

Research Project

Adaptation of functional control mechanisms when walking on uneven surface in patients with spastic hemiplegic cerebral palsy

Third-party funded project

Project title Adaptation of functional control mechanisms when walking on uneven surface in patients with spastic hemiplegic cerebral palsy

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Organisation / Research unit

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Status Completed

Patients with unilateral (hemiplegic) cerebral palsy (CP) often report difficulties when walking on uneven surfaces. Motor control impairment associated with CP not only restricts patients' daily activities but also their integration into the society. For instance, patients with unilateral CP need more time for completing daily tasks such as shopping because of their difficulties in walking stairs and steps. Moreover, children with CP have trouble keeping up with their healthy peers playing outdoors where the ground is uneven. Therefore, therapy in these patients should mainly focus on restoring and developing the abilities to accomplish more demanding real life situations. Identifying and objectively quantifying motor control deficits and movement deviations is a prerequisite for developing a patient specific and task orientated therapy concept. However, these deficits cannot be discovered by analysing walking in a controlled laboratory setting with flat ground as done in a routine clinical gait analysis. The patients need to be assessed in a more demanding environment, such as walking on uneven ground to reveal the full dimension of their motor control deficits.

The purpose of this study is to determine differences in the functional control mechanisms when walking on uneven ground between children with and without hemiplegic CP. I will identify gait parameters describing differences in functional control adaptations to walking on uneven ground between children with and without hemiplegic CP and determine if patients with hemiplegic CP require more time to adapt to the uneven ground during the transition from flat to uneven ground. A fast adaptation to a different surface is critical for preventing falls and beneficial when walking outside a laboratory or building.

Gait patterns of 20 children with hemiplegic CP and 20 age-matched normally developing children will be compared when walking on flat and uneven ground. Three-dimensional joint kinematics, centre of mass movements, spatio-temporal parameters and muscle activity patterns derived by an instrumented gait analysis will be analysed.

This study is a critical first step towards developing a new protocol for clinical gait analysis that includes walking on uneven surface. The knowledge gained in this study will be used for proposing a therapy concept aiming at training patient specific movement patterns to facilitate adaptation to uneven ground.

Financed by

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Add publication

Published results

4602236, Romkes, Jacqueline; Freslier, Marie; Rutz, Erich; Bracht-Schweizer, Katrin, Walking on uneven ground: How do patients with unilateral cerebral palsy adapt?, 0268-0033 ; 1879-1271, Clinical biomechanics, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

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