VITALITY OF TUMOR CELLS AND FIBROBLASTS BY MICROGRAVITY MODELING

M.O. Khotianovich[1], Y.P. Stukach[1], N.M. Navasiolava[1,2]
M.-A. Custaud[2], V.A. Kulchitsky[1]

[1]The Institute of Physiology of National Academy of Sciences, Minsk, Belarus
[2]UMR CNRS 6214 – INSERM 1083, Université d'Angers, France

Problem microgravity attracted the attention of scientists and physicians from the time of training for space flight. The first human flight to space revealed a number of health issues, the solution of which depended on the prospect of space exploration. Researchers have begun to investigate the influence of simulated microgravity on living organisms [1, 2]. The results of one such study are shown below.

Methods. C6 rat glioma cells and FLv human fibroblasts were cultivated (concentration 2×10^5 cells/ml) in 25 ml flasks in F10 medium with 10% fetal bovine serum and 10^{-4} g/ml gentamycin sulfates. Flasks were placed in CO_2 incubator at 5% CO_2 and 37°C. Flasks position was changed to ∠60º from the horizontal during experiments with C6 rat glioma cells and human fibroblasts cultures. Rotation was carried out in 40-48 hours after reaching 70% confluence. The change in full strength direction was made for 24 hours. One flask stayed in horizontal position during the experiment (No 1) and the other one was tilted ∠60º relative to the horizon (No 2). The results of observations were compared. The monitoring of analogue events was carried over 24 hours using inverted microscope Opton ISM-405 with an increase in lens 16x and Leica DC 300F camcorder, and then the events were accumulated in digital form on the computer every 10 minutes. The 24-hour monitoring was carried out to determine the features of proliferative activity of cultured cells. The research was made on tumor and non-tumor cell cultures. Passaged culture of rat glioma C6 was chosen as tumor cells, passaged culture of FLv line fibroblasts – as non-tumor cells. The calculation of the number of cells in the visual field was made considering the area the calculation took place in. The area of the field was 900 x 700 μm.

Results and Discussion. Figure 1 plots the curves showing the changes in C6 glioma cells number in horizontal position and in ∠60° flasks rotation. Flasks were standing in horizontal position *(control)* and in ∠60° flasks rotation *(exp)*.

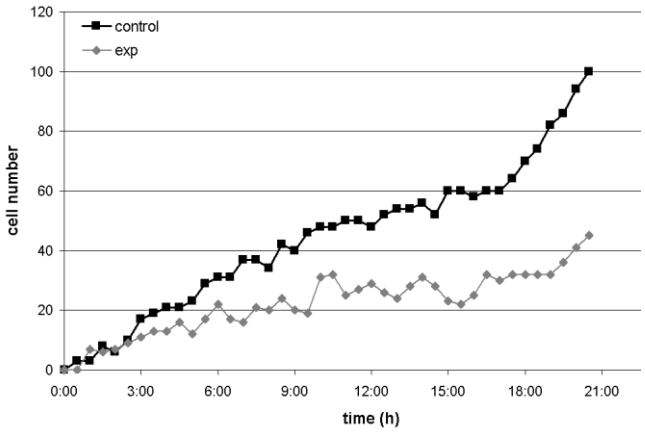

Fig. 1. Explanations in the text

Figure 2 plots the curves showing the changes in the number of human FLv-line fibroblasts. Flasks were standing in horizontal position *(control)* and in ∠60° flasks rotation *(exp)*.

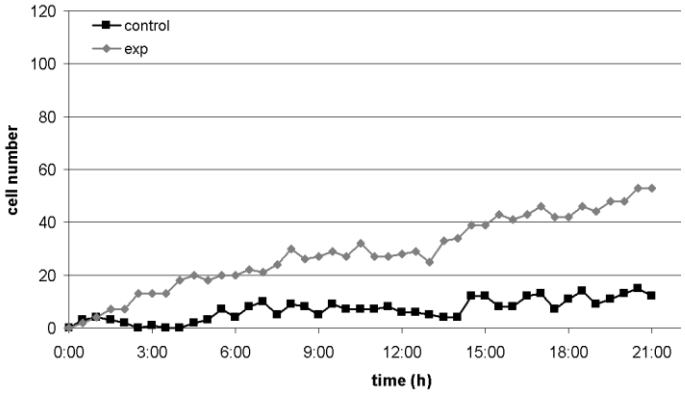

Fig. 2. Explanations in the text

The data on the structural and functional shifts in cell cultures when changing their position in space were obtained in conducted experiments. **It was found that the change in full strength direction provides an inhibitory effect on tumor glial cells (Fig. 1). Fibroblasts' proliferative activity enhances at the same situation (Fig. 2).** Namely the shift of full strength direction, which is one of the factors of wildlife development under gravity, comes out the cause of transformations in living cells in changing both the body position in space and the flask with culture position. The modeling of full strength direction shift in conducted experiments was accompanied with multidirectional changes in proliferative processes in fibroblasts (FLv) and C6 glioma cultures (Figures 1 and 2). The obtained data raised new questions about the effects of the factors of microgravity on living organisms.

References

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