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Special Issue: Brain Aging

Guest Editorial

Aging, Brain, and Mobility: Progress and Opportunities

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THE capacity to move is essential for functional independence and declines with age across species. Since a major aim of the field of aging is to promote prolonged functional independence, greater insights into the causes and management of age-related changes in mobility are one key to longer active life. Much is known about contributors to age-related mobility problems, especially due to cardiopulmonary, musculoskeletal, and overt neurological conditions like stroke and Parkinson's disease. In recent years, substantial epidemiological evidence suggests that subclinical changes in the brain are associated cross-sectionally and longitudinally with age-related gait slowing and variability (1). A better understanding of the role of the brain in age-related declines in mobility has the potential to lead to novel approaches to prevent or treat mobility disability. With this Special Issue, we wish to highlight progress in this high potential area.

With the explosion of neuroimaging technology in the past 15 years, a growing body of work, summarized by Holtzer et al. in this issue (2), identifies specific brain networks related to mobility in older adults. Novel paradigms, such as mental imagery of walking or analytic approaches to network detection, reveal that networks extend beyond the traditional mobility-related regional boundaries, especially to involve the prefrontal areas (3,4).

As with many systems, subtle alterations are most likely to manifest under challenge. For this reason, subtle alterations in mobility can be detected using Dual Task protocols involving simultaneous mobility and cognition tasks. This approach is especially fruitful for exploring the role of executive cognitive functions as they relate to mobility, which are well known to occur in older persons. The influence of executive cognitive function on mobility is now shown to be detectable even in midlife (5). Dual task findings might even distinguish between types of mild cognitive impairment (6). Findings related to cognitive impairment are inconsistent across studies, suggesting the need to further evaluate using state of the art methodologies to quantify both cognition and mobility.

These studies further our understanding of the CNS processes underlying mobility impairment in aging, but also have implications for novel interventions to improve mobility. Such interventions can include explorations of the impact of factors that modify the CNS in a variety of ways. One approach would be to improve input to the brain, for example, by enhancing somatosensation to reduce pre-frontal cortical activation during walking tasks (7). Another approach to intervention development is to incorporate insights from other fields that address how the CNS influences mobility. For example, fields such as sports medicine and rehabilitation are developing models of intervention based on motor learning theory and motor skill development that can be applied to CNS-mediated mobility problems of aging (8).

The aging brain may contribute substantially to the burden of mobility limitations among older persons. With cutting edge technology, novel paradigms, and cross-disciplinary communication, as demonstrated by the articles in this Issue, older adults in the future may be able to move better for more years, an essential goal of the quest to promote active life expectancy.

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