

脊髄相反性抑制に着目した力みのメカニズムの解明

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Elucidation of Strain Mechanism Focusing on Spinal Reciprocal Inhibition

by

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ABSTRACT

Excessive co-contraction interferes with smooth joint movement via mechanisms including failed spinal reciprocal inhibition against antagonists. However, the function of spinal reciprocal inhibition during co-contraction remains unclear. To investigate the influence of changes in contraction intensity during co-contraction on spinal reciprocal inhibition, 20 healthy adults were subjected to four stimulation conditions: a conditioning stimulus–test stimulation interval (CTI) of – 2, 2, or 20 ms or a test stimulus without a conditioning stimulus (single). Co-contraction (change in soleus muscle [Sol] vs. tibialis anterior [TA] activity) was examined at task A 0% vs. 0% maximal voluntary contraction (MVC), task B 5% vs. 5% MVC, task C 15% vs. 15% MVC, task D 5% vs. 15% MVC, and task E 15% vs. 5% MVC.

At CTI of 2 ms, the H-reflex amplitude value was significantly lower in tasks A, B,

C, and D than in the single condition. Among the tasks, the H-reflex amplitude values were lower for A, B, C, and D than for E. At CTI of 20 ms, the H-reflex amplitude was significantly lower in tasks A, B, C, D, and E. Among the tasks, the H-reflex amplitude was significantly lower from task A and B to task E. For co-contraction <15% MVC, reciprocal Ia inhibition may be modulated depending on the Sol vs. TA muscle activity ratio. D1 inhibition was equivalent when the Sol/TA ratio was equal or TA muscle activity was high. During co-contraction with high Sol muscle activity, D1 inhibition decreased from rest but D1 inhibition remained.

要 旨

が示唆された。

本研究の目的は、ヒラメ筋 (Sol) と前脛骨筋 (TA) の co-contraction 中の筋活動量の割合変化を調べ、脊髄相反性抑制 (RI) のメカニズムの一端を明らかにすることとした。

対象は健常成人20名とした。RIの計測は、条件-試験刺激間隔 (CTI) を -2ms, 2ms (Ia 相反抑制), 20ms (D1 抑制) と条件刺激をしない試験刺激のみ (single) を加えた4条件を刺激条件とした。また、刺激回数は刺激条件をランダムに合計60回 (4条件×15回) 刺激した。Co-contraction課題 (Sol vs TA) は、Task A (0%MVC vs 0%MVC), Task B (5%MVC vs 5%MVC), Task C (15%MVC vs 15%MVC), Task D (5%MVC vs 15%MVC), Task E (15%MVC vs 5%MVC) の5課題とした。

CTIが2msでは、Task A, B, C, Dでsingleと比較してH反射振幅値が有意に減少した。co-contraction課題間の比較は、Task A, B, C, DがTask EよりH反射振幅値が有意に減少した。CTIが20msでは、Task A, B, C, D, Eでsingleと比較してH反射振幅値が有意に減少した。Co-contraction課題間の比較は、Task A, BがTask EよりH反射振幅値が有意に減少した。

15%MVC以下でのco-contractionにおいて、Ia相反抑制とD1抑制はヒラメ筋と前脛骨筋の筋活動比 (Sol / TA ratio) に依存して変調する可能性