

comparative electrophysiological and microfluorimetric investigations of the cells, which have been exposed to space flight factors, will be conducted after space mission in a ground-based laboratory. For this ground-based experiment, the isolated cultivated cells kept under sterile conditions in a microincubator will be used, and the cells from rats, which were in the orbital station, will be tested in parallel.

The following methods will be used: cell cultivation, microphotography, computer morphometric analysis, electron microscopy, electrophysiological and electrochemical investigations.

This complex space-based and ground-based research will allow clarifying the nature of morphological and functional changes, as well as changes in development of the corresponding cells.

«Immunity» Experiment
IMMUNE RESPONSE IN MICROGRAVITY

Skok M. V.

*O. V. Palladin Institute of Biochemistry, NAS of Ukraine
9 Leontovych St., Kyiv 01030 Ukraine
tel: (380) +44 +2243354, fax: (380) +44 +2296365, e-mail: skok@biochem.kiev.ua*

Space flight factors, primarily, microgravity, affect all the functional systems of an organism. One of the most sensitive is the immune system.

The experiment will study microgravity effects on the immune response of test animals. Immunological approach to analysis of cellular processes occurring under microgravity will be used. The main objective is to identify the most vulnerable elements of the immune response in microgravity.

For this purpose, in the first set of experiments, it is planned to send on board the URM several groups of mice with different degrees of immunisation, and to study their immune response to the model antigens compared to control groups. Such an approach will enable following the effect of microgravity at different stages of the immune response: antigen presentation and primary recognition, germinal

centre and memory cell formation, as well as secondary immune response. In the second set of experiments, the cultivable antibody-secreting cells and hybridomas will be delivered to the space station. The rate of the antibody production, as well as the proliferation processes occurring under microgravity will be studied. In addition, the blood sera of both test animals and astronauts will be examined for the presence of natural antibodies.

The modern experimental techniques, such as immunoenzyme assays and immunoblotting will be used to determine the quantity and specificity of the antibodies produced. The expected results will help to determine the exact stages of the immune response, which are the most sensitive to the effect of space flight factors.

«Oblast» Experiment
INFLUENCE OF MICROGRAVITY ON OSTEOGENESIS

Rodionova N. V.

*I. I. Shmalhauzen Institute of Zoology, NAS of Ukraine
15 B. Khmelnytsky St., 01601 Kyiv Ukraine
tel: (380) +44 +2259084, fax: (380) +44 +2241569, e-mail: root@iz.freenet.kiev.ua*

The purpose of the experiment is to study the cytological mechanisms of gravity-dependent changes in the developing and mature bone skeleton under

the space flight conditions for devising methods to correct them. The main objectives are the following:
— to study peculiarities of proliferation, differen-

tiation, specific functioning and metabolism of osteoblasts, osteocytes and osteoclasts, as well as their morpho-functional interactions during osteogenesis and resorption;

— to study intensity of osteoplastic and resorptive processes in bones using ultrastructural criteria worked out by the author;

— to define peculiarities of specific metabolism of the osteogenic cells (including changes in Ca^{2+} -balance);

— to study organisation of the vascular-cellular complexes in osteogenic and resorptive zones and bone compact substance;

— to establish mechanisms of correction of the os-

teoporotic remodelling by biphosphonates or other protectors.

Objects of investigation will be the bones of white rats or mice (3-4 weeks old), which were at the space station for 7-14 days and have been returned to the Earth. The methods of histology, electron microscopy, autoradiography (with ^3H -thymidine, ^3H -glycine, ^{45}Ca), cytochemistry, osteodensitometry will be used.

Obtained data on cytological mechanisms of gravity-dependent changes in the bone tissue will be important for working out recommendations as regards their correction.

«Regeneration» Experiment

REGENERATION OF FISH DERMOSKELETON IN MICROGRAVITY

Pegueta V. P.

I. I. Shmalhauzen Institute of Zoology, NAS of Ukraine

15 B. Khmelnytskogo St., Kyiv 01601 Ukraine

tel: (380) +44 +2648406, fax: (380) +44 +2241569, e-mail: Gennady@concord.kiev.ua

The purpose of the experiment is to study the influence of microgravity on periosteal ossification in order to determine the cause of the bone calcification disturbance.

From this point of view, a study of the influence of microgravity on development of the dermoskeleton is the most important, because its bone elements (rays of fins and scales) are of periosteal origin.

A convenient object of investigation is a dermoskeleton of the small aquarium fish *Poecilia reticulata*. Two approaches can be used to meet this objective, namely:

— to experiment with the larvae, which have no bone skeleton yet. Study of the structure of dermoskeleton elements after landing will permit clarifying the influence of microgravity on initiation of ossification and development of dermoskeleton elements.

— to experiment with the adult fishes with partly (2/3) amputated caudal fins. A comparative analysis of the amputated part of fins and their regenerates after landing will permit to find out the influence of microgravity on periosteal ossification.

Histological, histochemical and electron-microscopy methods will be used.