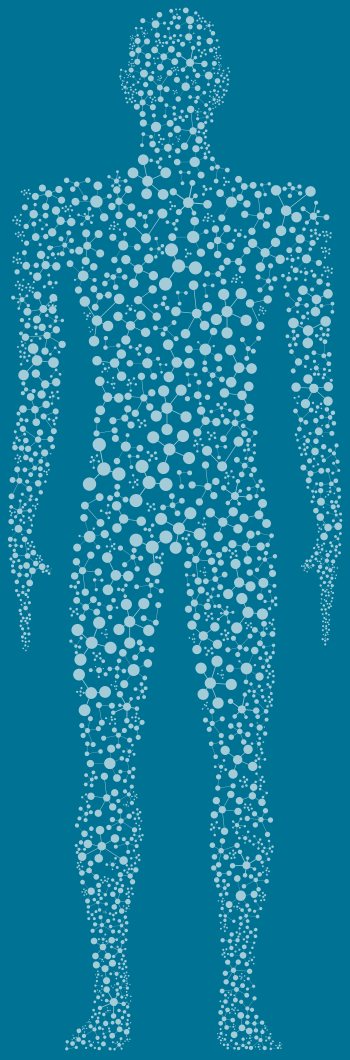
Duchossois Family Institute Impact Report

THE UNIVERSITY OF CHICAGO

March 2025

DFI CREDO

The DFI will optimize wellness and thriving longevity through groundbreaking science on the human immune system, genetics, the microbiome, and their shared systems.



By developing new knowledge about the optimal relationships between the human body and the microbiome, the DFI will identify, develop, and disseminate practices and treatment methods that break new ground in improving health around the world.

Written by Daniel Story | Designed by Alyssa Cieslak and Jaimie Lake

Essential steps to optimizing health and thriving longevity:

Demonstrate impact of the microbiome in causing disease

Engage clinicians who will commit time to study specific patient populations

Show how changes in the microbiome and metabolome are associated with disease states

Correct microbiome and metabolome defects associated with adverse outcomes

The Duchossois Family Institute:

Harnessing the Microbiome and Immunity for Human Health

The Duchossois Family Institute stands at the threshold of a new era of microbiome medicine.

After years of basic research, translational studies, infrastructure building, and regulatory oversight, the DFI's first clinical trial, Microbiota Augmentation to Reestablish Commensal Organisms (MARCO) is underway, with the first patients expected to be recruited this spring.

"Everybody is in their starting blocks and ready to head off on a sprint," says **DFI Director and Donald F. Steiner Professor Eric Pamer, MD**. Dr. Pamer and Matthew Odenwald, MD'17, PhD'15, are co-Primary Investigators on the trial.

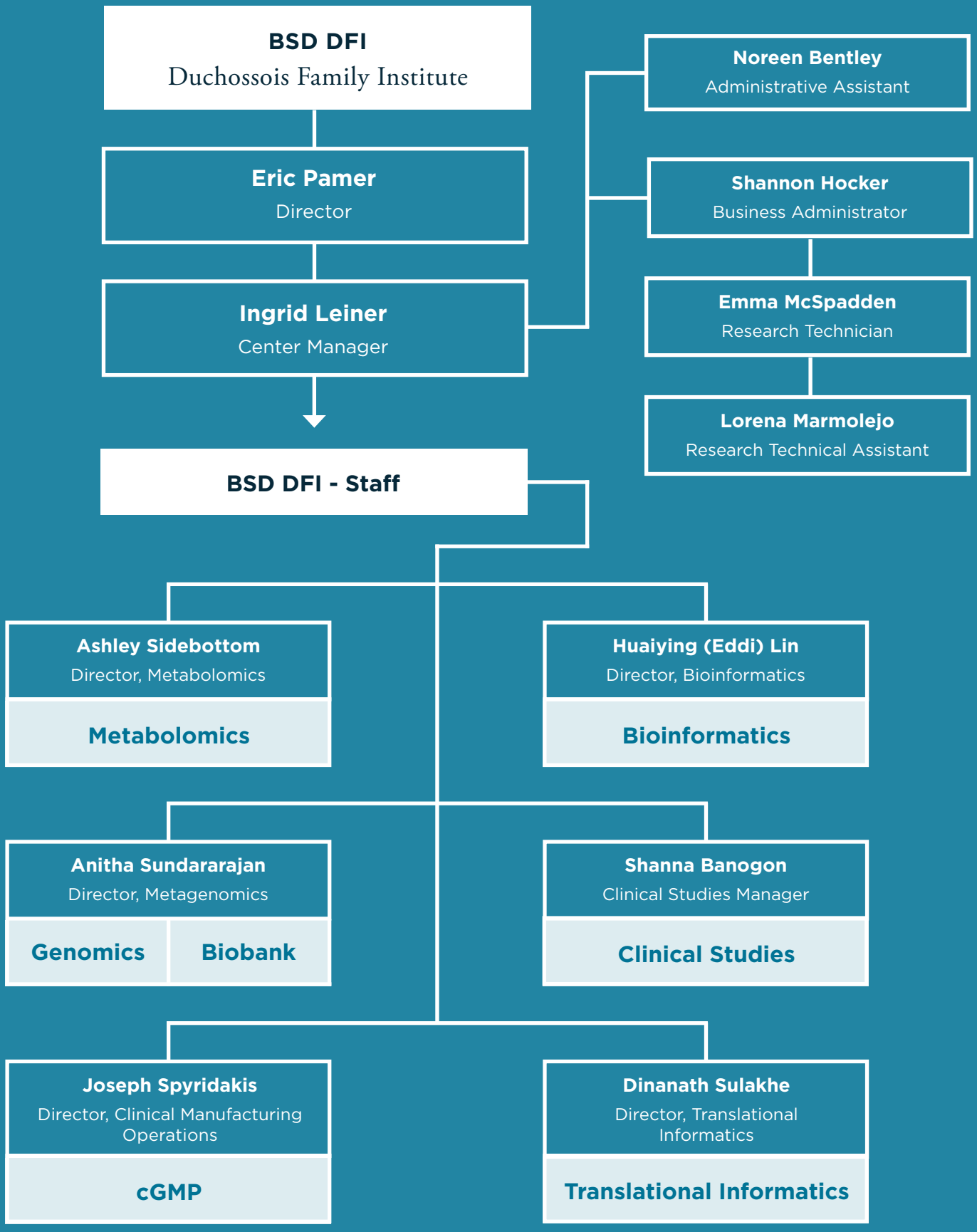
The trial showcases the DFI's unique abilities across the spectrum from research to production to clinical delivery. There was much to discover before this trial could happen—which microbes are necessary? what do they need to thrive? how can we tell which patients will benefit most?—and much more will be discovered through this new endeavor.

