International Conference on Ambulatory Monitoring of Physical Activity and Movement

THE DISCRIMINATING POWER OF SWAY PARAMETERS IN STANCE TASKS

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INTRODUCTION
The aim of this study is to determine which sway parameter can discriminate best between different stance tasks. Both a triaxial accelerometer and a force platform are used to measure sway, the calculated parameters are those which are typically used in literature [1, 2, 3].

METHODS
Eleven healthy subjects (age 22-29, 4 male, 7 female) performed 8 different stance tasks twice with increasing level of difficulty; standing with eyes closed and bare feet for 45 seconds on a 1) firm surface, feet at hip width, 2) firm surface, feet closed, 3) foam surface (Airex Balance-Pad 6 cm), feet at hip width, 4) foam surface, feet closed, 5) firm surface, semi tandem, 6) firm surface, tandem, 7) foam surface, semi-tandem and 8) foam surface, tandem. The tasks were all performed on a force platform (Maastricht Instruments BV) and a triaxial accelerometer (McRoberts, DynaPort MicroMod) was attached to the subject’s back at the location positioned over the L3 region.

From each measurement sway path, sway area and mean sway were calculated from both the platform and MicroMod displacement data. Within subject analysis was performed using Wilcoxon’s signed ranked test with Bonferroni correction (p<0.007).

RESULTS
Based on the calculated parameters, the difficulty level of the stance tasks was 1-2-5-3-4-6-7-8, with 1 (firm surface, feet at hip width) the easiest task and 8 (semi-tandem stance on foam) the most difficult task. The differences between tasks 4 & 6 were not significant for any parameter. Between tasks 6 & 7 only the MicroMod sway path showed a significant increase (p=0.005).

Between tasks 1 & 2, 3 & 4, and 7 & 8 MicroMod sway path, sway area and mean sway and platform sway path showed significant increases. Differences between tasks 2 & 5 were not significant for the MicroMod parameters, but platform sway path significantly increased. Between tasks 5 & 3 MicroMod sway path, sway area and mean sway significantly increased, but platform parameters were not significantly different.

DISCUSSION
The calculated parameters from both the force platform and the MicroMod triaxial accelerometer result in 1) a consistent level of difficulty for and 2) a consistent discrimination between the performed stance tasks. The force platform parameters mean sway and sway area are not able to show an increase in sway, whereas the MicroMod displacement parameters mean sway and sway area are. Sway path increases significantly in at least 4 difficulty steps, both is not consistent for both MicroMod and force platform. MicroMod sway path is the only parameter to show a significant increase in sway between a tandem stance on a firm surface and a semi-tandem stance on a foam surface.

CONCLUSIONS
Sway path appears to be the most useful parameter to discriminate different stance tasks.

REFERENCES