Dr. Julia Choi is an Assistant Professor of Kinesiology at the University of Massachusetts Amherst. Her laboratory studies the neural control of movement in healthy and neurological-impaired persons. To understand the sensorimotor learning processes that underlie adaptive gait control, her research uses a combination of experimental techniques, including transcranial magnetic stimulation (TMS), electromyography (EMG), electroencephalography (EEG), and split-belt treadmills. Julia received her B.S. in Physiology from McGill University and Ph.D. in Biomedical Engineering from the Johns Hopkins School of Medicine. She completed a postdoctoral fellowship at Emory University and Georgia Institute of Technology. She was also a Whitaker International Scholar at the University of Copenhagen, Denmark.

Human walking is a complex motor task that requires precise coordination of timing and scaling of many muscles acting across multiple joints. Central pattern generators in the spinal cord play an essential role in the control of locomotion. In humans, the activity of this spinal network depends much more on supraspinal influences such as the cerebellum and cerebral cortex. Fine-tuning of the neural control of locomotion is driven by interactions between the body and the environment – a process known as motor adaptation. My long-term research goals are to identify general principles of human locomotor plasticity, and to develop neuroscience-based strategies for locomotor neurorehabilitation. In my talk, I will address the following questions related to walking adaptation and learning: What is the human capacity for locomotor adaptation and how general is it? What are the effects of cerebral damage or TMS-induced cortical disruptions on locomotor flexibility? How does short-term training lead to long-term storage of new locomotor skills? Our ability to answer these mechanistic questions is essential for neurological rehabilitation.