

Remote effect of muscle relaxation

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Muscle relaxation is an "active process" requiring cortical activation, and not simply the end of contraction. The objective of this study is to clarify the remote effect of muscle relaxation of one limb on electromyographic (EMG), corticospinal and intracortical activity of muscles in the other limb. Firstly, we investigated the interaction between relaxation and contraction for muscles of ipsilateral hand and foot. When contraction of one limb was concurrent with relaxation of the other limb, the EMG activities of the contraction became smaller. Secondly, we investigated the effects of foot muscle relaxation on corticospinal excitability for hand muscles utilizing transcranial magnetic stimulation (TMS) technique. As a result, muscle relaxation of the foot reduces the

corticospinal excitability of the hand muscles. Then, we investigated the effects of foot muscle relaxation on intracortical inhibition in the hand area of the primary motor cortex utilizing paired-pulse TMS technique. It is clarified that muscle relaxation of the foot induced the increase in intracortical inhibition of the hand extensor. Finally, we investigated the effect of foot muscle relaxation on contralateral hand muscle. It is demonstrated that muscle relaxation of the foot reduces EMG activity and corticospinal excitability of the contralateral hand muscles. Based on these findings, it is speculated that contraction in one limb is difficult when relaxation is executed concurrently in the other limb, due to the cortical activation.