Public Abstract

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Title: CHARACTERIZATION OF MEMBRANE VISCOSITY CHANGES WITH THE NOVEL MOLECULAR ROTOR FCVJ

Membrane viscosity conditions are a useful indicator of cell health. Atherosclerosis, Alzheimer's disease, diabetes mellitus, and hypertension have all been reported to induce changes in afflicted cell membrane viscosity. Characterizing membrane viscosity will provide researchers and clinicians with a valuable tool in diagnosing the onset and progression of diseases. Molecular rotors are fluorescent molecules that have been shown to exhibit viscosity sensitive.

The phospholipid DLPC (1, 2-Dilauroyl-sn-Glycero-3-Phosphocholine) was combined with 10 •L of the molecular rotor FCVJ and liposomes were formed using an electroformation process. 250mM Sucrose solution served as the liposome formation solution. Control solutions of 50 ul of liposomes were then added to 950 •L of Sucrose solution in a microcuvette. The cuvette was excited at 460 nm under fluorescent spectroscopy and intensity values were recorded. The procedure was repeated for a 2% cyclohexane/sucrose solution. Peak emissions were compared and, as hypothesized, the cyclohexane fluidized the membrane resulting in a statistically significant reduction in intensity compared to the control group ($p=.00001$, $n=10$). To achieve a converse effect, a 20% (v/v) Cholesterol/DLPC mixture was used to produce liposomes in the presence of sucrose solution. Total FCVJ concentration remained constant. 50ul of the cholesterol liposomes were added to 950ul of the Sucrose solution. Excitation parameters were kept constant. Intensity values were compared to those of the control group for the cyclohexane experiments. As expected, the intensity values for the cholesterol group were higher than control and found to be significant ($p=.004$, $n=10$).

The liposomes used in this experiment are a suitable model for the mammalian cell membrane in both size and physical similarities. The next evolution in this research is to test our hypothesis on animal cells in vitro. The results of these experiments demonstrate the high level of sensitivity and abilities of molecular rotors as microviscosity detectors. This previously undocumented method for characterizing membrane conditions provides a qualitative method of measuring changes in membrane viscosity.