CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

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Project Number

J0508

Project Title

Computational Local Alignment Search of Neurodegenerative Disease-Related Proteins

Abstract

Objectives/Goals
The purpose of this study was to find non-human organisms that carry similar proteins to those associated with Parkinsons Disease, Alzheimers Disease, Marfan Syndrome, frontotemporal dementia, and Variant Creutzfeldt-Jakob Disease (vCJD).

Methods/Materials
Laptop computer with access to internet databases. The OMIM(Online Mendelian Inheritance in Man) database was used to find the human protein that was associated with each disease, and the online NCBI GenBank database was used to find the sequence for each protein. The sequence was then run in the online SmartBLAST program, and the five best matches were recorded with their local extreme metrics.

Results
The organisms that carried the closest proteins to the human query were recorded and compared from the software. Phylogenetic trees were generated from the results to compare the relationships between the organisms and proteins. These results showed that for each human protein, the organisms with the best matches were mostly primates and mice, with close phylogenetic relationships to humans.

Conclusions/Discussion
The human proteins all had similar proteins that could be found in primates and mice. Further study of the phylogenetic trees revealed that these organisms had close evolutionary relationships to humans. Similarities in proteins of humans and primates provide a different facet for tracing the history of the expression of certain neurodegenerative diseases across organisms, as well as examining and determining evolutionary relationships between these organisms.

Summary Statement

I used online bioinformatics databases to gather information about human proteins that are related to certain neurodegenerative diseases and aligned them with similar proteins found in other species, the majority of which were primates.

Help Received

None. I created the procedure, completed the experiments, and analyzed the data by myself.