Research topic «Nanostructured surfaces»

Ability of Al_2O_3 Nanocoatings to Change *Ido* Gene Expression Level in Mesenchymal Stromal Cells

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Use of stem cell technologies as a component whenn development of tissue engineering determines the necessity in improving the original methods to control the functional state of progenitor cells. Of a special value is the search for the ways of directed modification of mesenchymal stem cells (MSCs) functional status during their culturing *ex vivo*. The possibility of controlling the state of cells under the effect of nanocoatings playing the role of regulation factors for their functional potential is known [1]. However the data regarding the stem compartment cells are poor. One of the key characteristics of MSCs is their immune modulating activity, the implementation of which is related to *ido* gene expression. The very this gene has a key role in activation of an immune system suppressor link.

The research aim was to study the effect of Al_2O_3 nanocoatings on the *ido* gene expression level in MSCs, which is responsible for the manifestation of their immune suppressing activity.

In the work there were used the MSCs of CBA mice bone marrow. The cells were cultured on glass Petri dishes with and without Al_2O_3 nanocoating. To apply Al_2O_3 nanocoating there were used constant-current magnetron and BY-2M device [2]. Content of *ido* gene transcripts in cultured MSCs was examined with RT-PCR [3].

There was demonstrated the increased content of *ido* gene transcripts in MSCs cultured on Al_2O_3 nanocoating if compared with the control (glass). It is important that even after the first passage their content increased in 3.6 times. After the 2nd passage in the control the *ido* gene expression rate decreased twice, while in the cells cultured on Al_2O_3 it remained quite a high. In this connection after the 2nd passage the level of transcripts of the studied gene was 7.3 times higher than in the control.

The findings open the prospects of improving the methods of MSCs culturing on nanocoatings to change their immune modulating potential and to use in clinic particularly when treating graft-versus-host disease.

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