

«Liposomes» Experiment

INFLUENCE OF MICROGRAVITY ON STRUCTURAL AND FUNCTIONAL PROPERTIES OF ARTIFICIAL PHOSPHOLIPID MEMBRANES

Borisova T. A.

*O. V. Palladin Institute of Biochemistry, NAS of Ukraine
9 Leontovych St., Kyiv 01030 Ukraine*

tel: (380) +44 + 2243254, fax: (380) +44 +2296365, e-mail: tborisov@palladin.biochem.kiev.ua

The main purpose of the experiment is to study the influence of microgravity on the properties of model biological membranes. Application of artificial phospholipid vesicles (liposomes) as models of biomembranes for research of lipid bilayer state is planned. Several unique advantages make liposomes a powerful experimental model to study the properties of biomembranes. Influence of gravity on the molecular mechanisms can be easily investigated in such simplified model systems as liposomes.

The liposomes to be used in the experiment will be obtained directly on board the station. The interaction of liposomes with ribosomes, process of liposome's fusion, as well as the binding of liposomes with various proteins will be studied. The fluorescent «fusion-reporting» probe — *octadecyl Rhodamine*

B-chloride (R18) will be used for this purpose. This probe will be incorporated both into the membranes and ribosomes. The same experiment will be carried out under the conditions of gravity (in the ground-based laboratory).

Comparison of the results obtained in space and in the ground-based laboratories will allow selection of parameters of a quantitative nature from the wide parameter range. Results will provide a much more profound insight into the fundamental mechanisms of membrane interaction with ribosomes and proteins, as well as the membrane fusion process. The experiment will also enhance our understanding of the changes occurring in membranes during the space flight, as well as the role of gravity in the maintenance of normal cell activity.

«Messengers-1» Experiment

FUNCTIONING OF SECOND MESSENGERS (Ca⁺⁺-CALMODULIN, ADENYLATE CYCLASE)

Yavorska V. K.

*Institute of Plant Physiology and Genetics, NAS of Ukraine
31/17 Vasylkivska St., Kyiv 01022 Ukraine*

tel: (380) +44 +2635160, fax: (380) +44 +2635150

In this experiment it is planned to study adenylate cyclase system functioning under altered gravity. It is assumed that system of cAMP and Ca⁺⁺-homeostasis system take part in signal transduction. Following this hypothesis, the molecular mechanisms of gravity stimulus transduction into plant cell under altered gravity will be clarified.

Objects of investigation will be the seven- and eight-day old rye seedlings. The methods of thin-layer chromatography and high performance liquid chromatography, gel-chromatography, ion-exchange

chromatography (DEAE-cellulose), and of affinic chromatography will be used. It is intended for the following items:

- to determine the cAMP content,
- to study PDE properties under the action of Ca⁺⁺-calmodulin, phytohormones and other allosteric regulators under microgravity,
- to study the mechanism of interaction of two systems of second messengers under microgravity using adenylate cyclase system modulators and Ca⁺⁺-metabolism antagonists.