

Determination of Diffusion Coefficients of Fluorescently Labelled Molecules in Lipid Membranes Using Confocal Scanning Laser Microscopy

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A series of liposomes has been studied by the Fluorescence Recovery after Photobleaching technique using confocal scanning laser microscopy. Both mobile and immobile specimens of lipid membranes have been examined. The specimens consisted of liposomal suspensions incorporating mixtures of the phospholipids dioleoyl phosphatidylcholine (DOPC) and distearoyl phosphatidylcholine (DSPC) with the aminolipid dihexadecanol glycerophospho-ethanolamine (DHPE). The measurements reported provide information about the effective diffusion coefficients, which vary from $0.2 \cdot 10^{-10} \text{ cm}^2\text{s}^{-1}$ to $3.2 \cdot 10^{-10} \text{ cm}^2\text{s}^{-1}$. They were highly dependent on the ratio DSPC:DOPC. A simple theoretical model of 1-D diffusion was applied for the calculation of the effective diffusion coefficients. The measurements show that it is possible to use straightforward procedures with an unmodified commercial confocal microscope to determine diffusion coefficients of biological specimens.

Key words: Phospholipid; Lateral Diffusion; CSLM.