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Presence of Clustered GM1 Ganglioside in the Membrane of Endometrial Mesenchymal Stem Cells is Dependent on Cell Cycle Stage

V. I. Chubinskiy-Nadezhdin^{a,*}, M. A. Shilina^a, A. V. Sudarikova^a, O. G. Lyublinskaya^a,
Yu. A. Negulyaev^a, and E. A. Morachevskaya^a

^a Institute of Cytology RAS, St. Petersburg, 194064 Russia

*e-mail: vchubinskiy@gmail.com

Gangliosides, representing of the group of sialic glycosphingolipids, are typical components of lipid rafts of cell membranes that play an important role in the processes of reception and signal transduction. Gangliosides attract specific attention as possible regulators of directed differentiation of mesenchymal stem cells (MSCs). GM1 ganglioside is considered as a marker of lipid microdomains, and fluorescence labeling of clusters of GM1 molecules is

one of the main methods for assessing the integrity or destruction of rafts in various types of cells. At the same time, data on the presence and possibility of determining GM1 ganglioside in the plasma membrane of MSCs are extremely limited. The objective of this work was to identify the ganglioside GM1 in the membrane of human endometrial MSC (eMSC) using an experimental approach based on interaction with the pentamer of the beta subunits of cholera toxin (CTB). Fluorescence staining of cells using FITC-CTB conjugate revealed the heterogeneity of the eMSC culture by the presence of GM1 membrane clusters. Experiments on synchronized culture have shown that the amount of clustered GM1 in the eMSC plasma membrane depends on the phase of the cell cycle: it is maximum when the cells are stopped at the G₀/G₁ phase boundary and decreases when proliferation starts, reaching a minimum in the G₂/M phases. The data suggest the functional role of GM1-containing lipid rafts in cell cycle of eMSCs and possible changes in the mechanical properties of the membrane during preparation of the cells for division.

Keywords: X plasma membrane, ganglioside GM1, lipid rafts, mesenchymal stem cells, cell cycle