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Pfizer, Roche Embrace The Microbiome, Leading \$43M Bet On Second Genome

Scientists are super-excited about the way cheap, fast DNA sequencing technology is making it possible to gather vivid, detailed information about the microbiome. These are the trillions of bugs in our guts, and on our skin, that humans have co-existed with since the beginning.

Drug companies, until fairly recently, haven't been that interested, or at least haven't seen clear ways the science can applied with new drugs. But that's changing.



Second Genome announced it has raised \$42.6 million in a Series B venture capital round led by Pfizer Venture Investments and Roche Venture Fund. (Photo by Spencer Platt/Getty Images)

Today, a little company in South San Francisco called Second Genome is announcing it has raised \$42.6 million in a Series B venture capital round led by two major drugmakers—Pfizer Venture Investments and Roche Venture Fund. The round also included new investors Digitalis Ventures, Adveq, LifeForce Capital, MBL Venture Capital, and Mayo Clinic as well as the company’s previous investors Advanced Technology Ventures, Morgenthaler Ventures, and Seraph Group. The company has now raised \$59 million since it got going in 2010.

Second Genome was founded by prominent biotech entrepreneur Corey Goodman, a former Pfizer executive who’s now a venture capitalist. The original idea, which I wrote about at the beginning, was to gather information on bacterial pathogens that contaminate water and cause environmental health headaches. As sequencing technology evolved, the company turned its attention to getting information on the genomic profiles of the bugs that live in the guts of people. Now the little company

has 25 employees, and a wide array of pharmaceutical and biotech customers that use its technology to sequence microbial samples. That service business helped reduce the company's cash burn rate for the past five years, and helped put it in position to embark on an ambitious new strategy — to further build its capabilities to become a drug developer of its own.

The timing is favorable for such an undertaking. Several microbiome drug developers have been inspired by early success with fecal transplantations for the treatment of *C.difficile* bacterial infections, by coming up with pills that mimic the effect of a full-blown fecal transplant. That success has helped companies raise money from investors. The money has flowed, even though fecal transplants various derivative approaches have challenges with the ick factor, with large-scale manufacturing, and with delivering a consistent product that consists of live bacteria.

Second Genome is seeking to sidestep those challenges by using its knowledge of the microbiome to develop traditional pills and injectable protein drugs that pharma companies are comfortable making and selling. The first application the company is working on: A pill for ulcerative colitis, an inflammatory bowel disease that results when the careful balance between the gut microbiome and the body's immune system goes awry.

“There are more than just bugs-as-drugs approaches,” said Peter DiLaura, CEO of Second Genome. “The breadth of applications of the microbiome is expanding.” He added: “The microbiome isn't going to have all the answers, just like host biology won't have all the answers, but there's a nice recognition that in some disease indications, you're really missing part of the equation if you're not trying to understand the role the microbiome plays.”

Many pharma companies, conservative by nature, have preferred to wait and see. But more than a few pharmaceutical executives are intrigued. Jose-Carlos Gutierrez-Ramos, a former Pfizer executive, jumped ship a year ago to join Cambridge, Mass.-based Synlogic, a company that uses synthetic biology techniques to program bacteria to function like smart drug-delivery devices. At the time, he told me that Synlogic was a little too early, a little too risky, for any major pharmaceutical company. (Within a year, undefined AbbVie supported Synlogic with a big partnership.)

He's far from alone in his peer group. Nancy Thornberry, a former Merck executive, recently joined New York-based Kallyope to seek to better understand how the state of our gut microbiome influences our central nervous system, which some scientists call the "gut-brain axis." Roger Pomerantz, another former Merck executive, now runs Cambridge, Mass.-based Seres Therapeutics, a company working on a new drug for C.difficile gut infections. Other private companies seeking to come up with microbiome-based therapeutics include OpenBiome, Rebiotix, Evelo Therapeutics, and Vedanta Biosciences.

Second Genome isn't saying much about exactly what its first therapeutic application is all about. The company's lead drug candidate (SGM-1019) is a conventional small molecule that's supposed to interact with a molecular target involved in inflammation and pain experienced by ulcerative colitis patients. The compound is in clinical trials, and the new \$42.6 million financing is supposed to help drive it through mid-stage studies that will determine whether it works.

Second Genome isn't saying what the molecular target of the drug is, or even whether it's novel. DiLaura did say the target is a protein factor secreted by the microbiome in mild-to-moderate ulcerative colitis patients, and that it drives an inflammatory response against the gut. Looking at that situation another way, you could say Second Genome is an

immunology/inflammatory disease drug developer that happens to have a cool tool for sequencing and analyzing the microbiome.

Drug development is the clear goal, DiLaura says. The new financing is also going to be used to build up Second Genome's drug discovery capabilities, and clinical development capabilities, for diseases related to the gut barrier, insulin sensitivity, and immune system regulation. The company expects to grow from about 25 employees to about 40 as it seeks to take the next step.

Bernat Olle, CEO of Vedanta Biosciences, another aspiring drug developer based on microbiome learnings, said he's confident there's room for many different types of players in this emerging area. "I am more excited about using defined mixtures of organisms, but I believe in the end this field will see 'all of the above' (fecal transplants, defined mixtures, small molecules, engineered bacteria, etc)," he said.

Luke Timmerman is the founder of Timmerman Report, a subscription publication for biotech professionals.