

Microbes in the ocean may unlock secrets about the causes of IBD

BY MATT WOOD

Tools developed to analyze the genetic sequence data of microbes in the ocean work just as well on samples taken from the human gut. Now, a research team based at the University of Chicago is using these same technologies to look for rare or unusual strains of bacteria that could be linked with disease.

The researchers are using an array of technologies to study the gut microbiome and genetics of patients with severe ulcerative colitis who have surgery to remove part or all of their colons. Some of these patients develop inflammation in part of the reconstructed colon, a condition known as pouchitis. Because these patients are already being treated for ulcerative colitis, physicians can collect tissue, blood and microbiome samples before and after surgery to analyze over time as the disease progresses, and to compare with patients who don't develop pouchitis.

"This is the only model where we can actually see what events occur at the genetic, molecular and microbiome level before the disease happens," Chang said. "This may be the only way to gain significant insight to really move the needle in this area."

Chang and Sogin are working with computer scientist and microbiologist A. Murat Eren, PhD, an MBL fellow based in the University's Department of Medicine, to analyze data taken from patients at multiple time points during their treatment. Eren and his team developed a software platform called *anvi'o* to help scientists work with large sets of genetic and molecular data interactively through easy-to-use and integrated interfaces.

So far, they have identified two species of bacteria that could play a key role in the development of pouchitis. Finding out which part of the patient's genetic profile makes them susceptible to this chain of events is the next piece of the puzzle to be solved by the project's large team of basic science and clinical researchers.

"UChicago is particularly suited for this project," said David T. Rubin, MD'94, Joseph P. Kirsner Professor of Medicine and a member of the research team. "We have the personnel, the open lines of communications, and the expectation that everything that happens on the basic and translational science side of the street revolves around a patient who has a problem that we want to solve."

PHOTO BY JEAN LACHAT

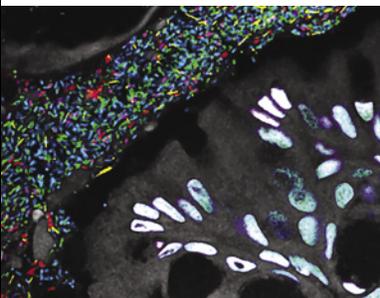


Eugene Chang, MD'86

The scientists received a \$10 million grant from the National Institute of Diabetes and Digestive and Kidney Diseases to study the causes of inflammatory bowel disease (IBD). The project is the result of a long collaboration between Eugene B. Chang, MD'76, Martin Boyer Professor of Medicine at UChicago, and microbiologist Mitchell Sogin, PhD, a Distinguished Senior Scientist at the Marine Biological Laboratory (MBL) in Woods Hole, Massachusetts.

Chang studies factors that influence the development of microbes in the human gut, and how they can be used to reshape the microbiome to prevent and treat disease. Sogin focuses on microbial ecology, and has developed genetic sequencing tools to study how microbes evolve and maintain relationships with their community and environment.

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Human gut microbiota established in gnotobiotic mouse, published in Jessica Mark Welch et al., PNAS 17115961144.