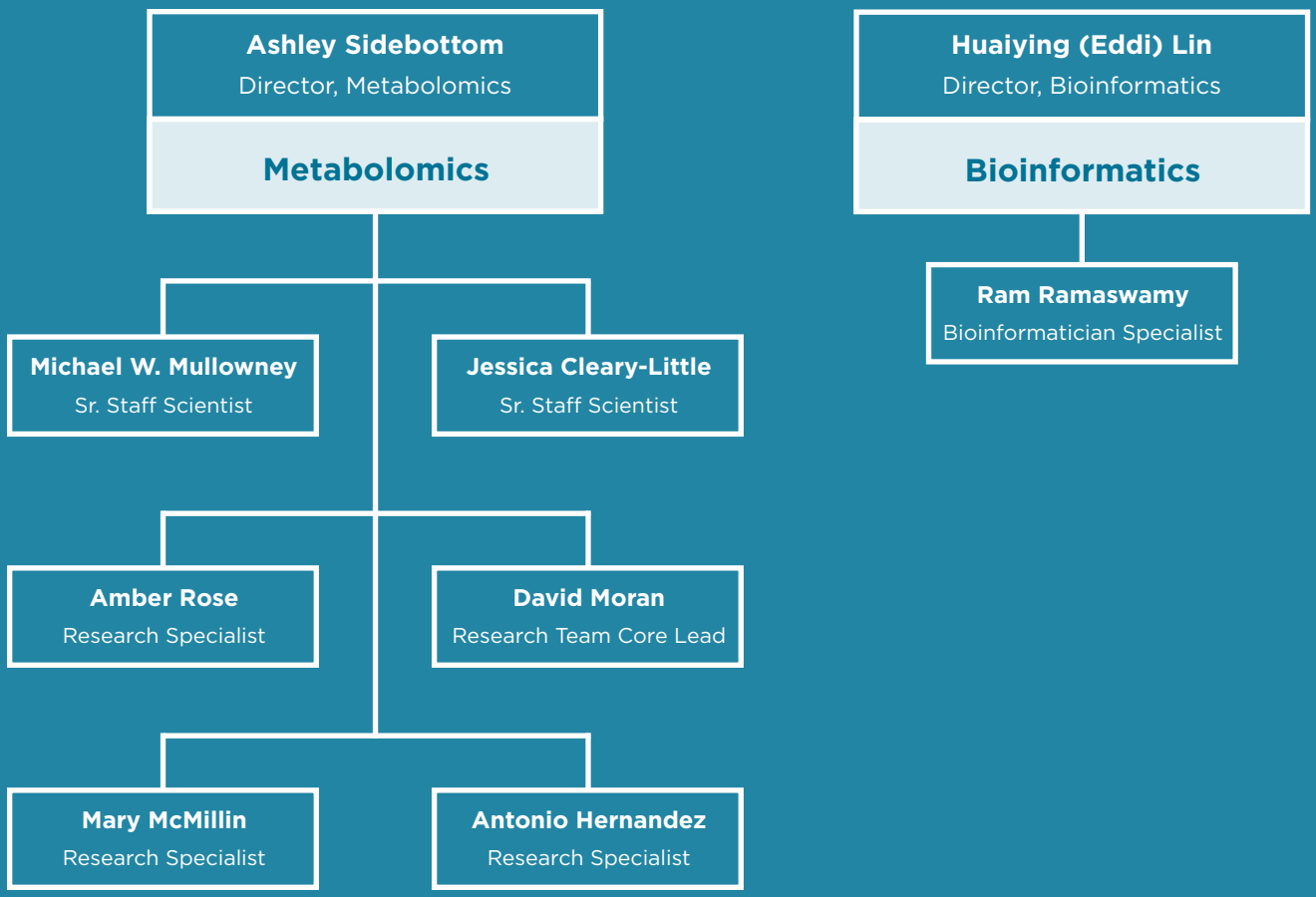
Crucially, the Good Manufacturing Practices (GMP) facility allowed the team to move forward with the trial directly—an advantage almost unheard-of in the field that philanthropic support made possible.

"At conferences people say 'Wow, that's an unbelievable amount of data and work and it's so well done,'" says Dr. Odenwald. "And then when you tell them you've got this facility that can manufacture specific bugs—they're blown away that this exists."

