Title: The impact of human milk metabolomics on the intestinal microbiome and pediatric obesity in a longitudinal cohort of exclusively breastfed infants.

Dominick J. Lemas, Ph.D
Assistant Professor
Health Outcomes and Biomedical Informatics
Clinical and Translational Research Building
University of Florida College of Medicine
2004 Mowry Road, Rm 2234
Gainesville, FL 32608
Ph: 352-294-5971
Email: djlemas@ufl.edu

Research Project Description

Pediatric obesity has more than doubled in children and tripled in adolescents over the past 30 years. Recent findings demonstrate that differences in energy harvesting bacteria promote obesity in the host and appear to be influenced by early life factors such as mode of delivery, maternal obesity, and breastfeeding. Exclusive breastfeeding is associated with protection against pediatric obesity; however, the association between human milk components and the microbiome that account for these observations are poorly characterized. The goal of this research is to investigate how human milk in exclusively breastfed infants impacts the gut microbiome during the first 12-months of life and identify the microbe-host interactions that mediates the anti-obesity effects of breastfeeding.

We are currently recruiting a longitudinal cohort of 100 normoglycemic pregnant mothers that live in Gainesville and will be following mom and baby through the first year of life. Specifically, we enrolling mothers with a pre-pregnant BMI <25.0 kg/m^2 as well as mothers with a pre-pregnant BMI >30.0 kg/m^2 mothers between 36-38 weeks of pregnancy that are committed to exclusive breastfeeding (>2 months) and plan to deliver at the University of Florida (UF) Health Shands Hospital. During study visits at the UF Clinical Research Center (CRC), we collect health histories, body composition data, self-reported behavioral data and a variety of non-invasive samples including stool, urine, saliva and human milk from mothers during 3rd trimester and maternal-infant dyads at 2-weeks, 2-months and 1-year. Additionally, we are extracting participant electronic health record (EHR) data that is linked to clinical study visits and will be available to calculate growth trajectories and assess potential bias among participants that complete and do not complete study visits.

Longitudinal data collection will be completed at the NIH-funded UF Clinical and Translational Science Institute and human milk metabolomics analysis will be completed at the NIH-funded UF Southeast Center for Integrated Metabolomics (SECIM). Finally, microbial sequencing will be completed at the UF NextGeneration DNA Sequencing Core and high-throughput data analysis will be completed at the UF Research Computing Center. The results of this exploratory study will characterize factors that influence microbial transmission between mothers and offspring and identify human milk compounds that stabilize a healthy infant microbiome with potential to reduce pediatric obesity.

We are looking for students with an interest in obstetrics and pediatrics to help with participant recruitment, consenting participants and clinical data collection at the UF CRC. Opportunities for students during the summer include developing independent projects based on the data we are collecting as well as the ability to contribute to peer-reviewed manuscripts.