

Alterations of *C. elegans* muscle fibers by microgravity

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We successfully confirmed the effectiveness of RNAi technology under microgravity in the *C. elegans* RNA interference space experiment (CERISE) (PLoS One 2011, 6, e204591). We also found that the expression levels of muscle and cytoskeleton proteins were repressed in the spaceflown *C. elegans*. Moreover, certain gene expressions involved in energy metabolism were repressed and oppositely sirtuin gene induced by caloric restriction was upregulated under microgravity. These findings indicate that spaceflown *C. elegans* 1) have reduced muscle and cytoskeletal protein concentration, and 2) demonstrate altered mitochondrial energy metabolism towards a saving energy mode.

In this proposal, we clarify whether *C. elegans* muscle fibers and cytoskeleton networks in each cell and individual were altered in response to microgravity. We also study whether insulin/IGF-1 signaling is sufficient to account for the muscular, cytoskeletal and metabolic changes using GFP imaging system. As summary of space flight experiment, wild-type and certain mutants are cultured in both microgravity and 1G centrifuge conditions on boat for 4 days starting from each L1 larva, and for additional 24 hr in 1G condition. All samples are fixed on boat and recovered, and analyzed on the earth. These results will be a clue to solve the effect of microgravity on muscle atrophy in astronauts.