The Role of Lipid Metabolism Across Cell Types in Parkinson's Disease

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Parkinson's disease (PD) is a common age-related neurodegenerative disorder with disabling motor symptoms and no available disease modifying treatment. While commonly believed to be a proteinopathy, specifically a synucleinopathy, recent studies have suggested a prominent role for lipids in pathogenesis. Studies have shown that many PD associated genes play a role in lysosomal function in both neuronal and glial cell types which suggest involvement for not only lysosomal clearance of proteins but also lipids in PD. Previously, cell type specific lipid storage changes have been shown in PD patient brains and lipid droplet binding may play a role in the oligomerization of alpha synuclein, the protein present in the disease's hallmark Lewy bodies. Furthermore, fatty acid binding proteins (FABPs), particularly FABP7 and FABP3, have been shown to play a role in lipid droplet formation. In addition to their roles as lipid chaperones, FABPs have been shown to affect metabolic and inflammatory pathways further pointing to their role in lipid metabolism. Investigating changes in lipid storage may provide powerful insights into disease progression and possible disease modifying treatments. Preliminary data shows that FABP7 may be upregulated in PD. Additionally, results from analysis of both PD brain tissue and astroglioma cell lines points to a prominent role for glial cell types. By observing differences and FABP7 expression in PD human tissue relative to controls and differences in lipid droplet formation in neuronal and glial cell lines during lipotoxicity cell type specific changes in lipid metabolism in PD can be further understood.