

Gary D. Wu, MD

Ferdinand G. Weisbrod Professor in Gastroenterology

Gary D. Wu, MD is the inaugural Ferdinand G. Weisbrod Professor in Gastroenterology at the Perelman School of Medicine, University of Pennsylvania. He is the Associate Chief for Research in the Division of Gastroenterology, Co-Director of the Penn-CHOP Microbiome Program, Associate Director of the Joint Penn-CHOP Center for Digestive, Liver and Pancreatic Medicine, and the Associate Director of the Center for Molecular Studies in Digestive and Liver Disease in which he is the Director of its Molecular Biology Core. He is an elected member of both the American Society for Clinical Investigation and the Association of American Physicians.

Dr. Wu has held many leadership positions nationally including the Chair of the NIH NIDDK-C Study Section, Co-Senior Associate Editor for *Gastroenterology*, Chair of the Intestinal Disorders Sections and member of the American Gastroenterological Association (AGA) Council, and currently serves as a member of the AGA Governing Board as the Basic Research Councilor. He has been the Director and Chair of the Scientific Advisory Board for the American Gastroenterological Association Center for Gut Microbiome Research and Education and the Grants Council Chair for the Crohn’s and Colitis Foundation of America. Dr. Wu is the communicating PI on a R24 grant from the NIH to develop a national FMT registry through the AGA with collaborating national associations including the Crohn’s and Colitis Foundation, IDSA, and NASPGHAN.

He is an internationally acknowledged leader in the interaction between diet, and gut microbiome, and the host metabolome. He has published senior authored papers in top tier journals such as *Science*, *Science Translational Medicine*, *Cell Host & Microbe, PNAS*, the *JCI*, and *Gastroenterology*. As a physician-scientist, Dr. Wu’s laboratory focuses primarily on multidisciplinary team research in the gut microbiome to translate basic research at the wet bench into the clinical setting. Dr. Wu’s research into the gut microbiome began nearly a decade ago with projects focused on the impact of diet on the composition of the gut microbiota initially funded by the NIH Human Microbiome Project. The focus of this project was to elucidate the mechanisms by which elemental diets are efficacious in the treatment of Crohn’s disease. Initial studies associating diet and the composition of the gut microbiota1 have been extended to patients with Crohn’s disease2, and now focus on an inpatient human diet intervention study named Food and Resulting Microbial Metabolites (FARMM) funded by the Crohn’s and Colitis Foundation of America. This study is designed to exam the impact of an omnivorous, vegan, and a defined formula diet on the composition of the gut microbiome, its metabolome, and their contribution to small molecules circulating in human plasma. Dr. Wu co-directs a number of NIH-funded projects including a study examining the association of the gut microbiome with its metabolome and their correlations with the development of rapid growth and childhood obesity in a large longitudinal prospective cohort of children as well as the effects of chronic kidney disease on the gut microbiome and its metabolome.

The Wu lab is also investigating the co-metabolism of ammonia between the host and its microbiome through the hydrolysis of host urea by gut microbiota urease activity. A core technology developed as part of this project was the ability to engineer both the composition and metabolic function of the gut microbiota using a minimal defined community of less than a dozen bacterial that decreases morbidity and mortality in a murine model of liver disease3. To translate this technology into the clinical arena, Dr. Wu is leading a collaboration between Penn, the Children’s Hospital of Philadelphia, and an industry partner (Seres Therapeutics), in a multidisciplinary effort to develop a microbiota-based therapy for patients with inborn errors of metabolism, such as hyperammonemia associated with urea cycle disorders.

Finally, with support from the NIH, Dr. Wu is leading a team composed of faculty from microbiology, biochemistry & biophysics, and engineering to study the dynamics of molecular oxygen utilization between the host and its gut microbiota at the mucosal interface using phosphorescence imaging of microparticles4. These studies will provide novel insights into the distinctive distribution of bacterial along the radial axis of the gut and the nature of the “dysbiotic” microbiota associated with intestinal inflammatory diseases.

Dr. Wu’s current research portfolio spans over 20 project grants from NIH, private foundations, industry partnerships, and intramural programs funded by $6 million dollars (directs) to his lab over the next 4 years in support of over $20 million in project funds to both Penn and CHOP.

**References:**

1. Wu GD, Chen J, Hoffmann C, et al. Linking long-term dietary patterns with gut microbial enterotypes. Science 2011;334:105-8.

2. Lewis JD, Chen EZ, Baldassano RN, et al. Inflammation, Antibiotics, and Diet as Environmental Stressors of the Gut Microbiome in Pediatric Crohn's Disease. Cell Host Microbe 2015;18:489-500.

3. Shen TD, Albenberg L, Bittinger K, et al. Engineering the gut microbiota to treat hyperammonemia. J Clin Invest 2015;125:2841-2850.

4. Albenberg L, Esipova TV, Judge CP, et al. Correlation Between Intraluminal Oxygen Gradient and Radial Partitioning of Intestinal Microbiota in Humans and Mice. Gastroenterology 2014.