Title: Braking and propulsive forces in individuals with post-stroke hemiparesis

Background
Stroke disrupts muscle coordination and often impairs walking ability. The hallmark features of post-stroke gait include slow gait speed, poor endurance, reduced quality and adaptability of walking patterns, and an inability to coordinate the legs. Slow gait speed may be directly linked to an inability of the impaired plantarflexors to generate sufficient push-off to accelerate the center of mass over the stance limb. Previous studies have suggested that the paretic leg does 30% to 40% of the total mechanical work over the gait cycle, but this likely varies with speed and stroke severity. Anterior-posterior ground reaction forces reflect the body’s contribution to braking and propulsion and may indicate inefficiencies in coordination.

Study objective
To quantify and characterize anterior-posterior ground reaction forces during post-stroke hemiparetic gait.

Study design
• Subjects were recruited to participate in a single session or multi-session research study approved by the local IRB. For stroke subjects, the inclusion criteria were as follows: 6 months elapsed time after a stroke involving cerebral cortical regions, ability to walk for 5 minutes at their self-selected walking speed, and sufficient passive ankle dorsiflexion range of motion to enable the paretic ankle joint to reach either neutral ankle angle (0°) or a minimum of 5° of plantarflexion with the knee flexed. Exclusion criteria were substantial cognitive deficits, severe aphasia, cerebellar involvement, and any preexisting conditions affecting walking function.
• Subjects completed a set of clinical exams and muscle performance testing. Comprehensive gait analysis was performed for each subject at self-selected walking and fastest possible walking speed. Data was collected on a split-belt instrumented treadmill.
• Outcome measures include bilateral anterior-posterior ground reaction forces (AP GRF) for three stroke survivors at two walking speeds. Additional data available upon request.

References
Study design & data courtesy of Amy Lenz, Jill Higginson, Darcy Reisman and Stuart Binder-Macleod.
