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## Step initiation speed as a physical marker of freezing inception in Parkinson's disease

The novel discovery of using step initiation speed as a potential physical marker of impending freezing of gait (FoG) in Parkinson's disease (PD) is proposed. FoG is a mysterious phenomenon whereby the individual is unable to initiate walking. It is a serious health problem as it often leads to falls and subsequent serious injuries. While some researchers ascribe the frontal executive functioning areas of the brain to be the source of the freezing, possibly due to depleted frontal dopamine output, other neurotransmitter systems long-term levodopa therapy or hemispheric asymmetry, other studies have not found support for some of these hypotheses. Abnormal inhibition of the thalamas and pedunculopontine regions which produce an increase in synchronization of the striatal networks is also thought to contribute to freezing. PD patients who develop freezing may represent a special classification of the disease condition that is yet to be discovered or characterized. Certain features of PD may increase the likelihood of the appearance of freezing. These include initial walking difficulty, severity of the disease (walking, balance control, and speech), cognitive decline, and depression. Although freezing is more commonly experienced in older patients, older age at onset of diagnosis does not appear to increase the odd of developing freezing. These variables have been shown to associate with the appearance of freezing. However, none of them provide the prospective and quantitative parameters needed to preempt its inception. A simple physical test that can be used to predict which PD patient is at risk for developing FoG would represent a critical advancement in improving the quality of life and enhancing fall prevention strategies in PD.

### 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 more than 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.

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