NEXT GEN ... with faculty

Pictured above Assistant Professor Xiaomei Cong (center) with PhD students Carrie-Ellen Briere '09 (left), and Victoria Vazquez '90, '08 MS (right).

Xiaomei Cong

NEXT GENERATION FACULTY

The K23 research team from left: Associate Professor (Molecular and Cell Biology) Joerg Graf, Assistant Professor Xiaomei Cong, doctoral student Victoria Vazquez, Associate Dean Jacqueline McGrath, and doctoral students Carrie-Ellen Briere, Dorothy Vittner, and Amy D'Agata.

In a breathtakingly bold move for an assistant professor, Xiaomei Cong has turned the direction of her research from the biobehavioral outcomes of NICU kangaroo care to a multidisciplinary collaboration studying neonates' gut microbiome.

In other words, baby poop.

The human body is an ecological system. It plays host to microbes -- including bacteria, eukaryotes, and viruses -- that far outnumber the body's cells. While we have long known that the gut microbiome is involved with digestion, a growing body of peer-reviewed research suggests associations between the gut microbiome and autoimmune diseases, obesity, and mental health problems like depression, anxiety, and autism.

Cong has long studied the effects of physical stressors on neonates. In her most recent work, for example, she has examined the physiological mechanisms in the well established benefits of kangaroo care (skin-to-skin contact between parent and infant) to alleviate NICU procedural pain. Her clinical trials of different durations of kangaroo care, measuring salivary levels of cortisol and oxytocin, extended our understanding of this simple, no-tech, intervention.

Building on that research, Cong will now investigate the mechanisms of early life stress and the neuro-immune system, specifically brain-gut-microbiota signaling mechanisms. She will investigate the regulation of early life stress by the brain-gut-microbiota axis and the prediction of neurodevelopmental outcomes in high-risk infants.

This promising avenue of research is part of a larger national endeavor sponsored by the National Institutes of Health. Begun in 2007 the Human Microbiome Project is developing tools and datasets for researchers. In its first phase the project observed and described the diversity of microbial communities inhabiting the body's mucosal surfaces, like the gastrointestinal tract. This stage evaluated these microbes' genetic metabolic potential. In the second current phase the Human Microbiome Project is creating the first integrated datasets of the microbiome's biological properties.

In 2013 the NIH National Institute of Nursing Research awarded Cong a three year K23 grant for a project entitled Early Life Physiological and Psychosocial Stress Imprints Gut Microbiome in Preterm Infants. As Cong explains, "Premature infants subjected to stressful early life experiences develop an altered gut microbiome, increasing the risk for neurodevelopmental morbidity and gastrointestinal dysfunction, including necrotizing enterocolitis." Supplemented by a UConn Affinity Research Collaboratives grant, one of only four awarded, this research will employ state-of-the-art genetic sequencing and computation.

Cong will now investigate the mechanisms of early life stress and the neuro-immune system specifically brain-gut-microbiota signaling mechanisms.

With her characteristic modesty, Cong attributes this project's potential to her multidisciplinary team. She has assembled a collaboration among UConn colleagues Joerg Graf (Molecular and Cell Biology), Jacqueline McGrath (School of Nursing and Connecticut Children's Medical Center), Adam Matson and Naveed Hussain (School of Medicine and CCMC NICU), as well as external partners Zhengqing Ouyang (Jackson Laboratory for Genomic Medicine) and Wendy Henderson (National Institute of Nursing Research, Biobehavioral Branch, Digestive Disorder Unit).

In this way nursing research leverages interprofessional health and life sciences to promote improved patient outcomes. ■