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ASSESSING NEUROINFLAMMATION IN OBESE INDIVIDUALS USING DIFFUSION BASIS SPECTRUM IMAGING (DBSI)

Tatianna Murphy

Mentors: Sarah Eisenstein and Tamara Hershey

Today in the United States, more than two-thirds of adults are overweight or obese. Obesity is associated with chronic systemic inflammation affecting many organs in the body. However, there has been little research in humans on whether inflammation is also present in the brain. My research seeks to determine if obese individuals have increased brain inflammation compared to controls. Previous studies using magnetic resonance imaging (MRI) and diffusion tensor imaging analyses (DTI) have found altered white matter integrity in the brain associated with obesity. However, these traditional diffusion analysis techniques confound axonal and extra-axonal (e.g., inflammation) effects in the brain. To separate the inflammation from axonal integrity, we used the recently developed Diffusion Basis Spectrum Imaging (DBSI) analysis approach. DBSI allowed us to measure indices of edema and cellularity (both associated with neuroinflammation) and axonal integrity in healthy normal-weight controls and obese individuals. Using Tract-Based Spatial Statistics to control for multiple comparisons, we found that obese individuals had higher edema and cellularity and lower axonal integrity metrics compared to normal-weight individuals. These results suggest that obesity increases brain inflammation and decreases axonal integrity in the brain. Future research will determine the specific clinical variables (e.g., insulin resistance, body fat) that are related to degree of brain inflammation in obesity.