

Summary

During the past few decades, advances in neonatal care has led to an increasing number of infants at risk of neurodevelopmental disorders such as cerebral palsy (CP). This has caused a growing need for effective treatment. Commonly, children with CP are assumed to benefit from an intervention initiated early in life but substantial evidence of this is lacking.

In Study 1, we discuss the neuroscientific background for intervention based on physical activity and suggest combining Magnetic Resonance Imaging (MRI) and the General Movements Assessment (GMA) to diagnose CP as soon as possible. Furthermore, we discuss why intervening early during the child's life is advisable.

Findings from Study 2 suggest that there may be a period during where the child's is especially susceptible to intervention. A cohort of healthy infants showed increased intramuscular and corticomuscular coherence at an age overlapping the period of Fidgety Movements (FM), which indicates that the first 2-5 months of a child's life may well be a sensitive period. This knowledge could be used to gain a greater effect of intervention and to sophisticate CP diagnostics.

Study 3 presents a randomized controlled trial (RCT) of an interactive 'baby-gym', which allows parents of infants at risk of CP to perform a daily, home-based intervention with the infant, supervised remotely by therapists. Preliminary results show a significant improvement in visual acuity among the infants in the intervention group, which inspires hope that this type of intervention is effective.

In Study 4, ultrasound measurements of the medial gastrocnemius (MG) muscle yielded that MG muscle volume is significantly reduced among children with CP from the age of 15 months. It is assumed that reduced muscle volume is related to the development of muscle contractures and, thus, our findings point to the need for intervention to be initiated prior to 15 months of age.

Therefore, in Study 5, we performed a pilot study to investigate if intensive gait training could prevent contractures among toddlers with CP. Our results showed that all of the children in the study increased their MG volume significantly during the training, which indicates that an intensive program of physical activity may stimulate muscle growth.

Collectively, the studies included in this thesis argue in favour of initiating intervention based on physical activity very early in the life of a child with CP. Such an intervention is likely to be the most effective if started during a sensitive period in corticospinal development.