

E11103

### Electrophoretic Analysis of Myosin Heavy Chain Isoforms in Rat Tenotomized Soleus and EDL Muscles Following Simulated Microgravity

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**Purpose:** The purpose of this study was to contrast two competing influences that have been well documented with regard to this impact on muscle atrophy and myosin heavy chain isoform expression: tenotomy (around ankle) and hindlimb suspension.

**Methods:** Twenty four male Wistar rats (8 wks of age) were assigned to either normal (ground) control (C), or tenotomized (T), suspended (S), tenotomized and suspended (S+T) groups. The soleus and EDL muscles were excised following 2 weeks suspension. Fiber types were identified by a modified standard staining methods. Electrophoretic separation of MHCs was performed using SDS-PAGE.

**Results and Discussion:** In the CSAs fibers atrophied SO and FOG fibers of soleus muscle were smaller by 60.0% and 61.2% respectively than those of ground age-matched control. Atrophied soleus muscles for S+T had a slow to fast twitch fiber transit which decreased in the percentage of SO fibers which counterbalanced by a simultaneous significant increase in FOG and INT fibers. Furthermore, electrophoretic analysis revealed different MHC isoform bands which contained more fast twitch fiber type MHC in S+T against age-matched control.

**Conclusion:** Subtle alterations in MHC isoforms reported herein suggest that tenotomized muscles after as little as two weeks in suspension induces a shift in the composition of MHC isoform toward fast twitch fiber MHC protein expression.

**Key words:** Muscle Atrophy, Tenotomy, Suspension, MHC isoform

E11104

### The Effects of X-Ray Irradiation under Simulated Microgravity on Enzymatic Activities of Skeletal Muscles in Rats

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**Objective** The purpose of this study was to investigate the effects of X-ray irradiation under simulated microgravity on rat skeletal muscles.

**Methods** Wistar male rats were randomly assigned to 4 groups based on unweighting using hindlimb suspension(SC) and X-ray irradiation(GX), and combined treatments above(SX) and age-matched control(GC). The rats were suspended for two weeks beginning at 8 weeks of age. At the first day of hindlimb suspension, the rats were exposed to a single irradiation by 5 Gy (0.4Gy/min) of X-ray. Muscle histochemical morphometry was performed on the soleus and extensor digitorum longus(EDL) muscles of the rats.

**Results and Discussion** In SC and SX rats, mean fiber CSAs of SO and FOG of the soleus were 56 ~ 70% smaller than those of GC and GX rats. In the EDL of both SC and SX rats, however, FOG fibers were significantly atrophied by 24%. In SC and SX groups, after two weeks of suspension, an increase in the percentage of intermediate fibers(from 1.4 ~ 2.2 to 11.1 ~ 14.3%) was counterbalanced by a simultaneous significant decrease in the SO fibers. The SDH activity in the SO fibers in SC and SX rats was significantly increased compared to both of ground groups. These findings indicate that the microgravity was more morphometrically and oxidatively effective in the muscles than X-ray irradiation.

**Key words** skeletal muscle, microgravity, X-ray, enzymatic activity