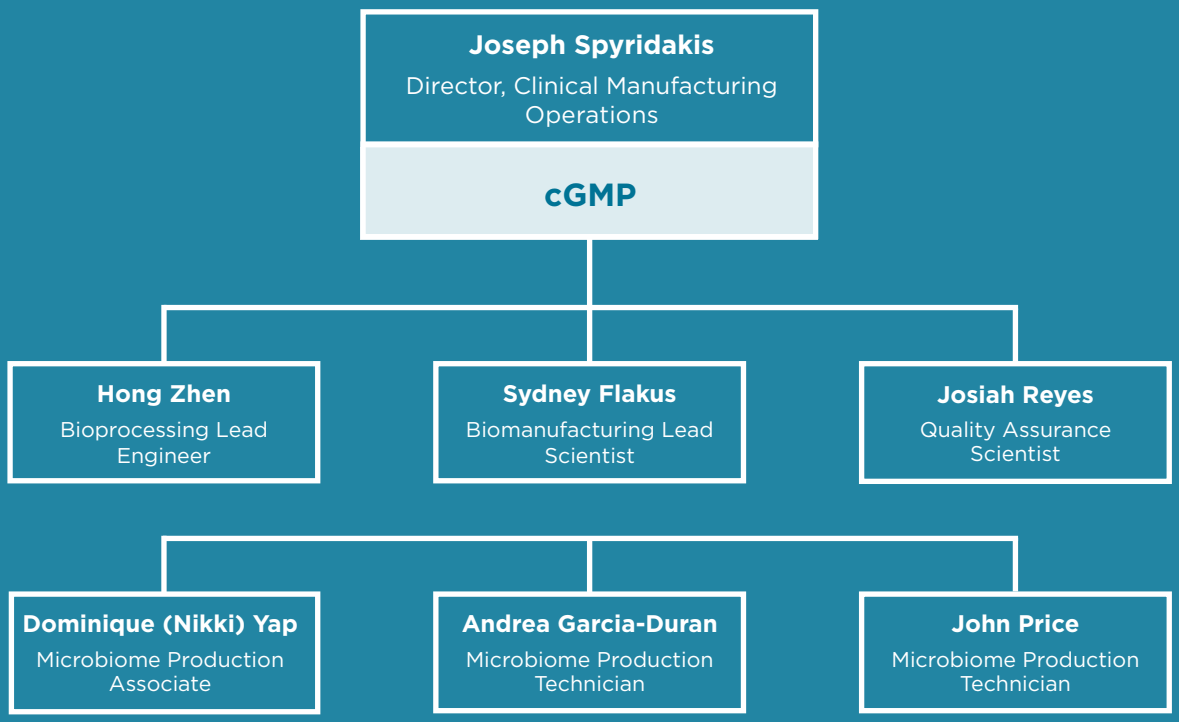
Their project is far more complex than standard small-molecule drug design, but genuinely revolutionary in its potential. Our understanding of the connections between the microbiome and health continues to expand, and with it grows the DFI's opportunities to make impact on human life.

