A COMPARISON OF THE TRI- AND TETRAETHYLS OF LEAD AND TIN AS MEMBRANE MODIFIERS AND CHLORIDE CARRIERS ACROSS LIPID BILAYERS

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The basic electrical parameters of bimolecular lipid membranes (BLM macrovesicles, with a surface of ~30÷150 mm^2) prepared from egg yolk lecithin and modified with ionic and nonionic ethyl derivatives of tin and lead were measured. The chambers on each side of the membrane were filled with 1, 10 or 100 mM NaCl. The concentrations in each chamber differ or were equal as required. Organometallic compounds were added from ethanol solution to each chamber. Bare Ag/AgCl electrodes immersed directly in electrolite solutions were used to apply an external voltage and to detect the electrical potentials.

Ionic or electroneutral organometallic compounds added to the NaCl electrolyte at both sides of the membrane did not change significantly the membrane resistance up to the modifier concentration of 10 μM. Measurements of the membrane potential (electrolyte concentration gradient 10/100mM) in the presence of Et_3Pb^+ or Et_3Sn^+ (10 μM max) showed no changes compared to the control samples without modifiers, i.e. the presence of these compounds did not build the Nernst potential across the membrane. This suggests that chloride transport - if any occurs - is electrosilent. Analogous experiments performed with macrovesicles immersed in diluted electrolytes (1/10mM) showed a slight change of about 2-2.5 mV, but only for ionic compounds and never with uncharged ones. These results were interpreted in terms of a change in the electromotive force (EMF) of our concentrational cell due to an increase in the Cl^- content in the outer cell. As the Et_3Me^+ cations behave as weak acids, its natural to postulate that OH^- is transported in the opposite direction, facilitating recirculation of the carriers. However, we did not observe considerable differences between the tin and lead compounds. The pK_a of these two cations differs considerably and, particularly for Et_3Pb^+ in a neutral or weakly acidic environment, there is a low amount of hydroxo complexes. We can postulate here that other anions present in the solutions can participate in the recirculation of the carriers, such as the bicarbonate anion present in all reagents and water, due to the solubility of atmospheric carbon dioxide.

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