



US DEPARTMENT OF DEFENSE
BLAST INJURY RESEARCH PROGRAM
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Pain Management and Rehabilitation after Amputation Mediolateral Joint Powers at the Low Back Among Persons with Unilateral Transfemoral Amputation

Persons with unilateral transfemoral amputation walk with greater trunk lateral flexion than able-bodied individuals. Such movements may be a reactive adaptation to walking with a prosthesis, or an active trunk neuromuscular/movement strategy to compensate for weak (or missing) musculature in the residual limb. In a study published in *Archives of Physical Medicine and Rehabilitation*, researchers at the CRSR at USUHS conducted a retrospective analysis of mediolateral joint powers at the low back during gait among individuals with unilateral transfemoral amputation. The aim of this study was to better understand the functional contributions of tissues in and around the low back to altered lateral trunk movements in this population. In persons with transfemoral amputation, researchers found four distinctly larger positive phases of mediolateral joint power at the low back (lumbosacral joint) occurring before and after each heel strike. Mean total generation energies throughout the gait cycle were larger among persons with transfemoral amputation than among uninjured controls. Larger positive phases of joint power at the lumbosacral joint in the frontal plane support previous suggestions that persons with transfemoral amputation use a more active mediolateral trunk movement strategy. However, such an active, proximal (trunk) movement strategy may contribute to low back pain risk because trunk muscle activities directly influence spinal loads; several able-bodied individuals reported acute discomfort in the lower back when performing gait training aimed at increasing trunk lateral flexion. Also, concentric muscle activity is more energetically demanding than eccentric muscle activity, which may contribute to higher metabolic energy expenditures during gait in persons with lower-limb amputations. This study has the potential to improve rehabilitation time for Service Members with transfemoral amputations by providing evidence that a more active mediolateral trunk movement strategy may be advantageous.