

Hunter College of the City University of New York
Department of Biological Sciences
Spring 2024 Inga Richter Seminar Series

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Small Molecule Signals from Gut Microbes to the Brain

The central nervous system interprets external and internal cues from the surrounding environment and the body. One complex source of signals is the bacterial community in the gastrointestinal tract, which resides outside host tissue in the gut but produces signals that enter circulation and can reach the brain. This active community of microbes breaks down dietary and host components into small byproducts, or metabolites. Some gut-derived metabolites serve as messages to the brain and influence function and behavior. We recently showed that one bacterial signal, 4-ethylphenyl sulfate (4EPS), can be selectively produced by engineered gut bacteria. Mice exposed to 4EPS via gut bacteria exhibited decreased maturation of myelin-producing cells, oligodendrocytes, leading to decreased insulation of neuronal axons, disorganized white matter, and elevated anxiety-like behavior in 4EPS-exposed mice. This work has helped transform the understanding of pervasive oligodendrocyte roles in behaviors such as anxiety, fear, depression, sociability, and learning, but precise mechanisms must be defined. We engineered bacteria with a 4EPS biosynthetic pathway to test its effects, and are now expanding this work to define and manipulate the bacteria in the mouse and human microbiota that are capable of producing 4EPS. Improved understanding of the neuroactive effects of 4EPS will advance potential therapeutics for anxiety within and beyond the context of ASD.

Thursday, February 22, 2024 @12:30pm
Host: Rabindra Mandal

Zoom:

<https://us02web.zoom.us/j/85133033979?pwd=c3BHSWIBRFRCczNBK1dXc2pJNjZlZz09> (passcode: 748749)