

UNIVERSITY OF MARYLAND MEDICAL **News**



University of Maryland
School of Medicine
655 West Baltimore Street
Baltimore, Maryland 21201
<http://medschool.umaryland.edu>

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Contact: Karen Buckelew (kbuckelew@som.umaryland.edu)

410-706-7590

Sarah Pick (spick@som.umaryland.edu)

410-707-2543

INSTITUTE FOR GENOME SCIENCES AT UM SCHOOL OF MEDICINE TO STUDY INTERSECTION OF HUMAN GENOME AND MICROBIAL DNA

\$24.6 Million in Federal Grants Will Fund Research into New Frontier of Genomics

Researchers at the Institute for Genome Sciences (IGS) at the University of Maryland School of Medicine have earned three new grants potentially worth more than \$24.6 million to study the microbes that live in and on the human body and how they affect human health. The grants are part of an expansion of the Human Microbiome Project, a \$140 million, five-year effort by the National Institutes of Health (NIH). The project's expansion, which the NIH announced today, is partially funded by federal money allocated to stimulate the U.S. economy under the American Recovery and Reinvestment Act.

The grants to the University of Maryland School of Medicine will fund research on obesity and metabolic syndrome in the Old Order Amish, Crohn's disease and bacterial vaginosis. The human microbiome refers to all of the genomes, or DNA, of the trillions of microorganisms that live on and in the human body. The Human Microbiome Project will investigate how the human microbiome affects the human genome.

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“Now that the human genome has been sequenced, the human microbiome is the next great frontier for genomics. We’ve become a center of excellence for this new frontier, the study of the human microbiome,” says Claire Fraser-Liggett, Ph.D., a professor of medicine at the University of Maryland School of Medicine and director of the Institute for Genome Sciences.

“Now we have the tools to study these complex microbial communities that colonize every cavity and surface in the body. They are not just hitchhikers. They play a very important role in improving health by providing capabilities humans don’t have. There also is a growing association between important chronic diseases and potential shifts or changes in these microbial communities. This new field of study gives us an innovative approach to looking at complex diseases we know can’t be easily explained with a single mechanism,” adds Dr. Fraser-Liggett.

“Many of our researchers, including Dr. Fraser-Liggett, were involved with the sequencing of the human genome. These new grants keep the Institute at the cutting edge of this new frontier of genomics,” says E. Albert Reece, M.D., Ph.D., M.B.A., dean of the School of Medicine. “We hope this work will expand medicine’s understanding of conditions like Crohn’s disease and bacterial vaginosis, and one day lead to new treatments or diagnostic tools for these conditions,” says Dean Reece, who also is vice president for medical affairs of the University of Maryland and the John Z. and Akiko K. Bowers Distinguished Professor.

One of the grants is fully funded, but the other two will cover the beginning of projects that could each last as long as four years. After one year, the National Human Genome Research Institute (NHGRI), the part of the National Institutes of Health that is funding the Human Microbiome Project, will review the projects and decide whether to award the additional years.

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The Institute for Genome Sciences already has received funding from the Human Microbiome Project (HMP). In October 2008, IGS earned one of the project's first grants, a \$9.9 million award to run the Data Analysis and Coordination Center that forms the bioinformatics core of the project.

The new grants will fund pilot demonstration projects to sample the microbiomes of healthy volunteers and volunteers with specific diseases over the next year. The data will allow the researcher to study changes in the microbiome at particular body sites in both health and diseased states. Dr. Fraser-Liggett received two grants to study the microbes found in the digestive tract.

One grant, for \$833,000 for one year, is to study Crohn's disease in collaboration with researchers at Lawrence Berkeley National Laboratory in Berkeley, Calif., and Oak Ridge National Laboratory in Oak Ridge, Tenn. Another grant, for \$1.02 million for the first year, and \$12.3 million for the following three years, will fund Dr. Fraser-Liggett's study of obesity and metabolic disorders in the Old Order Amish population in Lancaster, Pennsylvania. On that project she is collaborating with Alan R. Shuldiner, M.D., a professor of medicine at the University of Maryland School of Medicine. Dr. Shuldiner runs the Amish Research Clinic in Lancaster, which studies the genetics of the Amish.

A third grant goes to Jacques Ravel, Ph.D., an associate professor of microbiology and immunology at the School of Medicine and a researcher at the IGS, for the study of bacterial vaginosis. That project includes researchers at the University of Idaho. The grant is for \$987,000 for the first year of a four-year planned project; the total four-year budget is \$10.5 million.

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About 25 to 30 percent of women have bacterial vaginosis at any point in time, and it is the most common vaginal infection that brings women of reproductive age to visit their primary care physician. In addition to causing discomfort, it has been associated with an increased risk of such problems as acquiring sexually transmitted infections and even pre-term delivery during pregnancy, according to Dr. Ravel.

“It’s a big problem that is very poorly understood,” he says. “Bacterial vaginosis is the result of changes in the microbiome in the vagina. We hope to identify the causes of the disruption of the microbiome, and we anticipate that a better understanding of bacterial vaginosis will ultimately result in more effective and personalized treatments.”

The NHGRI announced the grants today as part of its nationwide expansion of the Human Microbiome Project. The project began in 2007 as a part of the NIH’s Roadmap for Medical Research. The expansion of the microbiome program will include pilot demonstration projects to study seven areas of the body: the digestive tract, the mouth, the skin, the nose, the vagina, the blood and the male urethra. The HMP expansion also will fund the sequencing of at least 400 microbial genomes. The sequencing of 500 other microbial genomes related to the human microbiome have already been completed or are in process.

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More information about the HMP is available at www.nihroadmap.nih.gov/hmp/ and www.hmpdacc.org.

An illustration showing the body sites that will be sampled as part of the Human Microbiome Project is available at: <http://www.genome.gov/pressDisplay.cfm?photoID=20163>.

A high resolution image of the bacteria, *Enterococcus faecalis*, a microbe that lives in the human gut, is available in color at www.genome.gov/pressDisplay.cfm?photoID=20023, or in black and white at www.genome.gov/pressDisplay.cfm?photoID=20024.

More information about NIH’s ARRA grant funding opportunities can be found at <http://grants.nih.gov/recovery/>. To track the progress of HHS activities funded through the ARRA, visit www.hhs.gov/recovery. To track all federal funds provided through the ARRA, visit www.recovery.gov.

