Tri-axial accelerometer-determined daily physical activity and sedentary behavior and function capacity in community-dwelling Japanese older adults

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論　文　名　：　Tri-axial accelerometer-determined daily physical activity and sedentary behavior and function capacity in community-dwelling Japanese older adults（地域在住高齢者における三軸加速度センサー内蔵活動量計による身体活動と座位行動の実態および生活機能との関連性)

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論　文　内　容　の　要　旨

Considerable literature shows the extensive health benefits of regular physical activity (PA) throughout the life span. Emerging evidence has also suggested that sedentary behavior (SED) is a distinct health risk independent of PA levels. To date, most of the evidence has primarily relied on subjective measurements of these behaviors, which are prone to a variety of biases, particularly in older adults. Studies with more accurate assessment of the daily levels of PA and SED, such as accelerometer, are needed for better understanding the current population levels of PA and SED, and quantifying of the does-response relationships with health outcomes in older adults. The overall purpose of this doctoral thesis was to objectively assess daily levels of PA and SED in community-dwelling older Japanese adults and to then investigate their associations with disability and cognitive function, using tri-axial accelerometers.

Firstly, the doctoral thesis provided an overview of the most commonly used methods for assessing PA and SED, and current literature regarding accelerometer-determined PA and SED levels in the older population, followed by a literature review of the associations between PA and SED and health outcomes, with a special focus on disability and cognitive function.

The first study described accelerometer-derived PA and SED levels in community-dwelling older Japanese adults and demonstrated that the levels of PA and SED differed by sex, age, and body mass index. Findings from this study also showed that older adults spent majority of their time being sedentary and accumulated a few minutes in moderate-to-vigorous PA (MVPA).

The second study was conducted to examine the cross-sectional associations between accelerometer-determined sedentary time and breaks in sedentary time with instrumental activities of daily living (IADL) disability in community-dwelling older adults. This study first demonstrated that shorter sedentary time and greater number of breaks in sedentary time were associated lower risk of IADL disability, independent of MVPA.

The third study was performed to examine the longitudinal association between accelerometer-determined total PA and cognitive function in non-demented community-dwelling older adults. In this study, no significant linear association between total PA and cognitive function was observed over a follow-up of two years.

Taken together, this doctoral thesis reveals that Japanese older adults spent majority of the

day being sedentary and accumulated few minutes of MVPA, and confirms that SED is a distinct concept from insufficient MVPA and has independent effects on health outcomes in older adults. These findings highlights the need of reducing overall time spent in SED in community-dwelling older adults to optimize their health, beyond encouraging PA. In addition, it also suggests that breaking up prolonged sedentary time may be beneficial for the maintenance of functional capacity in older adults. Although no significant association between accelerometer-determined PA and cognitive function was observed, the doctoral thesis has shown the feasibility and utility of the accelerometer in longitudinal, large-scale epidemiology studies. Further studies will be performed to investigate the associations of these objectively measured behaviors with other health conditions and the incidence of hard clinical endpoints (e.g., dementia, all-cause mortality) to facilitate development of guidelines related to PA and SED in this population.