



CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

Name(s) Eden Z. Deng	Project Number 38197
Project Title Molecular Changepoints in the Aging Human Brain	
Abstract Objectives/Goals The objective of this experiment was to identify changepoints in gene expression in the aging human brain and determine their role in the late onset of neurodegenerative diseases. Methods/Materials This project was done entirely in RStudio. Gene expression data from different regions of the brain were obtained through publicly available data sets and downloaded into R. Piecewise linear models were fit to gene expression patterns to identify changepoints of gene expression in the aging process. These changepoints were analyzed for their distribution across age, prevalence, and function. Results 90% of genes with changepoints showed constant initial expression then abrupt change at a critical age threshold. In each brain region, these changepoint genes were enriched for functions associated with the onset of neurodegenerative diseases. Conclusions/Discussion The distribution and molecular functions of changepoints in gene expression were associated with the onset of neurodegenerative diseases. These changepoints may be used as markers for the onset of diseases in the brain or to identify targets for preventative treatment.	
Summary Statement I identified changepoints in gene expression in the aging human brain, which showed strong correlation with the onset of neurodegenerative diseases.	
Help Received My dad assisted with statistical analyses and helped me learn R.	