2-O-34 Alternating walking strategy based on a prior knowledge of potential loss of ground support

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Purpose: Anticipating a potential perturbation is an essential component of our gait. The goal of the present study was to examine the effect of having prior knowledge on proactive strategies for the potential loss of ground support during walking. We compared muscle responses between completely unexpected situation and situation under which an alert for the perturbation was given.

Methods: Eight healthy young adults participated in this study. Two physical conditions (control and perturbed: with and without a hole in a walkway) and two psychological conditions (non-instructed and instructed: with and without prior knowledge of being potentially a hole) were tested. Electromyography (EMG) was recorded from both side of the tibialis anterior (TA), gastrocnemius (GAS) and soleus (SOL) muscles. The latency of the muscle reflex to the perturbation was calculated using threshold of the mean plus 2SD of the control trials. Contrasts between control and perturbed conditions were compared between non-instructed and instructed conditions.

Results and Discussion: The latency of the perturbed soleus was shorter in the instructed condition (64 ms) than in the non-instructed condition (78 ms). Decreased muscle activity was found in the left (support) soleus and gastrocnemius and the right (perturbed) tibialis anterior muscle during the window of 60-90 ms after the perturbation. These results suggest that anticipating the potential loss of ground support enable us to achieve fast and effective muscle responses to the perturbation.

Key words: perturbed gait, muscle reflex, anticipation, proaction, electromyography

2-O-35 Changes in Auditory Mismatch Negativity during Cycle Exercise.
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Purpose: The influence of cycle exercise on automatic auditory-change detection processing in the central nervous system was investigated using the auditory mismatch negativity (MMN).

Methods: Undergraduate and graduate students (n = 34) participated in the study. This experiment consisted of control and exercise conditions. In the control condition without cycle exercise, each participant was asked to perform the auditory MMN task that was randomly presented at binaural tones of 500 Hz (standard stimulus: 240 trials) and 750 Hz (deviant stimulus: 60 trials) with an inter-stimulus interval of 1 s. In the exercise condition, the same task was conducted during cycle exercise at 40% heart rate reserve.

Results: MMN amplitude in the exercise condition was significantly larger than that in the control condition.

Discussion: This finding suggests that moderate cycle exercise facilitates automatic auditory-change detection processing in the central nervous system. This facilitative effect may be caused by increased exercise-induced arousal.

Keywords: automatic auditory-change detection processing, mismatch negativity (MMN), cycle exercise, arousal level