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Aging and falls: Causes and prevention

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Studies on age-related changes in neurophysiological and sensory systems date back to the early 19th century. In general, the many studies undertaken since then have found that for each system studied, age-related functional declines commence in the third decade, and accelerate in older age. However, the extent of such changes is markedly affected by the varying test procedures and definitions of the normal aged individual used in each study. If the selection criteria include only older subjects who are not disadvantaged by poor health or inactivity, are at ease in a laboratory setting and have a high level of motivation for the task, only small age-related increases are observed. Small age-differences are also observed if the tasks required are relatively simple. If the selection criteria are relaxed, or if the tasks are more difficult, greater changes in performance with age have been observed.

This paper reviews the published studies on age-related changes in vision, vestibular function, peripheral sensation, strength, reaction time and balance. It also presents findings of work we have undertaken on the inter-relationships among these physiological systems, their contributions to stability and gait, and the role that impairments in these systems play in predisposing older people to fall. A range of screening and assessment tools will be described including the Physiological Profile

Assessment (PPA)¹. The PPA makes use of normative data derived from large population studies for assessing vision, peripheral sensation, lower limb strength, reaction time and balance. This information is then used to derive a falls risk index score and a physiological profile for identifying specific physiological deficits that require targeted interventions for reducing fall risk. Examples of how the falls risk index score and components have been used in falls prevention randomized control trials and health care settings will be described.

Our findings indicate that it is feasible to obtain quantitative measurements of important neurophysiological and sensory systems, and to use these assessments to identify older people at risk of poor outcomes such as falls and institutional placement, and to evaluate the effectiveness of intervention programs aimed at maximizing physical functioning and independence in old age.

Reference

1. Lord SR, Menz HB, Tiedemann A. A physiological profile approach to falls risk assessment and prevention. *Physical Therapy* 2003; 83:237-252.

The author is co-director of Balance Systems Inc., which makes some components of the PPA.

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