

## **A104 The Correlations Between Autophagy and Herpesvirus and Their Interactions to Neurodegeneration in Alzheimer's Disease**

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**Introduction:** Various microbes and viruses have been associated with the pathogenesis of Alzheimer's Diseases (AD), with many studies dating back to the 1950s. There are challenges in establishing direct links between the microbes and AD pathology. Since microbes and viruses have been observed to be dormant and reactivate in aging brains, it is not clear if the microbes are a byproduct of AD pathology or a direct cause of it. Recently, various publications considered the link between several herpes simplex viruses and neurodegeneration in AD. For example, Readhead et al. utilized multi-omics data from post-mortem brain samples meeting the neuropathological criteria for AD to construct biological networks and look for associations between viral genome, transcription, and AD. This study established associations between human herpesviruses HHV-6A and HHV-7 and various aspects of AD. The Herpes Simplex Virus (HSV) has been observed to interact with intracellular membranes during egress. During viral replication in the cell's nucleus, the secondary envelopment process resembles many of the processes associated with autophagy. The autophagy process has been shown to be disrupted in AD patients. Thus, autophagy might have significant interactions with HSV. In this study, we are interested in incorporating autophagy related genes to find correlations between autophagy processes, herpesviruses reactivation, and AD pathology. **Methods:** We have downloaded the code and data published by Readhead et al. available on synapse.org. We were able to run the code and reproduce the figures in their paper. We have also compiled a list of 180 autophagy related genes. We plan to mine viral quantitative trait loci (vQTL) to correlate host genomic and RNA-seq to viral load in preclinical and clinical AD. Integrating autophagy genes for QTL analysis will facilitate the comparison of the expression of autophagy genes in preclinical and clinical AD. Therefore, we will mine autophagy genes QTL to construct a network of autophagy, viral activity, and AD traits. **Results:** We hypothesize a correlation between autophagy related genes and the reactivation of the dormant viruses and the progression of AD pathology. **Conclusions:** The integration of autophagy related genes in this project will potentially clarify the role microbes and viruses play in the progression and onset of AD pathology and how they interact with viral products in the brain. Supported by NCRR and NCATS UL1TR001449.