

## Infectious disease and women's health

Scott Hultgren and Jennifer Elam introduce a new initiative that will take an interdisciplinary and translational approach to studying those infections that primarily affect women.

The need for biomedical research that is focused on the roles of sex and gender in health and disease has only been recognized in the past few decades as the differences between the biochemistry and physiology of men and women became more fully appreciated. Recent efforts to fill the gap in women's-health research are starting to mobilize the scientific community in new directions.

According to 2002 statistics from the World Health Organization, infectious diseases claim the lives of over nine million women and girls worldwide, which accounts for about one-third of all female deaths annually. Even in industrialized countries, communicable diseases represent approximately 5% of all illnesses in women each year. Despite the high risk of infection among women, conditions that primarily affect the health of women are often overlooked and under-studied.

Support for research on women's health was given a major boost in 1990 when the Office of Research in Women's Health (ORWH) was established at the National Institutes of Health (NIH) to coordinate NIH-funded women's-health research and to stimulate efforts to improve the health of women through biomedical and behavioural research efforts. Led by Director Vivian Pinn, the ORWH has been active in bringing together advocates, scientists, policy makers, educators and health-care providers to set priorities in women's-health research, determine progress on current initiatives and support emerging research areas. Pinn has spearheaded the development and implementation of interdisciplinary research centres that are co-funded by several NIH institutes known as SCORs (Specialized Centers of Research on Sex and Gender Factors Affecting Women's Health). This programme created a new paradigm of cross-institute translational funding built around an under-studied research area that has served as a model for the current NIH Roadmap Initiative under NIH Director Elias Zerhouni.

The SCOR programme has many success stories. For example, a group of investigators at Washington University School of Medicine and the University of Washington, with strong support from the National Institute of Diabetes and Digestive and Kidney Diseases, was awarded one of the first SCOR grants in 2002 to study the molecular and epidemiological basis of acute and recurrent urinary tract infections (UTIs) in women. The team found that the bacteria that cause UTIs in women are entrenched within bladder cells as intracellular bacterial

communities. This finding may lead to better evaluation and treatments for UTIs

The interdisciplinary theme of the SCOR programme, and inspiration from the remarkable careers of researchers such as Stanley Falkow and Staffan Normark, encouraged us to then pursue the creation of a new centre for research at Washington University in St. Louis that would be geared towards the study of infectious diseases in women. The new Center for Women's Infectious Disease Research (cWIDR) will study the impact of sex and gender issues on susceptibility to diseases that are caused by microbial pathogens. This initiative met with enthusiastic support from the Chancellor, the Dean and the executive faculty of the School of Medicine. In particular, the heads of three departments — Microbiology, Medicine and Biochemistry — pledged resources and commitments for the recruitment of five new faculty members to be placed within the centre, which will be housed in a new US \$235 million building as part of a new university initiative. Stephen Beverley, Head of Molecular Microbiology, was a mentor throughout this process and was the key leader, along with Michael Caparon (Co-director of the cWIDR), in helping to launch the initiative.

A combination of newly recruited investigators and existing research groups will collaborate at the cWIDR to study the microbial pathogenesis of women's diseases, including sexually transmitted diseases, infections that lead to complications in pregnancy, interstitial cystitis and painful bladder syndrome, vulvodynia, cancers that are associated with infective agents, such as cervical cancer, and the possible roles of infection in other diseases, such as neurodegenerative disorders, heart disease and autoimmune disorders.

A cross-discipline, translational approach will be necessary to fully understand and treat these often intractable infections. This new way of doing 'big science' from the bench to the bedside will also require centres such as the cWIDR to develop an infrastructure that combines the resources of many departments, programme grants and private funding in ways that are often different to the normal university structure. However, we hope that the benefits to human health that are possible from such collaborative, translational science will encourage some adventurous scientists to join us in braving these obstacles and begin to establish interdisciplinary centres that focus on other traditionally overlooked research areas.

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