

Mechanics of overground and treadmill walking in children

F. Degache, M. Zollinger, D. Currat, L. Pochon, Nicolas Peyrot, C. Newmans,
D. Malatesta

► **To cite this version:**

F. Degache, M. Zollinger, D. Currat, L. Pochon, Nicolas Peyrot, et al.. Mechanics of overground and treadmill walking in children. *Annals of Physical and Rehabilitation Medicine*, Elsevier Masson, 2014, 57, pp.CO76-003-e. <10.1016/j.rehab.2014.03.607>. <hal-01390529>

HAL Id: hal-01390529

<http://hal.univ-reunion.fr/hal-01390529>

Submitted on 2 Nov 2016

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Mechanics of overground and treadmill walking in children

F. Degache^{a,*}, M. Zollinger^b, D. Currat^b, L. Pochon^b,
N. Peyrot^c, C. Newmans^d, D. Malatesta^b

^a *Unité de Recherche en Santé, Haute École de Santé Vaud, Lausanne, France* ^b *Institut des Sciences du Sport de l'Université de Lausanne, Lausanne, France* ^c *Université de la Réunion, Le Tampon, France*

^d *Unité de Neurologie et de Neuroréhabilitation Pédiatrique, CHUV de Lausanne, Lausanne, France*

* *Auteur correspondant*

Keywords: Biomechanics; Gait; Human locomotion; Inverted pendulum Background and objective.— Motor impairments associated with cerebral palsy (CP) induce abnormal gait in children. The improvement of walking is an essential objective and the use of treadmill for walking analysis and training may offer several advantages. However, a controversy still exists regarding the similarity between treadmill and overground walking. The aim of this study was to compare the mechanics of these two types of gait modalities at standard and preferred walking speeds in hemiplegic cerebral palsy (HCP) and typically developing (TD) children matched on age, height and body mass.

Methods.— Mechanical parameters of walking were computed using two inertial sensors equipped with a triaxial accelerometer and gyroscope and compared in 10 HCP (14.2 ± 1.7 yr) and 10 TD (14.1 ± 1.9 yr) children during treadmill and overground walking at standard and preferred speeds.

Results.— The treadmill compared with the ground, induced almost identical mechanical changes in HCP and TD children with the exception of mechanical potential and kinetic vertical and lateral works, which are both significantly increased in the overground treadmill transition only in HCP children ($P < 0.05$). **Conclusions.**— These results showed that HCP children have a reduced adaptive capacity in absorbing and decelerating the speed created by treadmill.