LIMITED INTERLIMB TRANSFER OF LOCOMOTOR ADAPTATIONS TO A VELOCITY-DEPENDENT FORCE FIELD DURING UNIPEDAL WALKING.

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ABSTRACT

Several studies have demonstrated that motor adaptations to a novel task environment can be transferred between limbs. Such interlimb transfer of motor commands is consistent with the notion of centrally driven strategies that can be generalized across different frames of reference. So far, studies of interlimb transfer of locomotor adaptations have yielded disparate results. Here we sought to determine whether locomotor adaptations in one (trained) leg show transfer to the other (test) leg during a unipedal walking task. We hypothesized that adaptation in the test leg to a velocity-dependent force field previously experienced by the trained leg will be faster, as revealed by faster recovery of kinematic errors and earlier onset of aftereffects. Twenty able-bodied adults walked unipedally in the Lokomat robotic gait orthosis, which applied velocity-dependent resistance to the legs. The amount of resistance was scaled to 10% of each individual's maximum voluntary contraction of the hip flexors. Electromyography and kinematics of the lower limb were recorded. All subjects were right-leg dominant and were tested for transfer of motor adaptations from the right leg to the left leg. Catch trials, consisting of unexpected removal of resistance, were presented after the first step with resistance and after a period of adaptation to test for aftereffects. We found no significant differences in the sizes of the aftereffects between the two legs, except for peak hip flexion during swing, or in the rate at which peak hip flexion adapted during steps against resistance between the two legs. Our results indicate that interlimb transfer of these types of locomotor adaptation is not a robust phenomenon. These findings add to our current understanding of motor adaptations and provide further evidence that generalization of adaptations may be dependent on the movement task.