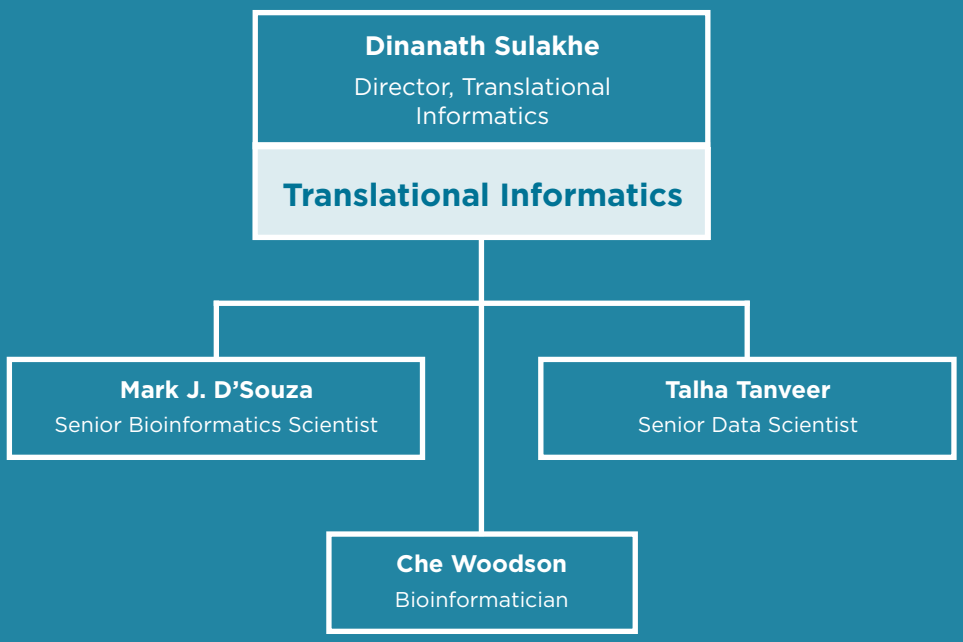
DFI Organization Chart

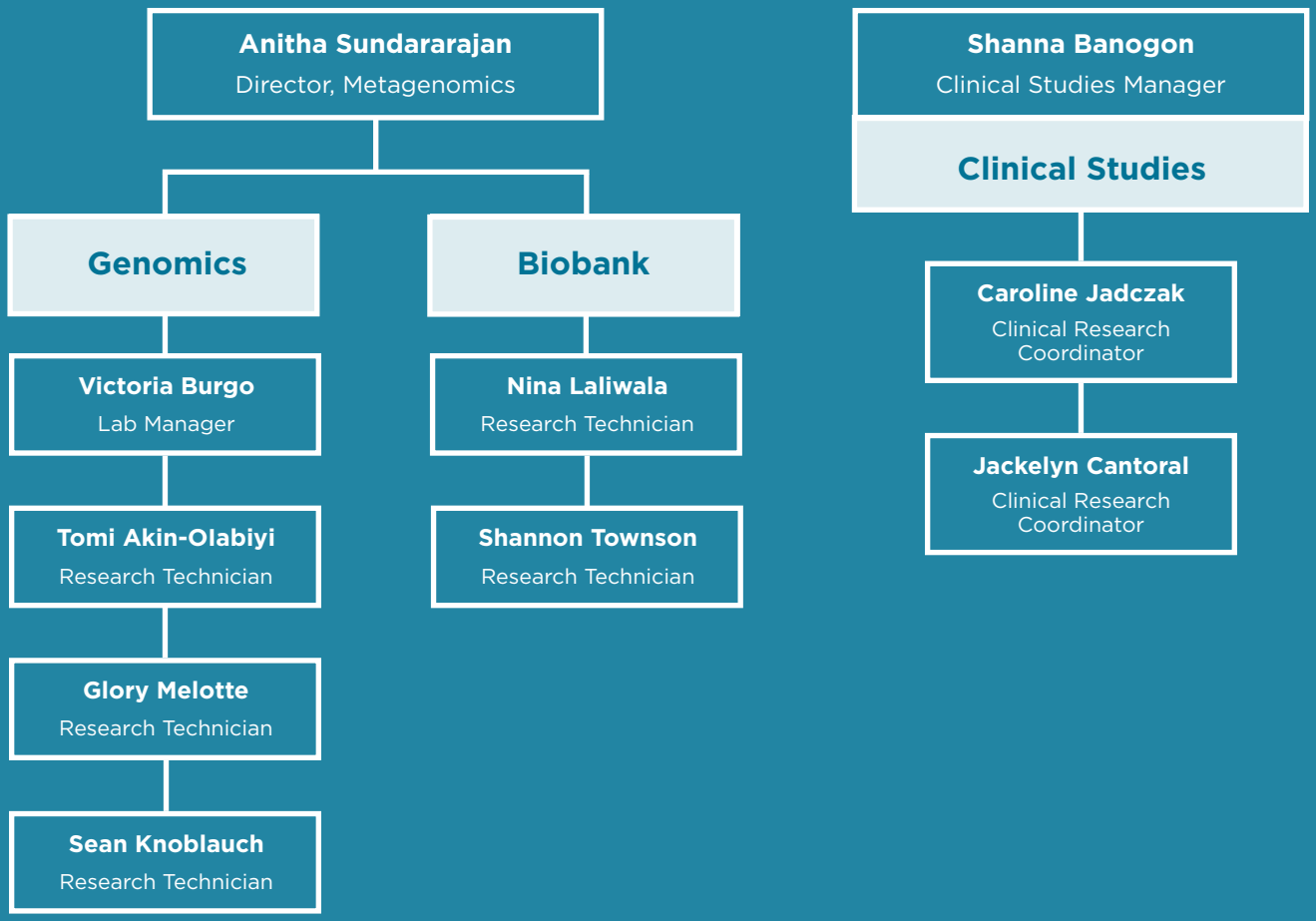



Ashley Sidebottom
Director, Metabolomics
Metabolomics
Michael W. Mullowney
Sr. Staff Scientist
Jessica Cleary-Little
Sr. Staff Scientist
Amber Rose
Research Specialist
David Moran
Research Team Core Lead
Mary McMillin
Research Specialist
Antonio Hernandez
Research Specialist
Huaiying (Eddi) Lin
Director, Bioinformatics
Bioinformatics
Ram Ramaswamy
Bioinformatician Specialist

DFI Organization Chart, continued






Anitha Sundararajan
Director, Metagenomics
Genomics
Victoria Burgo
Lab Manager
Tomi Akin-Olabiyi
Research Technician
Glory Melotte
Research Technician
Sean Knoblauch
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Biobank
Nina Laliwala
Research Technician
Shannon Townson
Research Technician
Shanna Banogon
Clinical Studies Manager
Clinical Studies
Caroline Jadczak
Clinical Research Coordinator
Jackelyn Cantoral
Clinical Research Coordinator

First in Humans

MARCO is a phase I trial designed to test a novel microbial treatment for patients with severe liver disease whose microbiomes are damaged by broad-spectrum antibiotics. These patients disproportionately experience drug-resistant infections—which pose a direct threat to their health while also putting other patients at risk.

"You get an infection, you get antibiotics, those antibiotics wipe out your good bacteria and then a drug-resistant bacteria can show up and replace them," says DFI infectious diseases expert Christopher Lehmann, MD, who is helping lead the trial. "Then you get another antibiotic to kill that, and then even more drug-resistant bacteria show up to replace it. This only goes in one direction."

The DFI team aims to improve outcomes for these patients with groups—called "consortia"—of microbes that are, effectively, starter kits to grow a new, healthy microbiome. Each consortium comprises eight microbes, selected from a set of 17 DFI strains that were extensively tested before being included in the New Investigational Drug application to the Food and Drug Administration (FDA). Together, they should take hold in patients' digestive tracts, cooperate with each other, oppose invasion by infectious bacteria, and produce metabolites that promote healthy recovery.

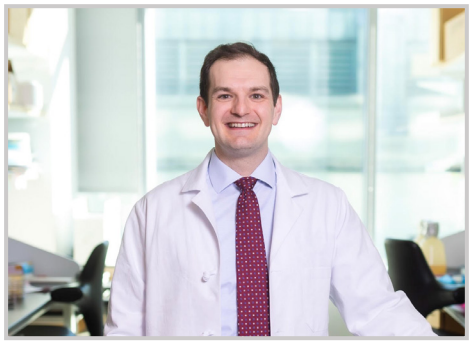
"We're trying to reestablish populations of bacteria and normal levels of these metabolites—the products they produce that we know are health-promoting," says Dr. Pamer.

One key insight driving the trial is that bacteria in the microbiome are on our side. "They have developed mechanisms to keep infectious pathogens in check, because if those pathogens make us sick, well, we're the host for those good bacteria so they get sick, too," says Dr. Lehmann. "We're in it together."

