CHEMICAL & BIOMEDICAL ENGINEERING SPECIAL SEMINAR

Harnessing Cell Type-Specific Extracellular Vesicles in Neurodegenerative Diseases: Pathogenesis and Biomarker Potential

Friday, July 31, 2026
1:00 PM
IRCB 1030

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Extracellular vesicles (EVs) are cell-derived nanoparticles that shuttle proteins, lipids, and nucleic acids between cells and help propagate pathogenic proteins in neurodegenerative disease. My research investigates how EVs released by specific brain cell types both drive pathology and open accessible windows into the diseased brain. Working with human iPSC-derived brain cells, we have defined cell type-specific EV protein signatures and identified ATP1A3 as a new marker for neuron-derived EVs; capturing ATP1A3+ EVs from blood enables detection of amyloid-ß and other disease-associated cargo with greater diagnostic specificity for Alzheimer's disease and other neurological disorders. We built an Alzheimer's disease EV protein network in which an astrocyte-enriched module is most strongly associated with disease pathology and cognitive decline; blocking integrins markedly reduces neuronal uptake of these astrocyte-derived EVs, pointing to a strategy for modulating pathological EV signaling. We also examined microglia-derived EVs and found that EVs from microglia carrying the Alzheimer's risk variant APOE4 disrupt neuronal proteostasis, dampen neuronal activity, and promote tau hyperphosphorylation under disease conditions.

This event is sponsored by FAMU-FSU College of Engineering and Department of Chemical & Biomedical Engineering

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