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Capturing neuroplastic changes after intensive rehabilitation in children with unilateral cerebral palsy using DTI, TMS and fMRI

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Intensive rehabilitation interventions have been shown to be efficacious in improving upper extremity function in children with Unilateral spastic cerebral palsy (USCP). These interventions are based on motor learning principles and engage children in skillful movements. Improvements in upper extremity function are believed to be associated with neuroplastic changes. However, these neuroplastic changes have not been well-described in children with cerebral palsy, likely due to challenges in defining and implementing the optimal tools and tests in children. In this study, three different neurological assessments (diffusion tensor imaging-DTI, transcranial magnetic stimulation-TMS and functional magnetic resonance imaging-fMRI) will be documented before and after a bimanual intensive treatment of upper and lower extremities intervention (HABIT-ILE) in children with USCP presenting differential corticospinal developmental reorganization (ipsilateral and contralateral). The aim of this study is to show how to capture neurophysiological changes in maps, brain activity, and associated white matter tracts, and to document the complementary relationship between these measures. Independent of cortical reorganization, children showed changes in activation and increase in size of the motor areas controlling the affected hand, quantified with different techniques. In addition, DTI demonstrated unexpected changes in corticospinal tracts.

Biography

Yannick Bleyenheuft is Faculty Member at the Universite catholique de Louvain (UCL), Institute of Neuroscience. She was trained as a Physiotherapist and completed her PhD in the field of Motor Control in children with cerebral palsy (CP) in 2009 at UCL. She completed her Post-doctorate, sharing her time between UCL and Columbia University (New York), working on intensive rehabilitation processes for children with CP. In 2014, she was appointed as tenured of the Chair for neurophysiological evidences in intensive neurorehabilitation at the Institute of Neuroscience, UCL. She is now Head of the "Motor Skill Learning and intensive neurorehabilitation lab" that was developed in 2015.

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