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REGULATION OF THE ASYMMETRIC LIPID DISTRIBUTION IN THE HUMAN ERYTHROCYTE MEMBRANE AT GLYCEROL AND POLYETHYLENE GLYCOL EFFECTS

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Cryoprotective agents (CPAs) used to protect erythrocytes during freezing can affect the structural and functional parameters of the membrane, which have an impact on cell viability. The aim of the study was to examine the effect of glycerol and PEG on the externalization of phosphatidylserine (PS) on the surface of erythrocytes, as well as to determine the role of Ca^{2+} ions and ATP-dependent processes in the regulation of transmembrane lipid asymmetry

at CPA presence. It was revealed that glycerol effect on erythrocytes does not lead to PS externalization. Maintaining the activity of scramblases and flipases in erythrocytes at glycerol presence at the level of control parameters allows them to respond similar to native cells to an increase in $[Ca^{2+}]_{in}$ caused by the ionophore A23187 and blocking of ATPase reactions caused by vanadate. The PEG effect contributes to the disruption of the PS distribution in the membrane due to changes in the activity of lipid translocases. However activation of scramblases and/or inhibition of flipases under the PEG effect does not reach maximum values, as attested by an increase in the amount of erythrocytes with externalized PS under cell loading with Ca^{2+} by ionophore and inhibition of ATP-dependent reactions by vanadate. The PEG effect on the lipid asymmetry of erythrocyte membranes is obviously mediated by its impact on the Ca^{2+} level in the cells. Disturbance of the membrane structure parameters due to the PS redistribution at the presence of PEG that distinguish it from the glycerol effect can cause instability of cryopreserved erythrocytes under physiological conditions *in vitro*.

Keywords: erythrocyte, membrane, phosphatidylserine, calcium, glycerol, polyethylene glycol, cryoprotective agent