

## Postural Control of the CVA Patients Against Perturbation During Walking

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### Abstract

The purpose of this study was to clarify the postural control of chronic cerebrovascular accident (CVA) subjects against perturbation during walking. Thirteen CVA subjects and 16 community-dwelling elderly subjects participated in this study. We used a separated-belt treadmill, which produced perturbations by rapidly decelerating one side of the walking-belt for 500 msec while the subject was walking. The walking speed on the treadmill was defined for each CVA subject as 30% of the subject's maximum walking speed. In all community-dwelling elderly subjects, the walking speed on the treadmill was 2km/h. The perturbations involved a 50% deceleration of the walking speed on the treadmill for both CVA and elderly subjects. The CVA subjects received perturbations to both the side with paralysis and the side without paralysis, and the elderly subjects received perturbations to only the right side. The electromyogram responses of the leg and thigh muscles on both sides were recorded. We analyzed the latency from the electromyogram, and compared the side with paralysis of the CVA subjects, the side without paralysis of the CVA subjects, and the right side of the elderly subjects. There were no significant differences of latency between the non-paralysis side of the CVA subjects and the elderly subjects. Otherwise, the latency of the tibialis anterior muscle of the paralysis side was significantly delayed to elderly subjects. In addition, on the side with paralysis of the CVA subjects, the latency of the tibialis anterior muscle was significantly delayed to the vastus medialis muscle. This proximal-to-distal muscle reaction pattern was the opposite of the normal pattern, which is distal-to-proximal. In CVA subjects, the response of the distal muscle was delayed, and the muscle reaction pattern was the proximal-to-distal sequence. We concluded from these results that CVA subjects were not able to effectively control the ankle joint, and thus were caused to fall.

**Key words:** postural control, treadmill-walking; muscle activity; cerebrovascular accident patients, elderly people

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