This trial is a fully UChicago endeavor, with contributions from the entire DFI. From basic biological research and observational studies, to therapeutic design and regulatory approval, to production and now clinical delivery: all of it was done on campus, and most of it with infrastructure in the DFI.

MARCO includes several other innovations. Patients will be screened using a diagnostic tool designed at the DFI by Ashley Sidebottom, PhD, metabolomics platform director, and Angelica Moran, MD, PhD, assistant professor of pathology. Their novel test measures metabolites—the molecules bacteria produce—to give doctors a quick overall picture of microbiome health. "I haven't seen any clinical labs that are running microbiome tests," says Dr. Moran. "This would be the first as far as I know."

The trial is also creatively structured to address the challenge of determining which microbes to include in consortia. There are 24,310 possible eight-microbe combinations of the FDA-approved set of 17. Thus, the first group of patients will receive one consortium and then recruitment will be paused to measure their responses. Based on the results, the next 16 patients will either receive the initial consortium or be randomly assigned to one of two others.



"We've acknowledged the inherent difficulty in this by designing multiple consortia and having multiple backup plans," says **Dr. Odenwald**.

Like the first Model T off of Ford's production line, MARCO is exciting both for what it is and for what it indicates about the future. The DFI's infrastructure investments drastically reduce the marginal costs of subsequent trials: soon, in-human tests of novel microbiome treatments will be commonplace.

Since the pathology that MARCO is designed to address appears in patients with many diseases, there will be obvious avenues to apply its successes across a range of conditions. The need for microbiome diagnostics will grow hand-in-hand. "This will be a foundation on which commercial ventures can be developed," says Dr. Pamer.

> **"Everyone is waiting with bated breath to see how this trial goes, not just here, but around the country."**

For the moment, though, all eyes are on MARCO. "Everyone is waiting with bated breath to see how this trial goes," says Dr. Lehman, "not just here, but around the country."

"This trial will give a lot of knowledge to the field," says Dr. Odenwald. "We'll have the lead, but others will learn a lot from this too, to push the field forward."

The Future of Microbiome Medicine

To lead a new field of medicine, the DFI is making a new kind of doctor.

The DFI created once-in-a-lifetime opportunities for Drs. Odenwald, Lehmann, and Moran, at the outset of their careers, to take central roles in a clinical trial that could reshape their fields. Dr. Lehmann is the most senior faculty member of the three: his appointment began in 2023.

They are the answer to a catch-22—what doctor is qualified to apply a treatment that has never existed before?—and an encapsulation of what makes UChicago special. Their success demonstrates the value of multidisciplinary teamwork, the complementary nature of research and education, and the power of philanthropy to change lives.

All three were DFI Fellows before they joined the faculty. Now, each holds a joint appointment between the DFI and their respective units, formalizing their dual nature.

Angelica Moran, MD, PhD

PATHOLOGY

"One of the incredible things is that we're all in different specialties, but we're all interested in the microbiome. We're all working toward the same goal of better understanding the microbiome and using those discoveries to help develop new treatments."

Team Science

The MARCO trial calls upon their separate disciplines and their combined perspectives. Dr. Odenwald brings direct experience as a gastroenterologist treating patients with liver disease. Dr. Lehmann brings training in infectious diseases to understand both how to cultivate good bacteria and defeat dangerous ones. Dr. Moran brings pathology expertise to design and apply the diagnostic test. "We each have our own unique aspects that we're bringing to the table," says Dr. Odenwald.

They are, of course, more than the sum of their parts. In true UChicago fashion, they support and challenge each other, offering their unique insights and benefitting from what the other two see. "When we're all looking at the same data, we have our own hypotheses about what's happening," says Dr. Moran.

"That spontaneity of research ideas doesn't happen unless you're rubbing shoulders and getting lunch with these people," says Dr. Lehmann.

Chris Lehmann, MD

INFECTIOUS DISEASES

"None of this is possible without our patients: the people here in Chicago and on the South Side who put their lives in our hands and ask for help, and in return give us an opportunity to learn from them. Patients come here expecting cutting-edge medicine, but also knowing that by participating in clinical studies they can make the world a better place."

Tomorrow's Leaders

The MARCO trial and related research has pushed them to grow in new directions. Drs. Moran and Odenwald learned to code together in order to fully engage with the computational nature of microbiome research. "With microbiome sequencing and metabolomics, it's a huge data set," says Dr. Moran. "You can't just browse through it and see what's popping out."

Similarly, they've gained experience navigating complex regulatory requirements. Where many clinical researchers engage with a new drug only at the trial delivery phase—after regulatory approval has been secured and the trial design approved—Drs. Odenwald, Lehmann, and Moran were directly involved at every step along the way.

They will also be among the first anywhere to care for patients receiving microbiome-based treatments. They will learn what to expect, how to handle complications or adverse reactions, and how patients experience these novel therapies.

MATT ODENWALD, MD'17, PHD'15

GASTROENTEROLOGY

"It's been a great experience. It wouldn't be possible without the really generous gift to the DFI, as well as the leadership of Dr. Pamer. He's assembled an amazing team, from the basic scientists to the core facilities to the clinicians to the translational scientists. He keeps the end goal in mind and knows how to assemble teams around that goal."

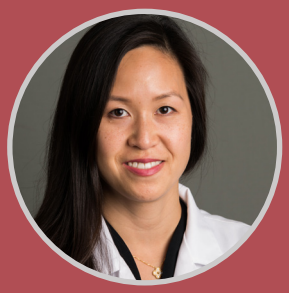
The sheer ambition of the DFI's research program provides a big pond in which they can all grow into big fish. "There's ample opportunity for each of us to do this project, learn from it, build our own careers and our own paths from it, while still being a really cohesive team," says Dr. Odenwald.

