

## «Expression» Experiment

## GENE EXPRESSION IN PLANTS IN MICROGRAVITY

Prima V. I.

*Institute of Molecular Biology and Genetics, NAS of Ukraine  
150 Zabolotny St., Kyiv 03143 Ukraine  
tel: (380) +44 +2661139, fax: (380) +44 +2660759*

It is known that specific genes of many plants are to be activated by extreme factors. It allows plants to survive and to adapt to the environmental stresses. Some of these genes have already been selected and cloned. There is evidence that altered gravity acts similar to an extreme factor producing a shock effect at the cell level. It is suggested that changes in gene expression can also ensure an adaptation to microgravity.

The purpose of experiment is to examine plant tissues for the intermediates in signal transduction pathways after space flight and clinostating in comparison with unit gravity conditions. It is important also to determine the cellular content of high and low molecular weight proteins and specific RNA or RNP, which are coded by various types of stress-related genes, in particular, c-myc, c-fos, hsp 70, SOD, SAUR and ubiquitin genes. Correlation of different types of nuclear RNP (mRNP, rRNP,

regulatory RNP), cytoplasmic RNP (mRNP, rRNP) and the poly(A)+RNA «spectrum» will be also studied.

The methods of purification and quantification of nucleic acids from plant seedlings, PCR technique for generation of probes for stress-related genes, DNA fractionation and agarose gel electrophoresis, Northern-blot hybridization, Western-blot hybridization and electrophoresis in polyacrilamide gels will be used to meet these objectives. Comparative analysis of results obtained during this experiment and those obtained before in flight and clinostat experiments will be done.

This integrated research will reveal interrelations between various links of the process of gravity perception, signal transduction and generation of biochemical and physiological responses of plant cells to altered gravity.

## «Chaperones» Experiment

## INFLUENCE OF MICROGRAVITY ON PROTEIN BIOSYNTHESIS

Kravets V. S.

*Institute of Plant Physiology and Genetics, NAS of Ukraine  
31/17 Vasylykivska St., Kyiv 01022 Ukraine  
tel: (380) +44 + 2633108, fax: (380) +44 +2635150, e-mail: KVS@ifrg, freenet.kiev.ua*

The role of molecular chaperones in plant cell reactions to the action of microgravity will be studied in this experiment. It is proposed to test the hypothesis which consists in that rearrangements in protein synthesis processes at the cellular and sub-cellular levels in microgravity can be adaptively significant and can change the reaction of plants to other types of abiotic stresses.

Proposed experiments with plants grown in altered gravity will include identification of changes in protein synthesis by means of PAGE and immunoblot-analysis of organelle proteins. Specificity of the synthesis and transport into mitochondria and nuclei of the hsp70 and members of other molecular

chaperones families at the different stages of maize caryopsis germination and seedlings development in microgravity will be also studied. This research will include an identification of molecular chaperones in different cell fractions. In view of the technical impossibility to study the protein de novo formation under space flight conditions, we intend to apply the methods of metabolic radiolabelling in the laboratory experiments only.

The data concerning the influence of altered gravity on gene expression, protein synthesis and transport of newly synthesized polypeptides to cellular compartments will be obtained.