AGE-RELATED CHANGES IN UPPER BODY COORDINATION AND REACTION TIME DURING VOLUNTARY POSTURAL SWAY

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Introduction: Slow reaction times and ineffective upper body control during challenging movement tasks may contribute to the overall decline in postural stability and increased falls risk in the elderly. However, little is known about the nature of upper body coordination patterns in older individuals under more dynamically challenging situations. Thus the aim of the present study was to examine whether age-related changes exist in, a) the pattern of coordination between head and trunk accelerations and COP measures and, b) reaction time, during a dynamic postural task.

Methods: Ten young (24 ± 5 yr), and ten healthy, community-living elderly (75 ± 2 yr) men participated in this study. Subjects stood on a force plate with tri-axial accelerometers attached to the head and trunk. The task goal was to voluntarily initiate a postural sway movement as quickly as possible following an auditory cue. The sway motion was initiated under both static and dynamic task conditions. The static transition involved generating AP or ML sway from quiet stance. The dynamic transition involved an orthogonal switch in the direction of sway between the AP and ML directions.

Results: The main results were that: 1) Older subjects had slower reaction time when switching the direction of sway between the AP and ML directions than young subjects, and 2) the COP and head and trunk accelerations were more in-phase in the elderly compared to the young.

Discussion and Conclusions: Overall, elderly subjects had slower response times, especially under more dynamic movement conditions. The increased coupling between head and trunk acceleration and COP measures in older subjects indicates that they adopted a more rigid posture compared to the young. This freezing of degrees of freedom suggests that the elderly sacrificed speed of response to maintain an increased perception of postural stability. For the elderly, the loss of functional degrees of freedom through increasing body stiffness coupled with the slower response times would seem to be detrimental to maintaining optimal postural stability.