

Thematic area of your work «Nanostructured surfaces»

Ability of Al₂O₃ Nanocoatings to Change *Ido* Gene Expression Level in Mesenchymal Stromal Cells

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Development of tissue engineering and stem cell technologies determines the need in the elaboration of innovative methods to control cell functional state. In this field the search for approaches of directed modification of functional status of mesenchymal stromal cells (MSC) applying in clinical practice should be emphasized. In this regard the use of nanomaterials, which can be both the substrates for MSC culture and factors of their status regulation, is promising. The possibility of control a cell state due to modification of nanocoating surfaces was shown [1]. However, there are just a few data on the effect of nanomaterials on the state of cells of stem compartment.

The objective of research was to study the influence of Al₂O₃ nanocoatings on *ido* gene expression level in MSC, which is responsible for their immunosuppressive activity.

In this study MSC culture of CBA mice bone marrow obtained by a standard method were used. The cells were cultured on glass substrates without or with Al₂O₃ nanocoating. Application of Al₂O₃ was performed with DC magnetron and HFI discharge-based ionic source (device VU-2M). The level of *ido* gene transcripts in the cultured MSC was determined by real-time PCR [2].

The results of analysis of *ido* gene expression demonstrated the 3.6-fold increase in the content of its transcripts in MSCs cultured on Al₂O₃ nanocoating after the 1st passage. Essentially that after the 2nd passage *ido* gene expression level in the control (glass) was decreased by 2 times, whereas it remained quite high in cells cultured with Al₂O₃. Herewith after the 2nd passage the level of transcripts of the studied gene was 7.3 times higher as compared to the control group.

These findings discover the prospects for improvement of the methods of MSC culturing on nanocoatings with directed changes of their functional characteristics and their possible application in clinical practice, in particular for treatment of graft-versus-host disease.

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2. Michael W.P. A new mathematical model for relative quantification in real-time RT-PCR // *Nucleic Acids Research*.- 2001.- N 9.-P.1829-1834