The nicotinic acetylcholine receptor (nAChR) is an integral pentameric ligand gated ion channel that conducts cations across a cell's membrane to initiate an action potential. Found in both the central and peripheral nervous system, nAChR is embedded in a lipid environment full of polyunsaturated fatty acids (PUFAs) (specifically $n-3$) and cholesterol. Through coarse grained simulations, we observe nAChR partitioning into domains with high concentrations of the $n-3$ PUFA docosahexaenoic acid (DHA) when using ternary membranes. While experiments to determine lipid composition of nAChR's native membrane have been preformed, experiments have not been done to show the protein partitions in native membranes, the preferential boundary lipids, or the role the membrane plays on the protein and vice versa. We are proposing a number of coarse grained simulations to better understand nAChR's lipid sensitivity. First, modeling oocyte membranes, we plan to modulate the DHA in the membrane and determine nAChR's boundary lipids. Next mutating nAChR's transmembrane domain, and modulating the lipid composition of neuronal membranes, we can better understand the effect the membrane has on nAChR. Lastly, we plan to build a general plugin for Visual Molecular Dynamics (VMD) that will calculate the fluctuation spectrum of a general membrane, to be used as a tool to better characterize the lipid environment of nAChR.