

1. Experiment Title

Mechanisms of Gravity Resistance in Plants

- From Signal Transformation and Transduction to Response

2. Principal Investigator

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3. Outline of Experiment

Resistance to the gravitational force is a principal graviresponse in plants, comparable to gravitropism. The present study aims to clarify the mechanisms of gravity resistance, in particular the processes from signal transformation and transduction to response, by the space experiment. The ground-based experiments using hypergravity conditions have indicated that membrane sterol rafts and cortical microtubules are deeply and independently involved in maintenance of normal growth capacity against the gravitational force. To confirm that the hypothesis is applicable to plant resistance to 1 g gravity on earth, we will cultivate *Arabidopsis* mutants defective in formation of membrane rafts and cortical microtubules as well as the wild type under microgravity and at 1 g conditions in CBEF, and compare growth phenotypes, gene expressions, and the cell wall properties. We will also analyze the changes in dynamics of membrane rafts and cortical microtubules under microgravity conditions by observing GFP-expressing *Arabidopsis* strains with a fluorescence microscope in CB. The results obtained in the present study will contribute to efficient plant production not only in space but also on earth.

4. Experiment Facility

Cell Biology Experiment Facility (CBEF)

Plant Experiment Unit (PEU)

Image Processing Unit (IPU)

The Minus Eighty Degree Celsius Laboratory Freezer for the International Space Station (MELFI)