

[Grant - in - Aid for Scientific Research on Innovative Areas(Research in a proposed research area)]
Interdisciplinary Area



Title of Project : "LIVING IN SPACE" - Integral Understanding of life-regulation mechanism from "SPACE"

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Research Project Number : 15H05935 Researcher Number : 20726260

【Purpose of the Research Project】

We investigate plasticity and collapse of life from extreme environment in space perspective. Plasticity is homeostasis by adaptation, restoration, resistance and resilience. Collapse is irreversible damage that destroys the homeostasis. It is a risk when staying in space for a long time. We investigate mainly three risks of extreme environment in space: zero-gravity, isolation, space radiation and microorganism. The purpose of our study is to integratedly understand the life controlling system from molecular-cell to high-levels, to comprehend the interrelation and combined effects and to challenge an unknown territory. Furthermore, we would like to apply the knowledge that we get to overcome challenges in super-aging and high-stress society.

【Content of the Research Project】

Our team consists of mainly eight universities and two research institutions including JAXA. We have three major research items.

In A01, molecular-cell bases of responses to gravity is investigated at cell, tissue and organ levels. The three research topics here are cell mechanosensing, nerve/muscle/metabolism and maintenance of skeletal muscles and stem cells.

In A02, effect of long duration stay in space on high-level homeostasis is handled. The five research topics here are circulatory control system, plasticity of vestibular system, autonomic nervous system, sleep-awakening, zero gravity and isolation environment.

In A03, space radiation and microorganism risk is chosen. The three research topics here are acute and late effects of space radiation, change of microorganisms.

Keeping these three pillars, our team members cooperate each other in a coordinated fashion.

We actively promote joint researches with researchers overseas, i.e., inviting advanced researchers and holding symposiums, sending young researchers abroad, and creating a global base that contributes to activation of international exchange.

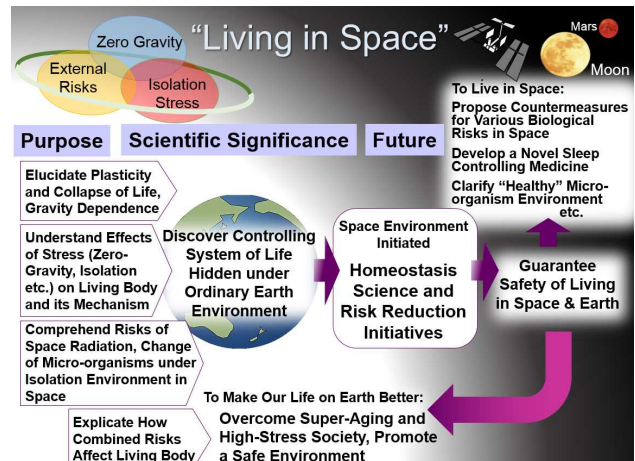


Fig. 1. Purpose, Scientific Significance and Future

【Expected Research Achievements and Scientific Significance】

Integrated understanding of the new controlling system of life from space point of view will enable us not only to overcome risks during long stay in space, but also to contribute to solving challenges in super-aging and high-stress society and to make our life on Earth better (Fig. 1).

Our achievements would affect philosophical view of life as well as science and medicine. Moreover, they stimulate the young's interest in space and science.

【Key Words】

Extreme environment in space: Zero gravity induces muscle atrophy, bone mass decrease and irregularity in the circulatory system. Psychological stress in long time isolation in space causes imbalance in autonomic nervous and endocrine systems as well as dysregulation of the immune system. "Healthy" microorganism environment and protection from space radiation are needed.

【Term of Project】 FY2015-2019

【Budget Allocation】 1,172,900 Thousand Yen

【Homepage Address and Other Contact Information】

<http://www.living-in-space.jp>