# Erector spinae fatigue alters head stability during walking


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## Published

2006

## Conference Title

Australian Falls Prevention 2nd Conference

# ERECTOR SPINAE FATIGUE ALTERS HEAD STABILITY DURING WALKING

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Introduction: The neck and trunk segments modulate oscillations arising from gait-generated events to ensure a stable and consistent trajectory of head motion. The trunk segment appears to minimise the impact of gait-related oscillations prior to reaching the head by providing a stable platform for the neck. The purpose of this study was to examine how inducing fatigue of the (i) lumbar erector spinae (LES) and (ii) cervical erector spinae (CES) muscles affected attenuation patterns of the upper body, and head stability during walking.

Methods: Triaxial accelerometers were attached to the head, upper trunk and lower trunk to measure 3D accelerations during walking. Using three accelerometers enabled two adjacent upper body segments to be defined: the neck segment and trunk segment. A transfer function was applied to RMS acceleration, along with peak power and harmonic data derived from spectral analysis of accelerations to quantify segmental gain. The structure of upper body accelerations were examined using measures of signal regularity and smoothness.

Results: Head stability was only affected in the AP direction, as accelerations of the head were less regular following CES fatigue. Further, following CES fatigue the attenuation properties of the trunk segment were altered in the AP direction, presumably to enhance head stability. Following LES fatigue the trunk segment had greater gain, and increased regularity and smoothness of accelerations in the ML direction.

Discussion and Conclusions: Overall, the results of this study suggest that erector spinae fatigue differentially altered segmental attenuation during walking according to the level of the upper body that was fatigued, and the direction that oscillations were attenuated. A compensatory postural response was not only elicited in the sagittal plane where greater segmental attenuation occurred, but also in the frontal plane where greater segmental gain occurred.