

# 論文の欧文要旨

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**(Title)**

The effects of resistance exercise and anti-inflammatory food on skeletal muscle atrophy and hepatic dysfunction in a rat model for chronic inflammation

**(Abstract)**

This study evaluated the usefulness of resistance exercise (RE) and anti-inflammatory (AI) food as preventative measures for secondary sarcopenia. In Chapter 1, the etiology of secondary sarcopenia and the proposed hypothesis that RE and AI food may serve as countermeasures are discussed. In Chapter 2, the development of a new, chronic inflammatory rat model (CI-rat) to evaluate this hypothesis is described. Intraperitoneal administration of peptidoglycan-polysaccharide 10S fraction (5  $\mu$ g rhamnose equivalent / gram of body weight) consistently induced chronic inflammatory symptoms and muscular atrophy. Additionally, the attenuation of Akt signaling activation by acute isometric (ISO) RE, or anabolic resistance, was observed. In Chapter 3, the effects of five ISO-REs or Stretch-Shortening Cycle (SSC) RE sessions, and AI food intake on muscle atrophy, were examined in CI-rats. Results indicated that both RE methods attenuate muscular atrophy. Moreover, in CI-rats fed AI food, circulating inflammatory cytokines (IL-1 $\beta$ , IL-6, and TNF $\alpha$ ) decreased and a negative correlation between these cytokines and skeletal muscle mass was observed. While these results indicate that AI food may reduce secondary sarcopenia, surprisingly, AI food only diminished the muscle hypertrophic effect in CI-rats who underwent SSC-RE sessions. RE during chronic inflammation may improve not only the maintenance of skeletal muscle, but also organ function. Therefore, Chapter 4 focused on hepatic dysfunction in the CI-rat and the impact of ISO-RE and SSC-RE. Results showed that hepatic dysfunction was suppressed in CI-rats exposed to SSC-RE compared to CI-rats exposed to ISO-RE; differences may be related to an increase in anti-inflammatory cytokines, characteristic in SSC.

Collectively, this study demonstrated that RE, or RE and AI food intake, may be effective in improving secondary sarcopenia and potentially poor disease prognosis. More detailed studies are needed to examine differences in the effects of RE modality and the mechanisms behind improvements observed from AI food intake.