



## RehabMove 2018: ARE INDIVIDUALS WITH UNILATERAL TRANSTIBIAL AMPUTATION ABLE TO ADAPT TO AN ACUTE PROSTHETIC INTERVENTION?

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**PURPOSE:** Individuals with a unilateral trans-tibial amputation (UTA) are known to minimise internal extension moments at the residual knee during running, in order to reduce discomfort in the residuum and reduce in-socket torques. When a running specific prosthesis (RSP) is altered or replaced, e.g. varying its stiffness, it is unknown whether individuals with UTA can quickly adapt to the perturbation, modulating moments at the residual knee in order to protect the residuum, or if such adaptations require an extended accommodation period. The purpose of this study was to investigate acute adaptations to a change in RSP stiffness in individuals with UTA.

**METHODS:** Optical motion capture and force data were recorded while eight male participants ran at their self-determined, normal running speed using their prescribed RSP (NORM; all; Blade XT, Blatchford, Basingstoke, UK) and also immediately after it was replaced with both stiffer (STIFF) and more compliant (COMP) RSPs (+/- one spring category, respectively). A 17 segment model (head, torso, pelvis, thighs, shanks & intact foot, with the RSP modelled as nine linked rigid segments) was constructed within Visual3D (C-Motion, MD, USA). Running speed, peak residual knee flexion and peak residual knee extension moment were compared between conditions.

**RESULTS:** There was no significant difference in running speed (NORM 3.49 (0.35) m/s; STIFF 3.53 (0.33) m/s; COMP 3.56 (0.36) m/s,  $p = 0.41$ ), residual knee flexion (NORM 33 (2)°; STIFF 33 (9)°; COMP 31 (8)°,  $p = 0.86$ ) or residual knee extension moment (NORM 1.50 (0.84) N.m/kg; STIFF 1.55 (0.87) N.m/kg; COMP 1.62 (0.90) N.m/kg,  $p = 0.45$ ).

**CONCLUSIONS:** Individuals with UTA, who run using an RSP, are able to adapt immediately to an alteration in the RSP stiffness in order to minimise moments at the residual knee, and thus potentially minimise torques at the residuum/socket interface. This is achieved without a reduction in running speed or change in residual knee flexion.