Challenges of Life Support/Medical Support for Human Missions (8)
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Author: Dr. Andrey Ratushnyy
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation, ratushkin@mail.ru

Mr. Danila Yakubetz
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation, lizard_96@mail.ru
Prof.Dr. Ludmila Buravkova
State Scientific Center of Russian Federation, Institute of Biomedical Problems, Russian Academy of Sciences, Russian Federation, buravkova@imbp.ru

PARACRINE ACTIVITY OF MESENCHYMAL STEM CELLS UNDER SIMULATED MICROGRAVITY

Abstract

Progenitor cells such as mesenchymal stem/stromal cells (MSCs) are an important member of the stem cell family and can be found in most postnatal organs and tissues. As a source of trophic mediators, MSCs secrete the wide range of cytokines, growth factors, extracellular matrix components, proteases, microvesicles to maintain tissue homeostasis. It was shown that real and simulated microgravity (smg) can significantly affect the functional characteristics of adult stem cells. The purpose of this study was to investigate MSC paracrine activity under smg. A desktop Random Positioning Machine – RPM (Dutch Space, Netherlands) was used to simulate microgravity effects. Samples were run on the RPM for 6, 24, 48 and 96 hours. Conditioned medium (CM) from all samples was collected for further analysis of MSC secreted proteins. To detect more than 100 secreted proteins, conditioned medium were analyzed using dot-blots and ELISA. Total RNA was extracted from MSCs for qPCR analysis of 84 growth factors and 84 matrix-associated genes. Smg had not a significant impact on MSC viability. The proportion of living cells did not differ between the experimental groups and was more than 95Therefore, the study demonstrated enhanced paracrine activity of MSCs under smg. It was shown that the production of interleukins, growth factors and matrix-associated proteins was susceptible to smg. These alterations may result in functional activity modulation of progenitor cells in tissues. This work was supported by the project of scientific Programm IBMP RAS and RFBR grant 19-29-04026.