Muscle fiber properties in animals living in hypoxia environment

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**Purpose:** We have investigated population and area of muscle fiber type in several mammals to demonstrate adaptation patterns of animal muscles and unique properties of human muscle. In this study, we showed some unique muscle properties in the Mole.

**Methods:** 15 ~ 18 muscle samples were collected from the whole body of 6 Moles including *Mogera wogura*, *Mogera imaizumii* and *Urotrichus talpoides* (BW: 20g~180g). Population and area of each fiber type were determined on some images stained with monoclonal antibodies to fast- and IIa- myosin heavy chain isoforms. To confirm the presence of gamma-motoneurons innervating muscle spindles in spinal cord, a retrograde labeling method was performed with an intramuscular injection of Fluoro-gold (survival time =4 days).

**Results:** In the muscle fiber population, type-I fibers were not observed and small type IIa/x fiber was dominant in all muscles of the Mole. In the spinal cord, bimodal distribution in the area of labeled motoneurons was observed, as well as another animals.

**Discussion:** Type I muscle fiber with high oxidative metabolic ability may have some demerits under ground with hypoxia environment. Although daily mole’s locomotion does not require the limbs to support the body weight, gamma-motoneurons innervating muscle spindle system seems to play some roles in their movements.

**Key words:** Muscle fiber type, Mole, hypoxia

Movement speed-dependent modulation on the activity of spinal inhibitory circuits following rhythmic visuomotor task

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**Purpose:** The aim of this research was to investigate whether spinal neural circuits were affected by movement speed of visuomotor task.

**Methods:** Twenty-seven healthy subjects participated in this study. 18 subjects performed visuomotor tasks involving ankle muscle slow (9 subjects) and fast (9 subjects) movement speed, and nine subjects performed non-visuomotor task (control task). The amounts of presynaptic inhibition (D1 inhibition) and reciprocal Ia inhibition were recorded before, and at 5, 15, and 30 min after the training session.

**Results:** D1 inhibition increased after visuomotor tasks irrespective of movement speed. The amount of reciprocal Ia inhibition increased with fast movement speed conditioning, but was unchanged by slow movement speed conditioning. Control task did not induce changes in D1 inhibition and reciprocal Ia inhibition.

**Discussion:** These results suggest that descending inputs from supraspinal centers for controlling joint movement are responsible for changes in the spinal neural circuits and, that task movement speed is one of the critical factors for inducing plasticity changes in the reciprocal Ia inhibition.

**Key words:** Movement speed, motor training, spinal plasticity