes. Forty-two percent of the men and 51 percent of the women had urinary urgency and 78 percent of the

men and 51 percent of the women had nocturia (excessive nighttime urination).

The study found 19 types of bacteria in the [urine samples](#), and few samples were overwhelmingly dominated by a single genus. In addition to *Staphylococcus* and *Streptococcus*, bacteria found in kidney patients' urine included *Corynebacterium*, *Lactobacillus*, *Gardnerella*, *Prevotella*, *Escherichia/Shigella* and *Enterobacteriaceae*.

Even samples that contained one dominant type of [bacteria](#) also contained several other prominent types.

Healthy kidneys secrete antimicrobial peptides in urine to prevent [kidney stones](#) and [urinary tract infections](#). It's possible that people with [kidney disease](#) secrete fewer peptides, leading to a more diverse microbiome, researchers said.

The study was a collaborative effort that included the departments of nephrology, urology, microbiology and public health sciences. The Loyola Genomics Facility did the sequencing and analysis of the bacterial DNA found in the urine samples.

More information: Holly Kramer et al. Diversity of the midstream urine microbiome in adults with chronic kidney disease, *International Urology and Nephrology* (2018). [DOI: 10.1007/s11255-018-1860-7](https://doi.org/10.1007/s11255-018-1860-7)

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