The research aim work was a comparative study of structural and functional state and capacity for differentiation of multipotent mesenchymal stromal cells, stored at various temperatures either as cell suspensions or within alginate microspheres. Storage was carried out in a culture medium based on α-MEM at temperatures of 4, 22 and 37 °C in sealed cryovials. After 1, 2 and
3 days the alginate microspheres were dissolved and viability (MTT test), the attachment properties and metabolic activity (AB test) were evaluated in monolayer cell culture. It has been shown that the storage of the mesenchymal stromal cells in suspension for 3 days at the indicated temperatures resulted in a decrease of the studied parameters. Mesenchymal stromal cells after storage within alginate microspheres at 22 and 37 °C showed a high viability (78 and 87%, respectively), kept the attachment properties (62 and 70%), metabolic activity (79 and 75%) and ability to differentiation. The results indicate that the mesenchymal stromal cells entrapped in alginate microspheres are more resistant to storage conditions than a suspension of mesenchymal stromal cells. Entrapment in alginate microspheres is a promising technological approach for a short-term storage of mesenchymal stromal cells at positive temperatures.

**Key words:** multipotent mesenchymal stromal cells, alginate microspheres, metabolic activity, induced differentiation.

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