

SCIENTIST PROFILE: A. MURAT EREN, PHD

Robert Mitchum

Ecology is everywhere, A. Murat Eren, likes to say. In the oceans and soil, in the human gut and on the skin, live microscopic worlds of astonishing diversity. The young science of using computational, molecular, and genetic approaches to study these complex ecosystems, often called the microbiome, promises to reveal rich new discoveries in biology and medicine.

Though trained as a computer scientist, Eren, who goes by Meren, was drawn to this emerging research as a graduate student at the University of New Orleans, later moving to the Marine Biological Laboratory to study microbial populations everywhere from plant leaf surfaces to city sewage systems. Now he's joined the University of Chicago Digestive Diseases Research Core Center to apply powerful computational tools to studying the role of the microbiome in health and disease.

"We believe that the field of microbial ecology is going to have a considerable impact on the future; how we address some of the outstanding questions related to human health as well as environmental health," said Meren, an Assistant Professor in the Department of Medicine and a member of the Committee on Microbiology.

A valuable method in this pursuit is called metagenomics. Instead of isolating a single organism and sequencing its genome, metagenomics takes a sample from soil, water, or a human and uses sequencing to reveal the bits and pieces of DNA from all organisms present in the environment.

Computation provides microbiome researchers with the ability to sift through the rising flood of metagenomic data to discover new insights and form new hypotheses. Meren's techniques determine what types of bacteria are present in an environment -- the colon of a patient with irritable bowel syndrome, for example -- and how that diversity compares to healthy individuals, or before and after treatment.

"We're like criminal investigators in a sense," Meren said. "We're trying to collect evidence, then go back and ask better questions, and do this over and over again. The more we understand, the more specific our questions become, and maybe between all the individuals we have run into at some point or another, we start seeing the emergence of a model."

In one recent study with Dr. David Rubin, Meren and the members of his lab applied some of the methods they have been developing to fecal microbiota transplantation (FMT), assaying the donor



A. Murat Eren, PhD (Meren)

microbial populations in two recipients following the procedure. The study offered important clues to the types of bacteria that successfully transfer from the donor and colonize recipients, perhaps informing future investigations and treatments that are better targeted and more effective.

"FMT is an interesting procedure that may teach us a lot about the ecology of microbes in the human gut, but studying FMTs with the level of attention and detail provided by genome-resolved metagenomics may also result in benefits for people who need this procedure," Meren said. "Although it is too early to suggest anything, I believe traveling this route may allow us to identify more precise strategies to deliver organisms with high colonization potential and metabolic benefits to ameliorate some of the intestinal disorders more effectively."

FAST FACTS

- » *The entire microbiota in a person weighs only one to four and a half pounds.*
- » *100 trillion microorganisms live in the intestinal tract.*
- » *The colon has the highest recorded population densities for any microbial habitat.*
- » *The intestinal tract has no microbiome at birth.*

Source: *Nature*, http://www.nature.com/nrrheum/journal/v12/n7/box/nrrheum.2016.85_BX1.html

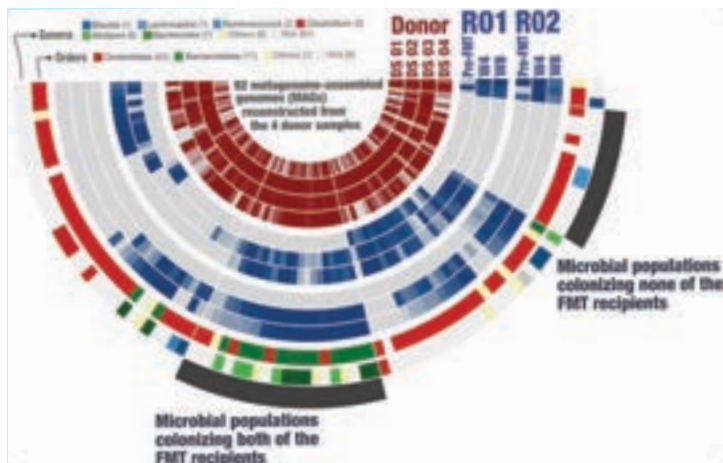
"WE BELIEVE THAT THE FIELD OF MICROBIAL ECOLOGY IS GOING TO HAVE A CONSIDERABLE IMPACT ON THE FUTURE . . . HUMAN HEALTH AS WELL AS ENVIRONMENTAL HEALTH."

