

Interhemispheric motor inhibition : its role in controlling electromyographic mirror activity

HÜBERS Annemarie ; OREKHOV Yuriy ; ZIEMANN Ulf

Abstract

Electromyographic mirror activity (MA) refers to involuntary activation of the non-active limb during intended strictly unilateral movements of the other limb. MA occurs in the majority of healthy adults but little is known about its neurophysiological foundation. Here we examined in healthy adults the hypothesis that transcallosal interhemispheric inhibition (IHI) between the primary motor cortices determines the extent to which MA occurs. IHI was tested by an established paired transcranial magnetic stimulation protocol [A. Ferbert et al. (1992) *J. Physiol. (Lond.)*, 453, 525-546]. In a first experiment we found that the magnitudes of IHI and MA were inversely correlated. In a second experiment we sought to establish a more causative relation by exploring the changes induced by low-frequency repetitive transcranial magnetic stimulation of primary motor cortex on IHI and MA. These changes were also significantly inversely correlated, i.e. a repetitive transcranial magnetic stimulation-induced increase in IHI was associated with a decrease in MA, and a decrease in IHI was associated with an increase in MA. These results provide strong and consistent evidence that transcallosal inhibitory interhemispheric interaction provides a significant route by which unwanted MA during intended unimanual motor tasks can be controlled.

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