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MAMMALIAN ERYTHROCYTE SENSITIVITY TO HYPERTONIC SHOCK UNDER CONDITIONS OF PRE-INCUBATION OF CELLS IN SUCROSE MEDIA

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Study of sensitivity of mammalian cells to changed environmental conditions is one of the most exciting and informative research areas of cell biology. This is especially important during long-term storage of cells. That is, when freezing a cell suspension there is found a sharp increase of osmoticity of extracellular solutions, which is a major damaging factor under these conditions. Pre-treatment of cells using the compounds with a cryoprotective effect reduces a cell damage at freezing stage.

In our research as the object of study there were selected the mammalian erythrocytes (human, equine, rabbit, rat), which are exposed to short-term hypertonic shock, i.e. incubation in 4 M NaCl (5 min). Preliminarily the cells were incubated in sucrose solution (0.2 - 1 M) for 2 min to remove osmotically active water. The research was performed at 37 °C. The share of damaged cells was spectrophotometrically determined at 543 nm wavelength.

The dependences of cell hypertonic hemolysis on sucrose concentration in the medium prior incubation were obtained. For human, equine and rat erythrocytes there was observed a change in sensitivity to hypertonic shock after incubation in sucrose medium. An exception is the rabbit erythrocytes, that as we believe is due to generally low level of hypertonic hemolysis of its cells. It should be noted that the shape of hemolytic curves are species-specific, and each of them has a minimum at determined sucrose concentration. Rat's erythrocytes show a minimal sensitivity to hypertonic shock after pre-incubation in 0.3- 0.6 M, the equine ones do in 0.4 - 0.6 M, and human erythrocytes in 0.6 M sucrose. The deepest minimum is inherent to human erythrocytes: due to conditions of pre-incubation in sucrose media their hypertonic injury reduces from 85 to 15%. For rat's erythrocytes under these conditions a decrease from 40 to 10% is observed, for equine erythrocytes it is found from 50 to 30%.

Thus it could be concluded that pre-incubation of mammalian erythrocytes in sucrose medium is able of significant altering their sensitivity to hypertonic effect. Certain degree of cell dehydration caused by hyperosmotic concentration of sucrose probably affect positively the cell resistance to further influence of osmotic shock. The difference between in erythrocyte sensitivity of different mammalian species to hypertonic shock and pre-incubation in the media which contain the certain sucrose concentration can be stipulated with various content of intracellular water.