Startup aims to predict behavior of trillions of microorganisms

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Prof. Jack Gilbert co-founded Gusto Global to better understand microorganisms inside humans and harness them to treat disease. Credit: Andrew Collings / UChicago Medicine

A new University of Chicago startup is working to better predict the behavior of the trillions of microorganisms living inside the human body

and harness them to treat disease.

Gusto Global, co-founded by Prof. Jack Gilbert with the help of the Polsky Center for Entrepreneurship and Innovation, is diving into one of the most promising and active fields of scientific research: the human microbiome.

Jumpstarting Gusto's drug development pipeline is research licensed from Gilbert and John Alverdy, the Sarah and Harold Lincoln Thompson Professor of Surgery and executive vice chair of the Department of Surgery. Their work is inspired by the human gut microbiome, a system composed of 30 trillion tiny swimming microbes, which, when combined, behave much like a human organ. These microbes are believed to calibrate the human immune system, shaping the likelihood of disease, response to surgery and even mental health.

"We believe it may be possible to treat chronic and acute diseases like allergies, infections or irritable bowel disorder by delivering microbes—living micro-organisms—into your gut via a pill," said Gilbert, who also serves as faculty director of the Microbiome Center, a collaboration among Argonne National Laboratory, the Marine Biological Laboratory and the University. "These micro-organisms will interact with the patients' immune system and the microbiome that is already in their gut to help reduce inflammation and wipe out disease-causing pathogens."

Gusto emerged from the Polsky Center's UCGo! Startup License program, which helps faculty, researchers and campus entrepreneurs quickly launch businesses. The startup is the third to complete the program, which offers an optional, standardized, non-negotiable licensing agreement for University-owned technology.

"It's exciting to see Gusto emerge from the University's campaign to

increase entrepreneurship on campus," said John Flavin, who leads the Polsky Center for Entrepreneurship and Innovation. "It's just a real privilege to work with Jack and John. They are dedicated to developing treatments that improve people's lives."

Microbes are found everywhere. For example, the oceans have more microbes than there are stars in the known universe. There are likely to be more than a trillion bacterial species on the planet, and they live in hundreds of thousands of microbial ecosystems called microbiomes.

Each microbiome is extremely complex—there are more than 1,000 species of microbes in the human gut alone—and scientists do not really understand how the human microbiome influences human health. Finding such answers will require new tools to gather and analyze large datasets.

"We know how some of these microbes interact with each other, but we don't understand the majority of these interactions, nor how the microbes interact with the human immune system," Gilbert said. "Gusto Global has built a proprietary computational modeling platform called GUST+ that uses databases from human studies to run thousands of simulations in order to predict how bacteria interact with each other, and how they cause changes in the immune system, and human health. This will give Gusto an advantage in the way it performs research and development of microbiome-based drugs. We'll have a better shot at finding something that works to address inflammation or disease."

The most famous microbiome manipulation is known as a Fecal Microbiome Transplant. It involves transferring healthy gut bacteria found in feces into patients suffering from potentially deadly gut infections. A number of companies are actively developing therapeutics in this area, including Rebiotix and Seres Therapeutics.

Gusto has received initial funding from its co-founders and Charlotte, N.C., investment bank Fennebresque & Co., while Gilbert and Alverdy's research was supported by a National Institutes of Health grant. Currently, Gusto is working with a major pharmaceutical company to help optimize their probiotic formulations. The company intends to raise a Series A round of venture funding in 2017.

"Through the UCGo! Start Licenses, we are accelerating the pace for both the University and startups," said Matt Martin, an assistant director at the Polsky Center for Entrepreneurship and Innovation, which is helping Gusto organize its intellectual property portfolio.

Provided by University of Chicago