EFFECTS ON THE EVOKED H REFLEX AND V-WAVE RESPONSES WITH COOLING STIMULATION

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(Introduction) We have demonstrated that the decrease in skin temperature with skin cold stimulation more markedly acted on high threshold MUs (HT-MUs). These results suggest that some recruitment thresholds might change among the HT-MUs that have the synaptic connections with the peripheral afferent in the spinal cord. Since the cutaneous afferents may well have a more important role in motor control, they require further detailed study. It seems possible that the effects on the motoneuron with cooling can be studied by using electrical stimulation, because V-wave amplitude is usually ascribed to change an elevated motoneuron excitability and/or alterations in presynaptic inhibition. The purpose of this study was to investigate the effects of cooling stimulation on the motoneuron using the evoked V-wave response. (Methods) The subjects who volunteered for this study were eight healthy adults. Subjects were examined in the prone position with the hip and knee joints at 180 degrees, and ankle joints at 80 degrees. The electric signals were picked up by surface electrodes on the belly of the right SOL and MG. The force of the isometric contraction and twitch were established by a force transducer attached to the apparatus. The EMG and mechanical signals were digitized on-line and stored for analysis with software. This experiment was performed under two conditions that consisted of control (skin temperature 33.) and cool (skin temperature 25 deg.). Maximal H-reflex and M-wave potentials were taken at rest (Hmax/Mmax), during MVC (Hsup/Msup) and sustained 40%MVC (2 min) in both conditions. During 40%MVC, RMS of initial and end period (each 10 sec) were measured in SOL and MG under both conditions. (Results and Discussion) During MVC and 40%MVC, a supramaximal stimulus induced the V-wave (V/Msup). There was no significant difference in Hmax/Mmax and Hsup/Msup in SOL and MG between the conditions. During MVC, V/Msup ratio in MG changed under the cooling condition. V/Msup ratio increased significantly under the cooling condition compared with control. However, no significant difference was found between both conditions in SOL. During 40%MVC, RMS in the initial and end period in MG increased significantly under the cooling condition to compared with control. Furthermore, during 40%MVC, the silent period of the initial period with maximal stimulus reduced significantly in cooling condition compared with control in MG. However, there was no significant difference in the end period in MG and SOL. These results suggest that the increased V/Msup wave in cooling condition is related to the elevated motoneuron excitability with cooling stimulation.

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