



CMiST

Inspire Discovery

Projects & Programs

O B E S I T Y

One out of every six children and adolescents in the US are obese.

Being obese will greatly increase a child's susceptibility for comorbidities such as cardiovascular disease and type 2 diabetes.

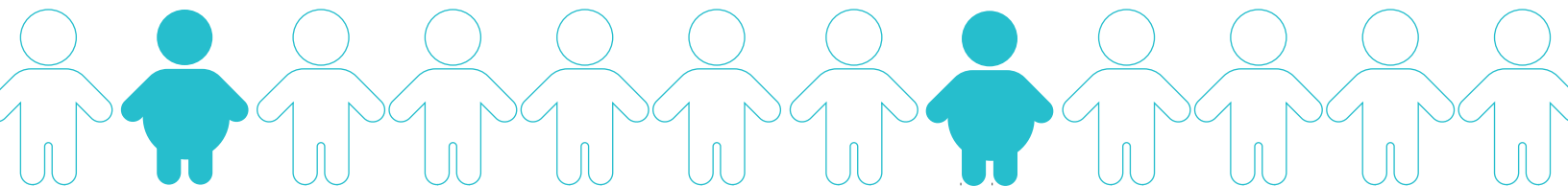


Probiotics and disease-associated microbiota in adolescents with prediabetes.

Collaborator: Christian Roth, MD, Seattle Children's Hospital

In addition to traditional risk factors, recent evidence demonstrates that perturbations in an individual's gut bacteria, or microbiota, contribute to the pathophysiology of obesity. Therefore, management and prevention of obesity and Type 2 diabetes should include therapies targeted at restoring a "healthy" microbiota. Despite their reported health benefits, probiotics have been unsuccessful in treating obesity or diabetes. These studies often focus on the host response, ignoring genetic and compositional regulation of the disease-associated microbiota by the probiotics. We propose to test probiotics previously shown to have anti-diabetic effects on the function of human and microbial cells.

This study will provide mechanistic insight into probiotic function, will test the novel hypothesis that probiotic bacteria differentially modulate disease-associated commensals, will identify probiotic strains or their products for use as bio-therapeutics and will provide critical data for future grant applications and private funding opportunities.



HIV

A young child with dark skin and short hair is looking over a blue ledge. The child's hands are resting on the ledge. The background is slightly blurred, showing what appears to be an indoor setting with a window and some papers on a wall.

Can antibiotics or chronic infection make diarrhea-causing bacteria more deadly?

HIV-exposed microbiome impacts the severity of co-infection.

Collaborator: Patricia Pavlinac, PhD, UW Global WACH

This project seeks to address an important gap in our understanding of enteric infections that occur in an intestinal environment with a low bacterial diversity. It proposes a conceptually innovative hypothesis that the chronic viral infection itself does not drive Enteropathogenic *Escherichia coli* (EPEC) virulence, but rather the reduced gut microbial diversity caused by the infection. Importantly, this project will evaluate whether restoration of diversity via fecal microbiota transplants can be used as a treatment strategy.

To answer these questions an integrated, interdisciplinary approach in mice, humans and bacteria using genomics, microbiology, and immunology will be used. If successful, these findings may re-define how we evaluate and treat enteric disease not just in HIV but any disease associated with a reduced microbial diversity, and may provide a biological framework to develop microbiota-based therapies.

Each year, approximately 1.5 million people are diagnosed with colorectal cancer. ^(1,2)

Using bacterial genes and function as a biomarker for precancerous polyps.

Collaborator: Cynthia Ko, MD, UW Medicine, Division Gastroenterology

Advances in microbiome research are altering the way we view chronic inflammatory diseases. In colorectal cancer (CRC), specific gut microbes have been identified that may contribute to cancer progression and may provide novel diagnostic tools and therapeutic targets. Thus, monitoring microbes, their genes, or protein/metabolite signatures offers new ways for measuring disease status or predicting response to treatments.

Despite the thinking that microbiome signatures are more discriminant than human genetic markers in their predictive value, few microbiome markers have actually been identified. While many diseases are associated with reduced diversity or loss of microbial gene richness, these commonly detected microbial shifts in composition do not seem to be disease-specific. This means that for diseases in which we want to use the microbiome as a diagnostic, we must identify relevant features that can be easily measured and have biological or clinical disease relevance.

Our group has preliminary evidence that human *B. fragilis* isolates from sessile serrated adenomas (SSA) and tubular adenomas (TA) have different protein and genetic signatures. This project will further investigate these differences in order to identify a panel of markers (genes, cytokines, peptide fragments, microbial virulence and metabolic pathways) that could be used to diagnose CRC and develop novel microbiome-based therapies to treat or prevent CRC.

