Winer Lab

Exercise-Mediated Modulation of the Gut–Brain Axis in Alzheimer's Disease Progression

Our lab is investigating how the gut and brain communicate to influence inflammation and neurodegeneration in Alzheimer's disease (AD). Specifically, we aim to understand the links between gut immunity, the gut microbiome, and the migration of immune cells from the gut to the brain to determine how these processes contribute to systemic and neuroinflammation. Using the 5XFAD mouse model, we will examine how changes in gut immune function are associated with loss of microbial diversity and a reduction in protective microbial metabolites, which may drive inflammation across the gut–brain axis, exacerbating AD pathology.

We will characterize neurodegeneration and inflammation using *in vivo* behavioral assessments and a variety of molecular and cellular techniques. Exercise and exercise mimetics will be implemented to evaluate how these interventions mitigate Alzheimer's disease (AD) pathology and brain inflammation. Additionally, stool samples from mice will be sequenced to examine how the gut microbiome responds to AD pathology and our interventions. Together, this work will help reveal how gut–brain interactions influence Alzheimer's disease and how lifestyle or pharmacological strategies may delay its progression.