CONTRIBUTIONS TO ENHANCED ACTIVITY IN RECTUS FEMORIS IN RESPONSE TO LOKOMAT-APPLIED RESISTANCE.

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ABSTRACT

The application of resistance during the swing phase of locomotion is a viable approach to enhance activity in the rectus femoris (RF) in patients with neurological damage. Increased muscle activity is also accompanied by changes in joint angle and stride frequency, consequently influencing joint angular velocity, making it difficult to attribute neuromuscular changes in RF to resistance. Thus, the purpose of this study was to evaluate the effects of resistance on RF activity while constraining joint trajectories. Participants walked in three resistance conditions; 0 % (no resistance), 5 and 10 % of their maximum voluntary contraction (MVC). Visual and auditory biofeedback was provided to help participants maintain the same knee joint angle and stride frequency as during baseline walking. Lower limb joint trajectories and RF activity were recorded. Increasing the resistance, while keeping joint trajectories constant with biofeedback, independently enhanced swing phase RF activity. Therefore, the observed effects in RF are related to resistance, independent of any changes in joint angle. Considering resistance also affects stride frequency, a second experiment was conducted to evaluate the independent effects of resistance and stride frequency on RF activity. Participants walked in four combinations of resistance at 0 and 10 %MVC and natural and slow stride frequency conditions. We observed significant increases in RF activity with increased resistance and decreased stride frequency, confirming the independent contribution of resistance on RF activity as well as the independent effect of stride frequency. Resistance and stride frequency may be key parameters in gait rehabilitation strategies where either of these may be manipulated to enhance swing phase flexor muscle activity in order to maximize rehabilitation outcomes.