FORMATION AND CHARACTERIZATION OF CHLOROPHYLL-A WITHIN TETHERED BILAYER LIPID MEMBRANE

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In some recent biophysical and biochemical studies many different simplified biomimetic analogues of lipid membranes were widely used to evaluate/model structural and permeability/transport properties of more complex natural bio-membranes [1]. The tethered bilayer lipid membrane (tBLM) is a complex system that can be used as an experimental platform for fundamental studies of the structure and function of the biomembrane. Long-chain thiol compounds, such as 20-tetradecyloxy-3,6,9,12,15,18,22-heptaoxahexatricontane-1-thiol (WC14), can be utilized as "anchors" in self-assembled monolayer (SAM) synthesis, allowing the production of stable and repeatable phospholipid bilayers [2]. In this work, one of such models, tBLM on the gold surface is formed by using the fusion of vesicles [3]. This immobilized membrane alteration enables different biosensors to be produced by adding lipid components such as DOPC (1,2-dioleoyl-sn-glycero-3-phosphatidylcholine) and cholesterol [4], having stability that can be modified by adding molecules such as chlorophyll a (Chl-a). By including lipid components such as DOPC and Chol, which give extra stability, specific modifications of tBLMs are ideal for the construction of diverse biosensors.

The investigation is performed by applying electrochemical impedance spectroscopy (EIS) to measure dielectric capacity and conductivity changes. Fluorescence microscopy (FM) is used to estimate the morphology of the membranes. The goal of this research is to see if the photoactive compound Chl-a could be incorporated into a tethered bilayer lipid membrane to create a platform that could be used to develop tBLM photosensitive surface constructs in the future, potentially for the development of new biosensors and biomimetic artificial leaves.

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References

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