

# **E. coli superbug strains can persist in healthy women's guts**

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A microscopic image of the bacteria *Escherichia coli*. Credit: Veronika L. Tchesnokova/UW Medicine

A recent study of over 1,000 healthy women with no symptoms of urinary tract infections showed nearly 9 percent carried multi-drug resistant *Escherichia coli* strains in their guts.

This is of clinical concern because disease-causing *E. coli* bacteria can transfer from the [digestive tract](#) to the female urinary tract via the urethra, the [urine](#) duct, which is shorter and positioned differently in females than in males. The bacteria can then make their way into the bladder and other parts of the urinary tract.

More than a third of urine samples provided by those who had fluoroquinolone (Cipro) resistant gut *E. coli* tested positive for *E. coli* growth. Of those, nearly 77 percent were Cipro-resistant, and the clonal type of the bacteria matched the fecal sample.

Most of the pathogenic *E. coli* found belonged to the pandemic, multi-drug resistant ST131-H30R or ST1193 clonal groups that currently cause the majority of drug-resistant urinary tract and bloodstream infections. They were detected twice as frequently in the urine of people who had these specific strains in their gut, compared to other strains of *E. coli* in general.

In addition, the presence of ST ST131-H30R in the gut in this study was associated with older age.

The researchers also checked to see which participants might have had an antibiotic prescription during the study for any type of [infection](#), including respiratory.

Three months after that earlier urine collection, urinary tract infections were diagnosed in nearly 7 percent of the 45 previously asymptomatic carriers who consented to follow-up electronic medical record examination. The study participants were from the Puget Sound area.

"The two pandemic fluoroquinolone-resistant urinary tract pathogenic strains of *E. coli* found in the clinical specimens are superior gut colonizers and tend to persist there," noted the researchers. "They can also show up, at an unusually high rate, in the urine of healthy women who did not have a documented urinary tract infection diagnosis at the time of sample testing. Both phenomena appear to be interconnected."

The researchers pointed out that it has long been known that a patient's gut microbial flora often harbors urinary tract infection-causing strains. It was not certain whether pandemic, drug-resistant strains have distinct moorage patterns in the gut or lower urinary tract of healthy people.

The study was published in the Oxford University Press journal, *Clinical Infectious Diseases*.

The findings could have several clinical care and infection control implications, according to Evgeni V. Sokurenko, professor of microbiology at the University of Washington School of Medicine. He was the senior researcher on the study. Several other UW microbiology faculty and Kaiser Permanent Research Institute investigators in Seattle collaborated on the work. The lead researcher was Veronika L. Tchesnokova, of the UW medical school's Department of Microbiology.

The results suggest the specific multi-drug resistant *E. coli* strains detected in this study take up a much more prolonged residence in the gut than do some other resistant strains, and also can become present in the urine of healthy women without causing burning, urgency, blood in the urine or other warning signs of bacterial infection.

Sokurenko explained that knowing whether or not multiple drug resistant strains are present in a woman's gut could help predict the resistance profile of a subsequent clinical infection. Efforts to get rid of the pandemic *E. coli* strains in the carriers gut could reduce their rate of

multiple drug resistant infections, and perhaps protect their household or other contacts as well.

Sokurenko also said medicine might need to revisit the clinical significance of finding bacteria in the urine, even without symptoms, during this pandemic of multiple antibiotic resistant strains of *E. coli*, because those strains could put the carriers at risk for a difficult-to-treat bacterial illness.

Fluoroquinolones are the most often prescribed drugs for urinary tract infections. Despite efforts to limit its use, strains resistant to this category of antibiotic are flourishing and spreading globally, according to the researchers.

The superior ability of the two pandemic strains, ST131-H30R and ST119, to take up long-term residence in people's guts may have contributed to their rapid global spread, the researcher surmised. They can be sustained and passed among healthy individuals even in the absence of antibiotic use, which can upset the microbial makeup of gut flora.

This study, the researchers concluded, highlights the likely physiological reasons behind the pandemic of these resistant *E. coli* strains. It also points out the value of determining female patients' carrier-status to predict future resistant infections, and the need to re-think the clinical significance of bacteria present in the urine without symptoms, especially as these pandemic [strains](#) can be superbugs: highly pathogenic to the urinary system and treatment resistant.

**More information:** Veronika L Tchesnokova et al, Pandemic uropathogenic fluoroquinolone-resistant *Escherichia coli* have enhanced ability to persist in the gut and cause bacteriuria in healthy women, *Clinical Infectious Diseases* (2019). [DOI: 10.1093/cid/ciz547](https://doi.org/10.1093/cid/ciz547)

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