

Backward Walking and Its Possible Use for Balance Assessment

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(バランス評価に後方歩行を用いる可能性)

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Abstract of Dissertation

The general objective of this dissertation was to explore the possibility of backward walking (BW) parameters as an indicator of balance ability-related falls instead of forward walking (FW). To clarify this objective, three studies were conducted.

In Chapter 2, This study aimed to investigate the effects of gait speed, arm positions, and visual feedback on BW in young adults. Notably, 23 young adults participated in this study. The results highlighted the different gait performances that occurred with increased walking speeds, restricted arms swing, and the removal of visual cues in BW.

Chapter 3 was purposed to determine the relationships between various types of BW (highlighted in Chapter 2) and the balance ability of 20 young adults. This study discovered that the modified functional reach test (MFRT) and gait parameters of normal BW (NBW) at a comfortable speed had the strongest relationships. Fast BW (FBW) specifically attempted to have a moderate correlation of cadence and mediolateral center of mass (ML COM) with the center of pressure displacement (COP).

Finally, Chapter 4 focused on age-related gait and balance ability. I aimed to identify the effects of age on gait parameters (FW and BW) and balance ability. The second objective was to determine the linear correlation between BW and an individual's balance ability in female young (n = 12) and older (n = 12) adults. The results convey that specific BW gait phase characteristics correlated to balance ability, especially COP either in young or older adults, while there were lower step lengths and higher step widths in BW, which were also influenced

by aging.

BW as a self-generated perturbation on a dynamic base of support tasks provides superior value to FW for evaluating balance ability. These findings established that BW gait parameters, especially step length-related cadence, step width-related ML COM, and velocity-related phases of gait, have the potential to assess balance ability in adults and are necessary for further investigation in larger sample sizes.