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THE EFFECT OF TRIFLUOPERAZINE ON THE STABILITY OF MAMMALIAN ERYTHROCYTES UNDER POSTHYPERTONIC SHOCK

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The development of new approaches for long-term storage of biological specimens, in particular erythrocytes, remains a pressing issue. The model of posthypertonic shock (PHS) allows studying the effect of cryodamage factors on cells at one of the stages of low-temperature preservation, associated with warming and removal of cryoprotective agent. Previously it was shown ability of trifluoperazine (TFP) to reduce the level of cell damage under hypertonic shock and hypertonic cryohemolysis conditions, which simulate the effects of cryoinjury factors during the freezing stage of erythrocytes. The aim of research was to study the antihemolytic properties of trifluoperazine to increase the resistance of human and rat erythrocytes under posthypertonic shock. Posthypertonic shock of erythrocytes was carried out by transferring erythrocytes from dehydration medium (1.65 mol/L NaCl) into rehydration one (0.15 mol/L NaCl) at 37 or 0°C. TFP was added into the rehydration medium before transferred the cells. The level of erythrocytes hemolysis was determined spectrophotometrically (λ = 543 nm). It was found that TFP at temperature 37°C did not reduce hemolysis level of human and rat erythrocytes, however at 0°C TFP decline hemolysis level under PHS. The effective concentrations of TFP were 150 and 175 μmol/L for human and rat erythrocytes respectively. The antihemolytic activity of TFP for human erythrocytes was 60%, for rat cells – 84%. The protective effect of TFP under conditions of PHS at a temperature of 0°C is most likely associated with the state of the erythrocyte membrane at a low temperature. At a temperature of 0°C, membrane components are less mobile and TFP molecules, incorporated into the bilayer, are able to "fix" microdefects that formed during the dehydration stage and prevent growth them to the hemolytic pore at the rehydration stage. The efficiency of TFP is higher for rat erythrocytes compared to human cells under PHS conditions. TFP as cationic amphiphilic compound is incorporated into the inner monolayer of the erythrocyte membrane, enriched of acidic phospholipids. Since this indicator is higher for rat cells, it can be assumed that the high antihemolytic activity of TFP may be due to the ability of rat erythrocyte membranes to bind a significant number of amphiphilic compound molecules.