

Effect of resistance exercise on the recovery of atrophied muscles in mice

Yuta Itoh^{1,2}, Nobuhide Agata³, Masumi Miyazu⁴, Masahiro Sokabe^{1,5} and Keisuke Kawakami¹

¹Nagoya University Graduate School of Medicine, Japan, ²Faculty of Rehabilitation, Nagoya Gakuin University, Japan, ³Faculty of Health Sciences, Hamamatsu University, Japan, ⁴Aiche Medical College for Physical and Occupational Therapy, Japan, ⁵FIRST Research Center for Innovative Nanobiodevice, Nagoya University, Japan.

The aim of this study was to examine whether resistance exercise (RE) would promote the recovery of atrophied muscles in mice. Skeletal muscle atrophy was induced in ICR male mice (ten weeks old) by suspending their tails for two weeks (TS). Then the animals were subjected to seven days of RE consisting of spontaneous standing-up exercises (25times /set, 2 sets /day). In advance of TS, animals were trained to learn RE by the operant-conditioning method.

The average myofiber cross-sectional area (CSA) of soleus muscle of the group with RE (RE group, $1843 \pm 194 \mu\text{m}^2$) was significantly greater than that of non RE group ($1315 \pm 153 \mu\text{m}^2$, $p < 0.05$), but was not significantly different from control group ($2005 \pm 196 \mu\text{m}^2$). Interestingly, the number of myonuclei of RE group (0.92 ± 0.03 /myofiber number) was 1.5 times greater than that of control group (0.56 ± 0.11 /myofiber number, $p < 0.05$). We could observe increases in the number of newly generated myonuclei in the first few days after the onset of RE using the 5-ethynyl-2'-deoxyuridine (EdU) assay. Since myonuclei in differentiated muscle fibers usually do not divide, the newly generated myonuclei might be originated from the cells such as satellite cells located outside of myofibers.