Enhanced Transbilayer Reorientation Rates of Phospholipids in the Erythrocyte Membrane after Cross-linking of Spectrin without Changes of Membrane "Fluidity"

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Oxidation of membrane SH-groups in human erythrocytes by tetrathionate or diamide, which goes along with cross-linking of spectrin, the major extrinsic membrane protein, has been shown to induce a net reorientation of phospholipids from the inner to the outer layer of the membrane, but not in the opposite direction (1).

We could now demonstrate that this transbilayer reorientation of phospholipids is due to an increase of their "transversal mobility", since oxidation of SH-groups also induces an increase of the rate of transmembrane reorientation of exogenous lysophospholipids to the inner layer of the membrane after their insertion into the outer lipid layer. In the case of lyso-palmitoylphosphatidylcholine this increase amounts to about 500%.

Since changes of membrane "fluidity" appeared to be the most obvious interpretation for these changes of reorientation rates, fluorescence polarisation of DPH (1,6-diphenyl-1,3,5-hexatriene) was measured in cells treated with SH-oxidizing agents. No significant differences in the polarisation of DPH could, however, be demonstrated between control and diamide (tetrathionate)-treated erythrocytes.

Thus alternative reasons for the enhancement of phospholipid reorientation have to be considered, such as a local "fluidization" of the membrane due either to lipid phase separations or to focal perturbations of the lipid bilayer as a result of spectrin modification.

(1) Haest, C.W.M., Plasa, G., Kamp, D. and Deuticke, B. (1978) Biochim. Biophys. Acta 509, 21 - 32.

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