INTRODUCTION

While walking can become limited or impaired with age, it is not known what specific changes in neural control over the adult lifespan are associated with this behavioural change [1]. In neurologically intact subjects, studies have used reflexes to probe the neural control of rhythmic locomotor tasks revealing characteristic reflex modulation patterns both within and between limbs [2,3]. These stereotypical reflex responses, originating from muscle and cutaneous afferents, are specifically sculpted to serve important regulatory functions during human locomotion [4]. For example, in young adults cutaneous reflexes of the foot have been shown to produce a coordinated response which is dependent on the phase of the gait cycle and serve a functional role in assisting with obstacle avoidance during swing phase [2,3,4]. Therefore, cutaneous reflexes measured at different latencies can be used as indicators of age-related changes in neurological function during locomotion as well as characterize deficits in neural control potentially associated with fall risk [5]. To date, changes in electrically-evoked cutaneous reflex responses during walking across the adult lifespan have not been investigated. The study of reflex responses during locomotor activities in the elderly will establish age related neural changes and present potential markers for deterioration in functional ability related to fall risk. While cutaneous reflex modulation has been investigated in young adults [4,6], to our knowledge no studies have explored cutaneous reflexes in older adults and minimal research has explored muscle afferent reflexes in older adults. Further electrically evoked reflexes have not been used to characterize differences in neural control between older adults who fall and those who do not. Therefore we intend to quantify changes in cutaneous reflex responses during locomotion in 3 groups; young healthy, elderly healthy (>70) and elderly with a history of falls. We hypothesize that neural outcomes at all latencies will be largest in the young adult group, diminished in the healthy elderly group and further diminished in the elderly with a history of falls.

METHODS

Three age groups will be involved: younger adults (19-40), older adults with no history of falls (70+) and older adults with a history of falls (2 or more falls in the past year). Cutaneous reflexes will be evoked during walking on a treadmill by stimulation of the superficial peroneal (SP) and tibial (Tib) nerves during separate trials [7]. Muscle activity will be gathered with a tethered EMG system (P511, Grass Technologies). EMG during stimulation and control condition will be collected, averaged and subtracted to yield a response solely due to the cutaneous stimulus. Reflex amplitude responses will be analyzed at early, middle and late latencies [7]. Statistical analysis will involve repeated measures ANOVA with post hoc analysis to determine main effects of phase of gait, group and their interactions.

REFERENCES


