Translational Approach To Develop N-Acetylneuraminic Acid (Neu5Ac) as Biomarker for the Diagnosis of Alzheimer's Disease (AD), Year Two Project

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Research depicts a lack of cost effective, efficient FDA approved medical tools for early diagnosis of neurodegenerative diseases, particularly Alzheimer’s Disease [AD] and onset dementia. Recent scientific discoveries point to the pivotal role of N-Acetylneuraminic acid in neurodegeneration and inflammation. This investigation utilizes student developed colorimetric assay for proof of concept, with an increased sample size of de-identified human samples from both healthy volunteers and AD patients. Hypothesis determines if the use of colorimetric chart in conjunction with cost effective application will show positive proof of concept for N-Acetylneuraminic acid as a biomarker for early diagnosis of AD and onset dementia. N-Acetylneuraminic acid was quantified through oxidation to formyl pyruvic acid followed by reaction with thiobarbituric acid to form colored adduct. Optical density (OD) of colored product generated using samples from healthy human volunteers was within range for normal N-Acetylneuraminic acid levels of less than 700 micro-molar. The developed assay is sensitive for quantification of N-Acetylneuraminic acid in human saliva samples. Proof of concept showed the OD of samples from AD patients was significantly higher than that of the healthy volunteers (ANOVA, $p<0.05$). Colorimetry chart and application supported the hypothesis through mobile app which used hexcode color identification. Samples above normal range supported the proof of concept as the group was pre-diagnosed with AD, necessitating the need for medical intervention. Future research will include partnering with local medical group encompassing four major hospitals; nursing home groups; and private practice doctors; with which IRB is currently pending.

Awards Won:
Fourth Award of $500