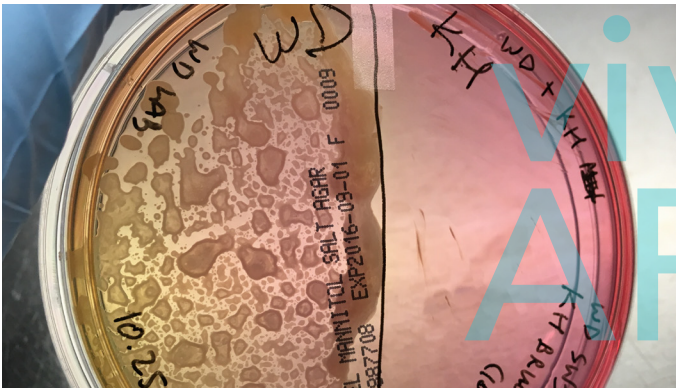
Colorectal cancer is the third most common cancer and the fourth most common cause of cancer death worldwide. ¹



One Million Dots
silkscreen painting
Michael Hegedus

IBD

The microbiome of persons with IBD is different than a “healthy” individual. But, what does this actually look like in terms of bacteria and the immune system?



Left, Will and Right, Kathy

Upon seeing her side of the plate, Kathy remarked solemnly that hers was “the land of lost microbes.”

Visualizing the Microbiome in Inflammatory Bowel Disease (IBD).

Collaborator: Kathy High, Professor of Video & New Media
Department of Arts, Rensselaer Polytechnic Institute, NY

In addition to using bio-art as a means to communicate with the public, through this initiative, Vivo Art, it is our aim to use art to advance science. In fact, our cornerstone pipeline, “Isolation & Cultivation / Batch ID,” was developed and refined through collaboration with one of our artists.

“Scientists sometimes aren’t so good at making science accessible to other people, but to be able to convey what you do and why it matters is vital. Kathy’s images can tell a story better than any dense academic paper.”

Will DePaolo for the UW Medicine, The Huddle

Art to Advance Science

MICROBIOME

Come for the coffee. Stay for the conversation.

Every other Thursday from 0900-1000
Health Sciences Building, J wing, Room 156

CLUB

Microbiome Club, a work-in-progress meeting, is a forum for University of Washington and affiliated students, postdocs, staff and principle investigators working with, or interested in the microbiome, to come together and share their work, initiate collaborations, promote microbiome research at UW and affiliated and neighboring institutions. Our goal is to draw faculty, staff and students from as many disciplines as possible to assure that the presenters get the best and most well rounded comments on their work.

Everyone who attends is expected to participate both by giving meaningful feedback, presenting new and unpublished data from your lab, and by regular attendance. As the microbiome touches so many disciplines, we are welcoming of labs who may not have begun working on commensal microbiota yet have experience or interest in nutrition, mucosal immunology, ecology, neuroscience, and many more.

Current Participating Institutions & Departments

University of Washington

- Cystic Fibrosis Research and Translation Center
- Department of Behavioral Nursing and Health Informatics
- Department of Bioinformatics
- Department of Comparative Medicine
- Department of Nursing and Health Informatics
- Department of Pediatrics
- Department of Periodontics
- Department of Psychiatry
- Division of Gastroenterology

Neighboring Seattle Institutions

- Fred Hutch
- Institute for Systems Biology
- Seattle Children's Hospital, Center for Global Infectious Disease Research
- Seattle Children's Hospital, Pediatric Endocrinology

Seminar
Series

Microbiome Matters

Since opening our doors in February 2017, it has been our vision is to be the foremost leader in microbiome research throughout the Pacific Northwest region known for our thoughtful collaborations, our unique approach to experimental design and our dedication to educating the community about the importance of the microbiome in maintaining a healthy lifestyle.

To achieve this vision, one of our chief goals this year is to secure funding in order to continue to host our microbiome seminar series that will span across many different fields and disciplines to engage as many researchers, trainees, students and clinicians as possible who are interested in microbiome studies. We will seek speakers from the UW and affiliated campuses, but also the greater PNW and across the country. By bringing our diverse backgrounds together, it is our aim to Inspire Discovery!

Past Speakers

2018

Gary Wu, MD

Professor of Medicine
Ferdinand G. Weisbrod Chair, Gastroenterology
Perelman School of Medicine
Co-Director, PennCHOP Microbiome Program
University of Pennsylvania

Karen Guillemin, PhD

Professor of Biology, Institute of Molecular Biology
Founding Director, Microbial Ecology & Theory of Animals (META) Center
University of Oregon

2019

Kelly Hoon

Executive Sales Specialist
Microbial and Infectious Disease
Illumina, Inc., San Diego, CA

**Learn
how to see.
Realize that
everything
connects to
everything else.**

- Leonardo da Vinci

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