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Step initiation speed as a predictor of freezing inception in Parkinson's disease

Raymond K. Chong and Kyoung-Hyun Lee

Georgia Regents University, USA

Abstract

In some individuals with Parkinson's disease (PD), freezing of gait episodes develop whereby the individual is unable to initiate walking for unknown reasons. It is a serious health problem as it often leads to falls and subsequent serious injuries. We published a study recently in which we found that a subset of patients in stages 2.5 to 4 of the Hoehn & Yahr disease severity scale initiated walking faster in the presence of virtual visual cues. Here we report the findings of a two-year follow-up survey with the subjects to test the hypothesis that those who initiated the first step faster with visual cues (i.e. responders) are more likely to develop freezing than non-responders. Chi-square analyses revealed an association between responders and the subsequent development of freezing. Specifically, subjects in the responder group had a 13- fold risk of developing freezing of gait within two years following the cueing study (OR = 13.3, 95% CI = 1.1 - 167). The sensitivity and specificity of the step initiation test were 73% and 83%, respectively. To the best of our knowledge, this is the first novel discovery of a physical marker of freezing in PD. Step initiation speed is a simple test to administer in the clinic or at home and may therefore be easily incorporated into a fall prevention training program for PD before the inception of freezing.

Biography

Raymond Chong completed his Ph.D at the University of Oregon in 1997. He is the director of the department's Human Movement Science lab. He is first author in >80% of his publications. His expertise and research interests are in the areas of aging, neurological diseases and fall prevention. He studies the sensorimotor mechanisms of automatic and volitional multisensory organization and postural control in humans during reaching, stance and walking in healthy and neurological conditions. He uses established and novel paradigms including surface perturbations, treadmill walking, suspended forward fall, obstacle crossing, optical prism adaptation and close-loop virtual-reality systems in his experiments. He serves in various study sections for the US Department of Veteran Affairs Rehabilitation & Research Development Service's review panels. He is executive editor of the Journal of Novel Physiotherapies, and associate editor of the Comprehensive Psychology journal. He also serves on the editorial board of the Degenerative Neurological & Neuromuscular Disease, World Journal of Neuroscience, and Clinical Research on Foot & Ankle journals. He is a regular reviewer for the Gait & Posture journal.

RCHONG@gru.edu