A. MURAT EREN

-continued-

As a fellow of the Marine Biological Laboratory, Meren is also interested in exploring how a better understanding of microbial life in the oceans could help us learn more about the microbial life in the human gut. One example is an unlikely contributor to human health, the sponge. Sponges enrich certain microbial populations very precisely, and their survival depends on the maintenance of these tight, symbiotic relationships. Unlocking how they promote the growth of certain types of microbes while suppressing others in an ocean full of microbes could have valuable medical applications.

“If we can find ways to understand mechanistic of simple host-microbe interactions, we may be able to learn things that can be translated to interactions taking place in our guts,” Meren said. “Marine habitats have many answers for us. Maybe we could learn from the sponge how to be very specific about what we target, or what we promote in our own guts.”



A visualization of tracking the microbial population genomes in FMT experiments from Meren's work.

NEWS & ANNOUNCEMENTS

GI RESEARCH FOUNDATION ANNUAL BALL

SATURDAY, MAY 20

56th annual gala to raise money for digestive disease physicians and researchers at UChicago Medicine.

Tickets: giresearchfoundation.org

THE CELIAC CENTER'S ANNUAL SPRING FLOURS GLUTEN-FREE GALA

FRIDAY, APRIL 28

Tickets: cureceliacdisease.org

EDUCATIONAL SEMINAR FOR PATIENTS AND FAMILIES

WEDNESDAY, JULY 12

An evening seminar featuring IBD multidisciplinary team. *Free.*

ABOUT THE GASTRO-INTESTINAL RESEARCH FOUNDATION:

A non-profit dedicated to raising funds to support the physicians and scientists at The University of Chicago Medicine Digestive Diseases Center in their efforts to provide outstanding care, train future leaders and perform innovative clinical and laboratory research in order to treat, cure and prevent digestive diseases.

THE UNIVERSITY OF CHICAGO DIGESTIVE DISEASES CENTER

is a collaborative, multidisciplinary network of physicians, researchers, and allied health professionals who share a legacy of innovation and a common purpose: to improve the lives of patients who suffer from digestive diseases.

CONTACT INFORMATION

The Gastro-Intestinal Research Foundation

Executive Director: Sabrina Bier

70 East Lake Street, Suite 1015, Chicago, Illinois 60601

Email info@girf.org Phone 312.332.1350 Fax 312.332.4757



@ResearchGI (GIRF)



/GIResearchFoundation

The Digestive Diseases Center

Newsletter Editor: Anna Gomberg

5841 S. Maryland Avenue, MC 4076, Chicago, Illinois 60637

Email ibdcenter@uchicago.edu UCM Connect 1.888.824.0200

Physician Referrals 1.866.UC.GI.DOC



@IBDMD (David T. Rubin, MD)



/UChicagoIBDCenter

@UChicagoIBD (IBD Center)

NEWS IN BRIEF: UCM Fellows to Compete to Receive Research Awards from the GI Research Foundation

The annual Fellows Research Competition will be held on Wednesday, May 31st. The University of Chicago Medicine Fellows will present in progress research projects to the Board. Winners of the competition will receive grants in the amount of \$5,000 to continue their work.

NEWS IN BRIEF: New study shows celiac disease may be triggered by a virus BANA JABRI, MD, PhD, Senior Author

“This study clearly shows that a virus that is not clinically symptomatic can still do bad things to the immune system and set the stage for an autoimmune disorder, and for celiac disease in particular,” said study senior author Bana Jabri, MD, PhD. The article can be found in *Science*, April 7, 2017