

Overview of Kibo experiment candidates for around 2012

1. Experiment Title

Evaluations of physiological responses to space environmental stresses by using medaka live imaging

2. Principal Investigator

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3. Outline of Experiment

The full-scale operation of the International Space Station has started. The evaluation of influences on astronauts under space environmental stresses during space flight is one of the most important research topics in the space medicine. The aim of this study is to verify the physiological influences of the space environment such as microgravity and the space radiation on living organisms from a basic biomedical point of view by using medaka – small teleosts. Some of the Medaka strains have transparent body and have been proven the survivability in space.

To accomplish the aim, we will conduct three plans for quantitative physiological evaluations under space environment by using the live imaging technique - muscle atrophy by reduction of muscle activity, alteration of autonomic nervous system by digestive functions and heart rate analysis, and behavior analysis. This experiment contributes to the development of the method for evaluation and analysis to health effect in the long term mission. This proposal will not require the returned sample collections because it is completed by the remote image acquisition on orbit, data transfer and analysis of those image data on the ground.

The slow muscle atrophy is quantitatively evaluated by the fluorescent intensity of slow muscle myosin heavy chain, which is expected to be associated with the amount of slow muscle and to change under the microgravity environment. In the functions of internal organs, the peristaltic movement in the gut and the change in the heart rate are quantitatively evaluated to analyze the alteration of the autonomic nervous system. The learning process under the space environment would be evaluated through the observation and calculation of the medaka behavior. These data will be expected to be applied to the stress forecast or health care of astronauts during space flights.