The opportunities the DFI has provided for them have helped them grow into unusually skilled and experienced physician-scientists relative to their peers. It is expected that, eventually, some of them will take their rare abilities to other institutions to lead microbiome-centered initiatives. For the time being, the unique environment at the DFI that fosters their growth is also the place where they can make the greatest impact. "I could have found a faculty position somewhere else," says Dr. Moran, "but I don't think I could do anything that I'm doing now if I wasn't part of the DFI."

Cross-campus Impact

The DFI has made an impact across the entire University. Physician-scientists in a variety of specialties are investigating how to use the microbiome to improve outcomes for their patients. Undergraduates are learning about this new field directly from the pioneers who are shaping it. Top-tier researchers are coming here to do work they cannot do elsewhere.

The DFI is showing what an institute can do—not only through its own research agenda, but also by contributing to the entire ecosystem in which it operates.



Improving Heart Transplant Outcomes

Assistant professor **Ann Nguyen, MD**, who specializes in advanced heart failure, is investigating the role of the microbiome in heart transplant outcomes.

Dr. Nguyen explains that with heart transplants, there is currently no personalized medicine. She says, "Everyone is on the same exact medications, no matter if they're a man or a woman, they're big or they're small, no matter what clinical characteristics they have."

The pioneering microbiome research happening at the DFI could change that. Dr. Nguyen and Maria-Luisa Alegre, MD, PhD, professor of medicine, have enrolled nearly 200 patients in a clinical study designed to investigate correlations between the gut microbiome and outcomes in heart transplant patients. Preliminary findings suggest that patients with low microbiome diversity before transplantation have a higher risk of post-transplant infections—which match the findings in liver disease that set the stage for the MARCO trial, suggesting that microbiome reconstitution treatments could help heart transplant patients. "If we establish this link, there's opportunity to potentially alter the gut microbiome to increase resistance to infection," Dr. Nguyen says.

This is research that nobody else is doing and the scientific community has taken notice. The team has been invited to present their findings at poster sessions for the International Society of Heart and Lung Transplantation and the American Transplant Congress, among others. Colleagues at other institutions have reached out for insight and guidance. Dr. Nguyen says, "People are interested in our work. They're reaching out because the resources and capability that we have here with the DFI are unique."

Phenotyping in the ICU

Bhakti Patel, MD, an assistant professor of medicine specializing in pulmonology and critical care, conducts clinical trials aimed at preventing complications in the Intensive Care Unit (ICU).

Many of the common interventions used in the ICU—like sedation, antibiotics, ventilators, or sustained immobilization—help patients recover from their initial injury or illness, but can have unintended consequences and cause lasting injuries. "We've learned how to keep people alive, but they're just surviving, not thriving," she says.

Dr. Patel sees microbiome reconstitution as a tool to help people recover. Since 2019, she and Matthew Stutz, MD, (then a pulmonary critical care fellow; now an assistant professor at Rush University Medical Center) have been studying the gut microbiomes of patients admitted to the ICU to better understand why some patients recover and do well after discharge while others continue to suffer from complications.

Physicians in the ICU care for patients with diverse ailments. "We're a part of the hospital where no one has a specific disease," says Dr. Patel. In collaboration with Dr. Pamer and the DFI staff, Drs. Patel and Stutz are addressing this complexity by "phenotyping" ICU patients, regardless of disease, according to their microbiome compositions and metabolite profiles.

> **"I can, for the first time, see a way that we could improve someone's biology so that they could recover better and be resilient to the next infection."**

In 2021, their research showed that patients deficient in certain metabolites had worse experiences and outcomes from COVID-19 infections—and that metabolite profiles were better predictors of patient survival and ventilator need than the field's standard predictive tools. These findings suggest that microbiome-based treatments could make a dramatic impact in the ICU.

Dr. Patel credits Dr. Pamer for helping the team move beyond traditional ICU research—which generally focuses on single inflammatory signals—to see the possibilities of improving patient biology overall. "I can, for the first time, see a way that we could improve someone's biology so that they could recover better and be resilient to the next infection," says Dr. Patel.

Undergraduate & Graduate Education

Under the leadership of Dr. Pamer and Shabaana Khader, PhD, the Bernard and Betty Roizman Professor and chair of the microbiology department, the microbiology faculty developed an undergraduate course on the microbiome and human health, which has now been expanded into a graduate-level course.

Two DFI faculty with appointments in Microbiology, **Mark Mimee, PhD**, and **Sam Light, PhD**, designed the course to cover essential topics such as bacterial genetics and bacterial physiology, and to include reading and discussing scientific papers. Feedback has been positive: students are excited to join a course in a new and evolving field. Many have expressed interest in further studies or careers in science and medicine.

Recruitment Efforts

The DFI's robust infrastructure and collaborative environment have been pivotal in recruiting top-tier scientists to UChicago, significantly enhancing the university's microbiome research capabilities and fostering groundbreaking advancements in the field.

Scott Oakes, MD, a professor of pathology and vice dean for clinical science research, emphasizes the DFI's crucial role in recruitment efforts: "Everybody in the microbiome field knows about the DFI," he says.

Dr. Oakes offers the recruitment of Arjun Raman, SB'08, MD, PhD, an assistant professor of pathology in the DFI, as just one example of many: "When I had the opportunity to recruit Arjun Raman, who is an incredible scientist and already had quite a name in the microbiome space, Eric Pamer told me, 'The DFI will help you recruit him. We'll give him space in the DFI so he can be next to other scientists working on the gut microbiome. He'll have all the core facilities available to him. He'll have the microbiome banks. He'll have collaborators.'" Dr. Raman joined the UChicago faculty in 2021. (*Continue reading for more on Dr. Raman and his work.*)

Dr. Khader tells a similar story about the value of the DFI—in her own recruitment from Washington University in St. Louis. She explains that Dr. Pamer's leadership inspired and excited her: "As a new leader to UChicago, I can see the path to what I want to do here in what Eric has already accomplished."

