Abstract

In this analysis, we were interested in examining the relationship between Alzheimer’s disease and various clinical covariates. In order to determine relevant covariates of interest for predicting Alzheimer’s disease, we performed a logistic regression analysis to see which variable are most predictive of Alzheimer’s disease. In corroboration with past research, we found that the APOE4 allele frequency is most predictive of Alzheimer’s disease. Additionally, we were also interested in characterizing the strength of relationships of our covariates of interest with Alzheimer’s disease. Interestingly, we found the years of education had a strongly significant negative association with Alzheimer’s disease.

Introduction

Alzheimer’s disease is a neurodegenerative disease affecting the central nervous system (CNS). Clinically, the disease is commonly characterized initially by early mild cognitive impairment (eMCI) where patients display slight forgetfulness, and progresses with worsening dementia symptoms to late MCI and finally severe Alzheimer’s dementia, where patients begin to lose muscular control and are unable to care for themselves, oftentimes requiring round the clock care.

Pathologically, the disease is characterized by the gradual build up of two proteins: Amyloid-Beta and Tau protein. Amyloid-beta aggregates in the extra-cellular environment in formations call plaques, while Tau builds up within neuron cell bodies. Both Tau protein and Amyloid-Beta have been shown to have cellular toxicity – Amyloid-Beta specifically disrupts (via depolarization) the neuron membrane potential, thereby interfering with proper neuronal cell communication abilities.

In the United States alone, Alzheimer’s disease affects 1 in 10 people over the age of 65, and represents the 6th leading cause of death. In fact, between 2000 and 2014, the rate of deaths due to Alzheimer’s disease nearly doubled, as a result of a rapidly aging Baby-Boomer generation. Likewise, Alzheimer’s disease healthcare costs are roughly $260 Billion dollars annually. As such, there is strong financial incentive to better understand this disease.

In this analysis, we characterize the ability of various clinical covariates to predict Alzheimer’s disease, and also make inference on the relationship of these clinical covariates with Alzheimer’s disease diagnosis.