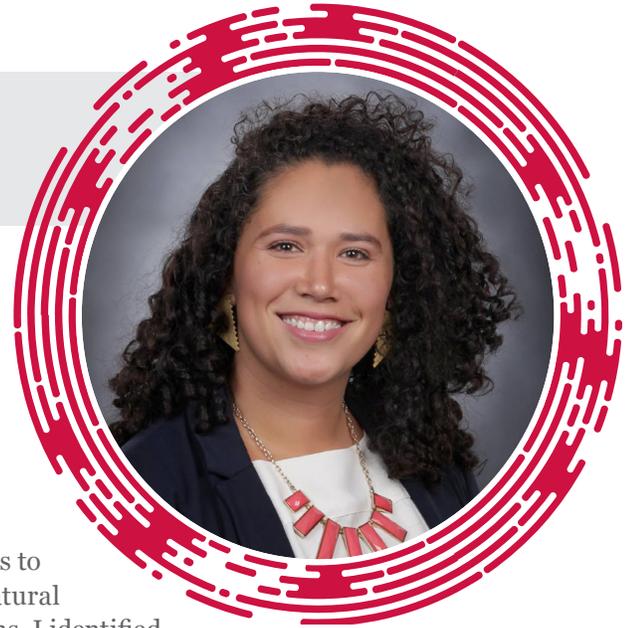




Engineered models to study the role of the extracellular matrix and the human microbiome in disease

Ana M. Porras, PhD
Presidential Postdoctoral Fellow
Cornell University

Extracellular cues play a crucial role in human tissue development, homeostasis, and disease. These cues include local signals such as those provided by the extracellular matrix (ECM) as well as more systemic signals stemming from sources like the gut microbiome. In my work, I engineer models of disease to systematically investigate the mechanisms and interactions through which these extrinsic cues drive pathological cell behavior. This talk focuses on two applications of these models at the micro- and macroscale within the contexts of the aortic valve and the gut. In the first, I designed complementary bottom-up and top-down approaches to mimic the features of the ECM in early calcific aortic valve disease using natural biomaterials and ex vivo gene delivery. By leveraging these in vitro platforms, I identified a previously unknown cascade of pathological events. The second half of the talk will describe the use of humanized mouse models to study the effects of geographic differences in gut microbiome composition on host health. Using these engineered in vivo models, I established that geographic differences in gut microbiota composition have an effect on susceptibility to enteric infection. Finally, I will discuss how we can merge both of these approaches to develop in vitro disease models to understand how microorganisms interact with human tissues, and specifically the ECM, to drive pathological behavior.



ABOUT the SPEAKER

Dr. Ana Maria Porras is currently a Presidential Postdoctoral Fellow at Cornell University. Her research interests encompass a wide variety of topics including biomaterials, cardiovascular disease, the human microbiome, and infectious disease. Her current research lies at the intersection of the gut microbiome and global health. Originally from Colombia, Dr. Porras arrived in the U.S. 13 years ago to pursue a BS in Biomedical Engineering at the University of Texas at Austin. Immediately after, she completed a Masters and Ph.D. at the University of Wisconsin-Madison, where she also obtained a Delta Certificate in Teaching and Learning with an emphasis on inclusive pedagogy. That passion for diversity and inclusion drives most of her work; most recently, she co-founded the Latinx in BME community and was selected as one of 125 AAAS IF/THEN Ambassadors for girls and women in STEM. Dr. Ana is also a science artist and bilingual communicator. Every #MicrobeMonday she teaches microbiology on social media using crocheted microbes designed by herself. Outside of all that, Ana loves to travel, bake, swim, dance, read, and above all, eat ice cream.

Monday, January 27 at noon
1003 Engineering Centers (Tong Auditorium)