Currently, recruitment is a top priority for the BSD. Dr. Khader says, "As soon as I arrived, the microbiology department went right into faculty recruitment. And both years, we got our top candidates." One of those top candidates, Elias Gerrick, PhD, came to UChicago from Stanford specifically to investigate protists—a large and genetically distinct group of organisms, such as amoebae and algae—in the gut microbiome: research that is happening almost nowhere else in the world. "Candidates get to see the partnership and interactions across departments," she says. "They see that there are no departmental boundaries, that the DFI really is available to them."

Networked Benefits

Intriguingly, the relationship between the DFI and the larger University community mirrors that of the microbiome and the body: once one starts looking, one sees effects everywhere.

The DFI's unique resources and expertise support advanced microbiome research that few other places can match. These resources promote cross-campus collaboration and innovation, create distinctive educational opportunities, and open new avenues to improve patient care. "The DFI was a huge boon for the University," says Dr. Patel. "I don't think any of us realized what it was really going to be."

The Fundamentals

Arjun Raman, SB'08, MD, PhD, has developed a statistical method for creating new microbial consortia—like those in the MARCO trial—to address any medical condition that the microbiome interacts with. In 2024, his lab received a grant from the Gates Foundation to apply this model to pregnancy complications in the context of malnourishment or other stressors in low-resource communities.

His approach works: "What we found, almost inadvertently, is that we've created the first preclinical mouse model of stress-induced infertility that is reversible," he says. "We can reverse the infertility if we give the right bugs to the gut." His team is now going both backward and forward: basic research into the biological and molecular mechanisms at play in this result, alongside development of an actual treatment based on his model. The foundation asked him to present his findings at the Global Grand Challenges Annual Meeting this summer.

> **"We really have a monopoly on being able to create consortia for different use cases."**

"They're very excited about the DFI in terms of its capacity to synthesize therapeutic consortia," he says. "We really have a monopoly on being able to create consortia for different use cases."

And that's just one thing that his platform does. "The fundamental problem is not microbiome-related at all," he says.

His other major projects this year—developing a new kind of artificial intelligence architecture and designing better methods for personalizing cancer treatments—point toward a much grander ambition: understanding the basic principles of biological organization.

"Birds come together and do something together," says Dr. Raman. "Each one of those birds has its own brain, but you would not know that looking at the way they flock. They act collectively."

Emergent systems, like flocks of birds, appear at every scale in biology. Cells performing their own functions end up arranging into tissues, tissues into organ systems, organ systems into lifeforms, lifeforms into communities. How? "This problem has not been solved from a fundamental perspective," he says. "There's no physics that can tell you how to build an emergent system."

His search for those basic principles led him to his machine-learning platform that can, for example, design microbial communities that kill *Klebsiella pneumoniae*. "That same framework could be used across different scales of biology, and that's what we've really started to test," he says.

One example: the tumor microenvironment (TME). Tumors maintain a complex ecosystem beyond their characteristic clusters of mutated cells, often using chemical signals to secure the cooperation of nearby healthy cells. Research at UChicago and elsewhere has shown that TME characteristics affect how a tumor responds to treatment, especially immunotherapies.

Dr. Raman's team thought that the TME, made up of individual cells, seemed a lot like a flock of birds. They gathered a large set of correlated spatial and gene expression data—where in the TME a given cell was and which genes it was making use of—and found reliable patterns in TME architecture, despite the significant genetic variance from tumor to tumor.

These patterns can be used diagnostically. The team collaborated with oncologist Marina Garassino, MD, to test their method on her bank of lung cancer biopsies. Given spatial and gene expression data, it could accurately predict which of the patients responded to cancer immunotherapies. Dr. Raman is now working to commercialize this technology for use in computer-aided diagnostics that pair patients with treatments most likely to defeat their cancer.

The TME research was one application of a new model of artificial intelligence (AI), designed in Dr. Raman's lab according to the same principles of emergence he studies. Their method is fully interpretable—that is, it will readily show users how it came to the conclusions it did—unlike now-famous large language models, which provide outputs but will not explain how they came to them. Interpretability is valuable for almost any AI application but near-essential in research, where AI outputs would inform, for example, which lines of research a lab might pursue. Dr. Raman has formed a company to commercialize this AI platform.

"No single lab has any business being able to think they can attack these seemingly separate problems," says Dr. Raman, "but there's a core problem at the center of it all, and that core problem is emergence."

Natural Selection

Like Darwin cataloguing Galapagos finches, **Laurie Comstock, PhD**, looks into still-mysterious ecosystems and studies the creatures that live there. Instead of birds, though, she catalogues *Bacteroidales*, an order of bacteria abundant in the human microbiome—who engage in genetic maneuvers no finch has ever done.

For a recent publication in *Cell Host and Microbe*, her team examined microbes in the DFI's Symbiotic Bacterial Strain Bank (SBSB) that had been collected from more than 400 healthy donors. They asked the kinds of questions of *Bacteroidales* one might expect from a 19th century naturalist—what do they eat? How are their communities organized? How do they defend themselves?—but with the 21st century methods available to them from the DFI's core facilities.

In Dr. Comstock's lab, basic research like this has a pathway to clinical application: just down the hall. "This will all contribute to making more resilient biotherapeutics," she says. Understanding what these bacteria need to thrive, how they interact with their neighbors, and how they are likely to evolve is essential for designing therapeutic consortia like those in the MARCO trial.

