Acute changes in motor preparation processes immediately after moderate exercise.

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Purpose: In this study, the influence of acute exercise on brain function, particularly motor preparation, was investigated using the bereitshaftspotential (BP) and negative slope (NS') components of motor-related cortical potentials (MRCPs).

Methods: Twelve undergraduate and graduate students participated in this experiment. Each participant performed right-handed grip movements at 30% maximal voluntary contraction, without cycling before (pre), immediately after (post 1), and 30 min after exercise (post 2). The grip movements were performed 90 times (30 grip movements × 3 sets) and self-paced with a trial interval of 5-10 s. Exercise intensity was set at 65%HRmax, with a duration of 30 min.

Results: BP and NS' amplitude at post 1 were significantly larger than that of pre.

Discussion: These findings suggest that acute moderate exercise activates brain areas related to motor preparation, e.g., the primary sensorimotor cortex, supplementary motor area, and premotor area.

Key words: acute exercise, motor preparation, motor-related cortical potentials, bereitshaftspotential, negative slope

Changes of soleus motoneuron excitability during sustained rotation of hip joint

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Purpose: Many studies have examined the modulation of soleus (SOL) H-reflex during statically or dynamically imposed hip angle changes in the sagittal plane. The aim of this study is to elucidate whether the SOL H-reflex is modulated during ipsilateral hip joint rotation in the horizontal plane.

Methods: Nine healthy men (age ranged 21-30 years) participated in the present study after giving their written informed consent. All experimental procedures were approved by the Local Ethics Committee of Hiroshima University. In supine position, SOL H-reflexes were recorded with the following five hip joint positions, i.e., neutral, external rotation (EXT), forced EXT (EXT+), internal rotation (INT), and forced INT (INT+). To augment the muscle spindle Ia afferents, vibration at 100 Hz was applied on hip adductors muscles (ADD) or gluteus maximus (GM). Further, to assess the presynaptic inhibition on the SOL Ia terminals, SOL H-reflexes were conditioned by the preceding electrical stimulations to the common peroneal nerve.

Results: Hmax/Mmax was significantly reduced in EXT, EXT+ and INT+ positions, compared to the neutral position. The amplitude of Soleus H-reflexes was reduced during vibration, irrespective of the applied muscles and the hip joint positions. Presynaptic inhibition was significantly increased in EXT and EXT+ positions.

Conclusion: These findings suggest that the SOL motoneuron excitability is decreased by hip joint rotations. The muscle spindle afferents from the ADD, rather than the GM, seem to enhance prominently the presynaptic inhibition of SOL motoneuron.

Keyword: H-reflex, hip joint, presynaptic inhibition