

MetroHealth Medical Center**RESEARCH DAY 2023****Abstract Submission Form**

Poster Title: Assessing Spinal Reflex Excitability During Gait in Post-Stroke Stiff- Knee Gait

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Category: Physical Medicine and Rehabilitation

Stiff-Knee gait (SKG) is a common post-stroke impairment often defined as a decreased knee flexion angle during the swing phase of gait. Stroke survivors who exhibit SKG often compensate for the reduced foot clearance with hip circumduction and pelvis obliquity and are therefore at higher risk of falls and joint pain. A prominent but incomplete theory for the mechanism of SKG suggests the impairment arises due to hyperreflexia of the quadriceps. New studies have found a link between rectus femoris H-reflex amplitude and peak knee flexion angle exhibited during SKG. Current clinical interventions for the condition often employ anti-spasticity medications to reduce quadriceps activity. While these treatments can improve knee flexion in some cases, they are hindered by significant side effects and not specific to each individual case. We propose a combined biomechanical and neurophysiological approach to assess the spinal reflex mechanisms underlying the pathology of SKG. Using the H-reflex, the electric analog to the tendon-jerk reflex, we will probe different spinal reflex pathways during gait to better understand the neural origins of SKG. To complete this, we have proposed 4 separate experiments that we will complete across 3 sessions in 20 individuals with stroke and 20 non-impaired control participants. Experiment 1 will assess the link between the compensatory hip abduction and RF hyperexcitability at the pre-swing phase stage of gait. Results from this aim will prove substantial in defining the extent to which hip abduction post-stroke is due to the inability to flex the knee or otherwise. Experiments 2-4 will assess the homonymous, heteronymous, and antagonistic spinal reflex pathways that modulate human gait patterns. These results will provide key evidence on the long-held hypothesis that RF overactivity/hyperreflexia causes post-stroke SKG. Using this battery of tests, we can better diagnose the underlying causes of SKG and therefore determine more targeted interventions for the impairment.