> **"This will all contribute to making more resilient biotherapeutics."**

Over the past year, her team led two significant studies that directly informed which bacteria are being used in MARCO. The studies focused on mobile genetic elements (MGEs), which are modular parcels of DNA that bacteria pass between them to alter their structures and functions. "You get this piece of DNA, you've got 100 genes or more," says Dr. Comstock. "These elements could really change an important characteristic in the recipient cell."

The process (called "horizontal gene transfer") is reminiscent of mid-century science-fiction films, in which a character infused with fly DNA suddenly grows wings and compound eyes. Yet for bacteria this is a perfectly normal event, which, as these studies showed, can be crucial for building and maintaining healthy communities.

The first study—led by Leonor García-Bayona, PhD, who was a postdoctoral scholar in Dr. Comstock's lab and is now an assistant professor at Stanford—concerns a large MGE very commonly shared among *Bacteroidales* bacteria in the human gut. Its genetic package encodes for the production of surface molecules that, together with the surface molecules produced by other bacteria with the same MGE, form a protective biofilm around the whole community. The biofilm helps participating bacteria survive in adverse conditions, and even resist some antibiotic medications.

This research showed the team that the MARCO consortia needed *Bacteroidales* that have this MGE, so that the community is more likely to take hold and survive long-term. "This is going to allow these strains to be more resilient," she says.

The second study, published in *Science*, concerns bacterial weapons. Just like macro-scale creatures, bacteria will sometimes act violently to gain access to resources or keep others off their turf. Bacteroidales, in particular, make tiny, pointed, toxin-filled tubes—basically poison-tipped spears—called type 6 secretion systems (T6SS). *Bacteroides fragilis*, a specific *Bacteroidales* species, has a ferocious type of T6SS, which it will readily use to kill other cells that get too close, including other Bacteroidales.

The study showed that an MGE, encompassing around 100 genes, contains both the plans for a new T6SS and a transcriptional repressor for the original: it gives the bacterium a new spear and stops it from using the old one. The key difference is that the new T6SS encoded on the MGE will not kill other *Bacteroidales* bacteria. So this MGE takes a bacterium with a potentially antagonistic relationship to the community and makes it more cooperative: like the biofilm described above, it improves the entire group's chances of survival.

MGEs add a layer of complexity to the already complex project of building clinical microbiome consortia. It's not enough to have the right strains in the right combination: they also have to have the right MGEs. Research like this showcases UChicago's commitment to relentless questioning and robust science. By pushing forward the frontier of knowledge, Dr. Comstock continues to discover ways to make microbiome treatments more effective for more patients.

Dissemination & Commercialization

The DFI, in partnership with the Polsky Center for Entrepreneurship and Innovation, brings their discoveries to the market and to patients as quickly as possible.

Archer Daniels Midland (ADM), a multinational food processing and commodities trading company, is negotiating a material transfer agreement to receive 25 strains from the DFI's Symbiotic Bacterial Strain Bank. The company intends to further study these strains for potential use in direct-to-consumer products; should they do so, a second licensing agreement would be negotiated that would bring revenue to the DFI.

Eugene Chang, MD, and **John Alverdy, MD**, brought together two DFI-related startups under a shared company, **32 Biosciences** (pronounced "three squared"). The company was formalized in April as the parent to two wholly owned subsidiaries, Covira and Gateway Biome, established in 2018 and 2022, respectively. Both have participated in various programming opportunities at the Polsky Center for Entrepreneurship and Innovation over the years.

The team has leveraged the DFI core facilities to produce one of its lead assets, GB-0001, an advanced diagnostic management tool that aims to provide a standardized measure of functional gut microbiome health.

"None of this would have been possible without the DFI," says Dr. Chang. "They have the capacity, capabilities, and expertise." If approved, GB-0001 would help health care professionals monitor and ultimately restore gut health with medication and nutrition.

New technologies in 2024

Items in the following list are arranged by date of submission. The lead inventor is indicated in **bold**.

Anti-PD1/anti-PDL immune checkpoint blockade therapy in metastatic non-small cell lung cancer

June 10, 2024 | Provisional Patent

Inventors: Arjun Raman, Vivek Behera

A computational model that analyzes spatial transcriptomic data to determine which patients will respond to non-small cell lung cancer therapies.

A novel statistical framework for spatial transcriptomic analysis

April 1, 2024 | A novel statistical framework for spatial transcriptomic analysis

Inventors: Arjun Raman, Vivek Behera, Benjamin Doran, Hannah Giba

A computational model that analyzes spatial transcriptomic data to find new therapeutic targets, as well as stratify patients for clinical trials in oncology.

Duchossois Family Institute Fellowship

The DFI Fellowship offers a training experience unlike any other. Its results could not be more clear: former DFI Fellows Drs. Odenwald, Lehmann, and Moran are, at the outset of their careers, transforming the shape of science and medicine.

Sambhawa Priya, PhD

This year, the DFI Fellowship was awarded to **Sambhawa Priya, PhD**, who uses machine learning to study host-microbiome interactions. Dr. Priya holds a PhD in bioinformatics and computational biology from the University of Minnesota, and came to UChicago in 2024 from a postdoctoral position at the Broad Institute of MIT and Harvard. She works in the laboratory of Ran Blekhman, PhD'10, in the Section of Genetic Medicine, and collaborates with Dr. Pamer's laboratory.

An expert in machine learning methods, Dr. Priya is developing methods to integrate electronic health record (EHR) data with microbiome data. Such computational tools will uncover yet-unknown interactions between the microbiome and various diseases, and identify potential biomarkers for predicting patient outcomes—which could inform doctors in real time that a patient would benefit from a microbiome-altering treatment.

As the newest member of the remarkable cohort of DFI Fellows, Dr. Priya will continue to hone her skills and push forward the frontier of microbiome research.

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