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August 23, 2017 | By Heather Buschman, PhD

Help UC San Diego Scientists Study Link between Body Bacteria and Autoimmune Diseases

The public's help is being enlisted in the Microbiome Immunity Project, what's thought to be the biggest study to date of the human microbiome — the communities of bacteria and other microbes that live in and on the human body, where they influence our health.

Since studying the entire human microbiome would be almost impossible with traditional methods, massive supercomputing processing power is being crowdsourced via IBM's World Community Grid. Volunteers download a secure software program that automatically detects when a computer can offer spare processing power, then taps it to run virtual experiments on behalf of researchers. Anyone with a computer and an internet connection can join the World Community Grid and sign up to support the Microbiome Immunity Project at www.worldcommunitygrid.org

The project is co-led by Rob Knight, PhD, professor of pediatrics at University of California San Diego School of Medicine and director of the Center for Microbiome Innovation at UC San Diego, with collaborators at Broad Institute of Harvard and MIT, Massachusetts General Hospital and Simons Foundation's Flatiron Institute. At UC San Diego, Tomasz Kosciolek, PhD, a postdoctoral researcher in Knight's lab, Rommie Amaro, PhD, professor of chemistry and biochemistry, and Bryn Taylor, a graduate student mentored by Knight and Amaro, are also involved in the project.

The team will use the surplus processing power on World Community Grid volunteers' computers to conduct millions of virtual experiments. They aim to map 3 million bacterial genes found in the human microbiome and predict the structure of their associated proteins.

The study's goal is to help scientists better understand the microbiome's interaction with human biochemistry and determine how that interaction may contribute to autoimmune diseases, such as type 1 diabetes, Crohn's disease and ulcerative colitis. With better

understanding, scientists might be able to more easily prevent and treat these diseases. The researchers will make their data publicly available to other scientists, accelerating the advancement of scientific knowledge in this important area of research.

“Had World Community Grid not existed, we wouldn’t have even contemplated this project,” Knight said. “By harnessing the efforts of volunteers, we can do something that exceeds the scale of what we have access to by a factor of thousands. For the first time, we’re bringing a comprehensive structural biology picture to the whole microbiome, rather than solving structures one at a time in a piecemeal fashion.”

Since its founding in 2004, World Community Grid has supported 29 research projects on cancer, HIV/AIDS, Zika, clean water, renewable energy and other humanitarian challenges. To date, World Community Grid, hosted on IBM Cloud, has connected researchers to $500 million U.S. dollars’ worth of free supercomputing power. More than 730,000 individuals and 430 institutions from 80 countries have donated more than one million years of computing time from more than three million computers and Android devices. Volunteer participation has helped researchers to identify potential treatments for childhood cancer, more efficient solar cells and more efficient water filtration.

UC San Diego researchers are also involved in OpenZika, a World Community Grid project launched in May 2016 which aims to identify drug candidates to combat the Zika virus.

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