

\$5.3 million boosts research to fight urinary infections

October 30, 2012

By Michael C. Purdy

Researchers at Washington University School of Medicine (<http://medicine.wustl.edu/>) in St. Louis have received a five-year, \$5.3 million grant to explore the way gender and age influence susceptibility to urinary tract infections (UTIs), one of the most common bacterial infections.

The grant is funded by the Office of Research in Women's Health (ORWH) and the National Institute of Diabetes and Digestive and Kidney Diseases, both part of the National Institutes of Health (NIH).

With the funding, Scott J. Hultgren, PhD, the Helen L. Stoeber Professor of Molecular Microbiology and director of the Center for Women's Infectious Disease Research, will lead a multidisciplinary team of scientists investigating the underlying mechanisms of these infections.

UTIs are a significant cause of illness in girls and women throughout their lifespan and also can be a problem for infant boys and older men. The infections often recur and can become chronic. The bacteria that cause UTIs also can spread to the kidney and bloodstream, with the potential for serious complications. Antibiotic resistance is increasing among these bacteria, making effective treatment more difficult.

Scientists and clinicians have long recognized that the anatomical differences between men and women affect their susceptibility to disease, with UTIs being a prime example. But they are becoming aware of additional differences in disease risk and the body's response to therapies that are less obvious.

"We're starting to realize that chromosomal differences between men and women affect much more than the reproductive system," Hultgren says. "There appear to be sex-based differences in the activity levels of genes throughout our DNA that impact nearly all tissues and body systems, causing changes in biochemistry, physiology, immunology and in the way medications affect our bodies."

The mission of the ORWH, founded in 1990, is to support research into these differences. Hultgren, an international expert in UTIs, is beginning his third five-year cycle of funding under the ORWH initiative.

Much of Hultgren's research has focused on how bacteria like *E. coli* cause UTIs. Through the new grant, Hultgren will collaborate with co-principal investigators George Macones, MD, the Mitchell and Elaine Yanow Professor and head of the Department of Obstetrics and Gynecology, and David Hunstad, MD, assistant professor of pediatrics and of molecular microbiology.

Hultgren's group will work to identify the precise genetic factors that allow *E. coli* to cause infections in the bladder.

Macones and Amanda Lewis, PhD, assistant professor of molecular microbiology, will collaborate on a clinical study of 3,000 pregnant women. The researchers will investigate links among UTIs, the asymptomatic presence of bacteria in the urine, preterm birth and bacterial vaginosis, which is an imbalance of the healthy bacterial flora that normally live in the vagina.

Hunstad will lead a clinical study of 1,200 infants with and without UTIs to look for sex differences in susceptibility to these infections and in how the immune system responds to UTIs. His group also has developed a new model of UTI in male mice, which will allow further exploration of the findings in patients.

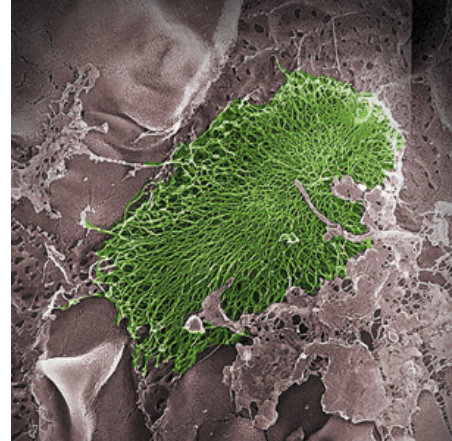
Jeffrey Henderson, MD, PhD, assistant professor of medicine, will compare patients from these studies and investigate whether the diagnosis of UTIs can be improved using a biochemical approach he has developed to identify markers that affect treatment options. His research will help physicians understand the differences in patient responses to UTIs and treatments, and advance efforts to predict risk of recurrence and other outcomes.

Hultgren founded the Center for Women's Infectious Disease Research at the School of Medicine in 2007. He directs the center and has closely aligned its goals with those of the ORWH. Both Lewis and Henderson are researchers at the center.

"The center is an interdisciplinary research initiative focused on improving the lives of women by understanding the molecular basis of infectious diseases that are a burden to them," Hultgren says. "That includes UTIs, bacterial vaginosis and conditions that arise in pregnancy, such as group B streptococcal colonization, a risk factor for serious infection in infants."

This research is supported by the Office of Research in Women's Health and the National Institute of Diabetes and Digestive and Kidney Diseases (P50 DK064540).

Washington University School of Medicine (<http://medicine.wustl.edu/>)'s 2,100 employed and volunteer faculty physicians also are the medical staff of Barnes-Jewish (<http://www.barnesjewish.org/>) and St. Louis Children's (<http://www.stlouischildrens.org/>) hospitals. The School of Medicine is one of the leading medical research, teaching and patient care institutions in the nation, currently ranked sixth in the nation by *U.S. News & World Report*. Through its affiliations with Barnes-Jewish and St. Louis Children's hospitals, the School of Medicine is linked to [BJC HealthCare](#)



HULTGREN, HEUSER AND ROTH

E. coli bacteria, shown in green, are the most common causes of urinary tract infections. Washington University researchers have received a \$5.3 million grant from the National Institutes of Health to investigate how gender and age influence susceptibility to these infections.

