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Isoflurane Increases Cell Membrane Fluidity Significantly at Clinical Concentrations JIGESH PATEL, Texas Tech Univ — There is an on-going debate whether anesthetic drugs, such as isoflurane, can cause meaningful structural changes in cell membranes at clinical concentrations. In this study, the effects of isoflurane on lipid membrane fluidity were investigated using fluorescence anisotropy and spectroscopy. In order to get a complete picture, four very different membrane systems (erythrocyte ghosts, a 5-lipid mixture that mimics brain endothelial cell membrane, POPC/Chol, and pure DPPC) were selected for the study. In all four systems, we found that fluorescence anisotropies of DPH-PC, nile-red, and TMA-DPH decrease significantly at the isoflurane concentrations of 1 mM and 5 mM. Furthermore, the excimer/monomer (E/M) ratio of dipyrene-PC jumps immediately after the addition of isoflurane. Our data indicates that isoflurane is quite effective to loosen up highly ordered lipid domains with saturated lipids. As a comparison of the effects on membranes, the decrease of nile-red fluorescence anisotropy in erythrocyte ghosts by 1 mM isoflurane is more than the corresponding decrease caused by 52.2 mM of ethanol, which is three times the legal limit of blood alcohol level. Our results paint a consistent picture that isoflurane at clinical concentrations causes significant and immediate increase of membrane fluidity in a wide range of membrane systems.

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