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**SCOTT J. HULTGREN, PH.D**

MOLECULAR BLUEPRINT OF UROPATHOGENIC *E. COLI*  
PATHOGENESIS AND TARGETED THERAPIES

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MARCH 7, 2013  
4:00 P.M.  
208 LIGHT HALL



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Upcoming Discovery Lecture:

**JONATHAN SEIDMAN, PH.D.**  
*Harvard Medical School*

*March 14, 2013*  
*208 Light Hall / 4:00 P.M.*

VANDERBILT  UNIVERSITY  
MEDICAL CENTER

## MOLECULAR BLUEPRINT OF UROPATHOGENIC *E. COLI* PATHOGENESIS AND TARGETED THERAPIES

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Our studies blend multiple scientific disciplines elucidating bacterial and host mechanisms that determine the onset, course and outcome of interactions between a host mucosal surface and bacterial pathogens. Using genetics, genomics, biochemistry, structural biology, high-resolution imaging, animal models, clinical studies and combinatorial chemistry, we have illuminated how bacterial intracellular lifestyles and community behaviors play critical roles in urinary tract infection (UTI). We uncovered principles of adhesive pili biogenesis in Gram-negative bacteria of the chaperone/usher pathway; delineating molecular details of donor strand complementation and exchange mechanisms by which subunit folding is coupled with translocation and assembly of pili across the outer membrane. We delineated how uropathogenic *E. coli* use type 1 pili to invade and establish biofilm-like intracellular bacterial communities within bladder cells subverting extracellular host defenses and how quiescent intracellular reservoirs can seed recurrent infection. We identified complex networks governing mucosal epithelial responses that determine disease outcome. Further, we elucidated a mechanism by which bacteria form a directed biofilm-associated amyloid fiber called curli. Finally, our work has also revealed fundamental insights into catheter-associated urinary tract infections caused by *Enterococcus* and *E. coli*. Together, our work is changing the way UTIs are evaluated, re-shaping models of bacterial infections in general and spawning new technologies to design novel vaccines and anti-microbial therapeutics to diagnose, treat and/or prevent UTIs and their sequelae.



### **SCOTT J. HULTGREN, PH.D.**

**HELEN L. STOEVER PROFESSOR OF  
MOLECULAR MICROBIOLOGY**

**DIRECTOR OF THE CENTER FOR  
WOMEN'S INFECTIOUS DISEASE RESEARCH  
WASHINGTON UNIVERSITY SCHOOL OF MEDICINE**

**MEMBER, NATIONAL ACADEMY OF SCIENCES**

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Scott Hultgren is the Helen Lehbrink Stoever Professor of Molecular Microbiology at Washington University in St. Louis where he also serves as the inaugural Director of the Center for Women's Infectious Disease Research. He was elected to the National Academy of Sciences in 2011. He received his undergraduate education at Indiana University, his Ph.D. at Northwestern University in Chicago, and his postdoctoral training at Umeå University in Sweden under the tutelage of Staffan Normark. He is also a Fellow of the American Association for the Advancement of Science (AAAS) and has been honored with a Distinguished Investigator Award at Washington University. He received the Eli Lilly award (1998), the preeminent Microbiology award granted for individuals younger than 40. In 2012 he was received "The Fellows Award" that recognizes a distinguished individual for outstanding achievement in science by the St. Louis Science Academy. He was the Co-Chair of National Conference sponsored by ORWH/NIH and Washington University, "Moving into the Future: New Dimensions and Strategies for Women's Health Research." Other honors include a Nobel Fellowship; an NIH Merit grant; an honorary Doctor of Philosophy at Umeå University in Sweden, a Shipley Lecturership at Harvard University and Chairmanship of a Gordon Conference on Microbial Attachment. Further, he has been recognized as Course Master of the Year and Academic Women's Network Mentor of the Year in honor of his dedication to teaching. Dr. Hultgren has mentored more than 50 individuals as pre- or post-doctoral trainees; fostering their success in establishing their own professional careers.

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