School of Medicine News

UM Institute for Genome Sciences Researcher Wins Critical Role in NIH’s Human Microbiome Project

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$9.9 Million, Five-Year Federal Grant to the University of Maryland School of Medicine Will Fund a Core Facility to Store and Analyze Genomic Information on the Microorganisms That Live in and on the Human Body

The human body is teeming with microbes — tiny microorganisms, trillions of them, living in every surface and cavity of the body. The genetic composition of these organisms is considered to be a critical new frontier in the field of genomics, and researchers at the University of Maryland School of Medicine’s Institute for Genome Sciences have been selected by the National Institutes of Health to play a central role.

The NIH has chosen Owen White, PhD, a professor of epidemiology and preventive medicine at the University of Maryland School of Medicine and a researcher at the University of Maryland Institute for Genome Sciences, to lead a $9.9 million project that forms the core of the Human Microbiome Project. That project is an initiative of the NIH’s National Human Genome Research Institute.

The Human Microbiome Project will engage scientists throughout the U.S. to sequence the genomes of 600 microbes that have been identified on the human body. It also funds work in refining the tools and technology used in this sequencing.

Dr. White, a bioinformatics expert, will spearhead the Human Microbiome Project Data Analysis and Coordination Center, a database system that will analyze, organize and disseminate the genomic information gathered at various sites as part of the Human Microbiome Project. All information in the Human Microbiome Project will be made available for free to U.S. investigators, just like the information gathered as part of the Human Genome Project. Scientists will access the information using the database Dr. White and his colleagues are developing at the University of Maryland Institute for Genome Sciences.

“Ease of access to the information gathered as part of the Human Microbiome Project is critical to accelerating the pace of scientific discovery,” says E. Albert Reece, MD, PhD, MBA, Vice
President for Medical Affairs, University of Maryland, and John Z. and Akiko K. Bowers Distinguished Professor and Dean, University of Maryland School of Medicine. "We are honored that the NIH has entrusted such a crucial task to the University of Maryland Institute for Genome Sciences. For the institute to have received such a prestigious grant so early in its history recognizes the program's strength and the skill of its researchers."

Claire Fraser-Liggett, PhD, director of the University of Maryland Institute for Genome Sciences and a professor of medicine at the University of Maryland School of Medicine, says the institute already has a strong foothold in the field of metagenomics.

"The Data Analysis and Coordination Center will be a critical component of the Human Microbiome Project," says Dr. Fraser-Liggett. "This award to Dr. White is a testament to his stature in the field of comparative genomics and bioinformatics, and will significantly add to the metagenomics research effort already underway within the University of Maryland Institute for Genome Sciences."

"The Human Microbiome Project is the next generation of the human genome," says Dr. White. "It is about studying the ecology of the organisms that are growing in association with the human body. Even healthy individuals have collections of bacteria in their mouths or on their skin that play a role in our health. There is already some research underway analyzing species of bacteria in healthy people versus unhealthy people. Studying the microbiome will enhance our overall understanding of human health."

Dr. White and his colleagues will create a pipeline to funnel the information into their database from the Human Microbiome Project partner sites, as well as a data analysis system to organize the data accordingly. They will also establish a Web portal through which scientists can access the information, and a helpdesk that will make experts available to answer questions about the system. The project also will include community outreach such as training sessions and workshops to familiarize scientists with the bioinformatics system.

"The technology to sequence DNA has existed for a long time," says Dr. White. "But we are still learning how to make use of the genetic information it generates."

"The volume of data is so large, a streamlined system is needed to perform processes such as finding all the genes and figuring out what they do," Dr. White adds. "You can't do that on your desktop; you need a huge computer infrastructure. That's what we will create for the Human Microbiome Project."

On Tuesday, Oct. 7, the NIH announced its first awards under the Human Microbiome Project. The $21.2 million in grants includes Dr. White's $9.9 million grant and 10 others, averaging about $1 million each. The projects enter new territory in genomics known as metagenomics. Genomics typically focuses on the sequencing of the DNA of one microorganism at a time. But the advanced field of metagenomics allows scientists to analyze all the DNA in all the microbes in a sample. Many of the studies funded in this first round of the project are intended to improve the techniques and technology used to identify microbes and the location and significance of their genes, according to the NIH.

All the information uncovered will be stored in the database at the University of Maryland Institute for Genome Sciences, to be located in the institute's new headquarters in the University of Maryland BioPark.
Dr. White has been with University of Maryland Institute for Genome Sciences since its founding in 2007. Like many of the 72 researchers who are now part of the institute, Dr. White was previously with The Institute for Genome Research, or TIGR, in Rockville. When that organization folded last year, its director, Dr. Fraser-Liggett, PhD, assumed a new role as director of the University of Maryland Institute for Genome Sciences, bringing many of her colleagues with her.

“This new core facility really helps confirm the University of Maryland Institute for Genome Sciences is a success,” says Dr. White. “The Human Microbiome Project is an exciting part of the genomics field that is really beginning to address very interesting health questions. Genomics is becoming more applied and having an impact on human disease. Being a part of this is genuinely very exciting for us.”