



US DEPARTMENT OF DEFENSE
BLAST INJURY RESEARCH PROGRAM
COORDINATING OFFICE

Orthotics and Prosthetics

EACE Research Effort in Gait Optimization

Researchers at EACE authored six publications in peer-reviewed journals on gait optimization in individuals with transtibial and transfemoral lower limb amputation. In the journal *Gait Posture*, the researchers examined the upper extremity kinematics of bilateral transtibial amputee (BTA) gait, finding that BTAs display greater lateral trunk flexion range-of-movement and shoulder abduction than able-bodied individuals when walking at similar speeds. A study published in *Clinical Orthopaedics and Related Research* concluded that residual femur length has less of an effect on transfemoral amputee gait efficiency and energy requirements than previously thought. In a paper published in *Clinical Orthopaedics and Related Research*, the authors suggested that there is an increased risk for early onset and progression of arthritis in the intact limb, especially in individuals with transfemoral limb loss. In a second article published in *Gait Posture*, EACE researchers reported the relationship between pelvis-trunk coordination and lower back pain in individuals with transfemoral amputations, and suggested that lower back pain may result from altered gait mechanics associated with use of prosthetic devices. In the *Journal of Prosthetics and Orthotics*, the authors presented a case study of a patient with bilateral amputations (right transtibial, left transfemoral), and found that a powered prosthetic system may offer increased mechanical efficiency and decreased lower-limb loading than a passive prosthetic system. Additionally, a literature review published in *Work: A Journal of Prevention, Assessment and Rehabilitation* concluded that the CAREN is a capable tool for both assessment and rehabilitation, but more research is needed to evaluate its effectiveness as a rehabilitation tool. Collectively, the biomechanical, prosthetic, and rehabilitation research conducted by EACE is critical to improving the understanding of increasingly complex prosthetic and orthotic devices and ensuring that they are properly prescribed and utilized.