

Science Infos

Paralysie Cérébrale

N°24- JUIN 2016



Focus

28^{ème} réunion annuelle de l'EACD (European Academy of Childhood Disability)

Du 1^{er} au 4 juin, la 28^{ème} réunion annuelle de l'EACD (European Academy of Childhood Disability) a pris une dimension internationale en réunissant plus de 1500 participants représentant 66 pays de tous les continents. En effet, cette réunion était couplée au premier meeting de l'IAACD (International Alliance of Academies of Childhood Disability) et à la 5^{ème} conférence internationale de l'ICPC (International Cerebral Palsy Conference).

La Fondation Motrice s'est engagée lors du congrès de l'EACD à subventionner chaque année pendant 3 ans la conférence magistrale d'un scientifique ayant apporté une contribution majeure dans le domaine de la recherche sur les troubles neuro-développementaux.

Ainsi, cette année, La Fondation Motrice a subventionné la conférence magistrale du Professeur Naila Khan. Le Pr Naila Khan est responsable du département de Neuropédiatrie à l'hôpital des enfants de Dhaka au Bangladesh. Le Pr Naila Khan a ouvert au sein de cet hôpital le premier Child Development Center (CDC) dans lequel interviennent des équipes multidisciplinaires comprenant médecins, psychologues, kiné, neurophysiologistes, spécialistes de la thérapie comportementale, travailleurs sociaux. L'objectif est d'améliorer les compétences fonctionnelles et l'adaptation des enfants présentant des troubles neurodéveloppementaux aigus et chroniques. Lors de sa conférence le Pr Naila Khan a présenté le travail qu'elle réalise sous l'égide du gouvernement du Bangladesh en ouvrant des nouveaux centres du même type dans les différentes provinces de son pays.

Le prochain congrès de l'EACD se tiendra à Amsterdam du 17 au 20 mai 2017.



Sommaire

Manifestations et congrès

Publications scientifiques

Epidémiologie

Epidemiological analysis of diseases of children and adolescents requiring neurological and mobility rehabilitation in the Świętokrzyskie Rehabilitation Center in Czarniecka Góra, Poland. 9

MRI classification system (MRICS) for children with cerebral palsy: development, reliability, and recommendations. 9

●Prévalence- Incidence

Cerebellar injury in preterm children with cerebral palsy after intraventricular hemorrhage: Prevalence and relationship to functional outcomes. 10

Disabling chronic conditions in childhood and socioeconomic disadvantage: asystematic review and meta-analyses of observational studies 11

More than two-thirds of adolescents who received active perinatal care after extremely preterm birth had mild or no disabilities. 11

●Facteurs de risque – Causes

Altered autonomic control in preterm newborns with impaired neurological outcomes 12

Analysis of antenatal-onset cerebral palsy secondary to transient ischemia in utero using a national database in Japan 12

Asphyxia, Neurologic Morbidity, and Perinatal Mortality in Early-Term and Postterm Birth. 13

Cerebrovascular adaptations to chronic hypoxia in the growth restricted lamb. 13

Effect of Intra- and Extrauterine Growth on Long-Term Neurologic Outcomes of Very Preterm Infants. 14

Neurodevelopmental Outcome of Extremely Low Birth Weight Children at Corrected Age of Two Years. 14

Prolonged latency of preterm prelabour rupture of membranes and neurodevelopmental outcomes: a secondary analysis. 15

Significant discrepancies were found in pooled estimates of searching with Chinese indexes versus searching with English indexes. 15

●Génétique

The association between antioxidant enzyme polymorphisms and cerebral palsy after perinatal hypoxic-ischaemic encephalopathy 16

Lésions - Prévention des lésions

●Données fondamentales

New means to assess neonatal inflammatory brain injury. 17

Pretreatment with Resveratrol Prevents Neuronal Injury and Cognitive Deficits Induced by Perinatal Hypoxia-Ischemia in Rats. 17

•Données cliniques

- Influence of one-year neurologic outcome of treatment on newborns with moderate and severe hypoxic-ischemic encephalopathy by rhuEPO combined with ganglioside (GM1 17
- Effect of Early Prophylactic High-Dose Recombinant Human Erythropoietin in Very Preterm Infants on Neurodevelopmental Outcome at 2 Years: A Randomized Clinical Trial. 18
- Hyaluronidase and Hyaluronan Oligosaccharides Promote Neurological Recovery after Intraventricular Hemorrhage. 19
- [Prenatal treatment with magnesium sulphate: Initial clinical outcomes in pre-term infants less than 29 weeks and correlation with neonatal magnesium levels]. [Article in Spanish] 19

Detection – Diagnostic

•Données fondamentales

- Nanoscale effects in dendrimer-mediated targeting of neuroinflammation. 20

•Données cliniques

- Alterations in regional shape on ipsilateral and contralateral cortex contrast in children with unilateral cerebral palsy and are predictive of multiple outcomes. 20
- Automated, quantitative measures of grey and white matter lesion burden correlates with motor and cognitive function in children with unilateral cerebral palsy. 21
- Extent of altered white matter in unilateral and bilateral periventricular white matter lesions in children with unilateral cerebral palsy. 21
- Formal training in general movement assessment is required to effectively evaluate infants with perinatal asphyxia in outpatient settings. 22
- MR angiography findings in infants with neonatal arterial ischemic stroke in the middle cerebral artery territory: A prospective study using circle of Willis MR angiography. 22
- Neonatal brain hemorrhage (NBH) of prematurity: translational mechanisms of the vascular-neural network. 22
- Neonatal DTI early after birth predicts motor outcome in preterm infants with periventricular hemorrhagic infarction. 23
- Usefulness of the most popular neurodevelopmental tests in preschool assessment of children born with very low birth weight. 23
- Using ventricular modeling to robustly probe significant deep gray matter pathologies: Application to cerebral palsy 23

Motricité - Mobilité – Posture

- An electromyographic protocol that distinguishes spasticity from dystonia. 24
- Anticipatory postural adjustments associated with a loading perturbation in children with hemiplegic and diplegic cerebral palsy 24
- Applications of musculoskeletal ultrasonography in pediatric patients. 25
- Assisting Hand Assessment and Children's Hand-use Experience Questionnaire - Observed Versus Perceived manual Performance in Children with Unilateral Cerebral Palsy. 25
- Biomechanical behavior of valgus foot in children with cerebral palsy: A comparative study. 25
- Body representation in children with hemiplegic cerebral palsy. 26
- Children with cerebral palsy have uncharacteristic somatosensory cortical oscillations after stimulation of the hand mechanoreceptors. 26
- Classifying the manual abilities of young children with cerebral palsy. 26
- Clinical motion analyses over eight consecutive years in a child with crouch gait: a case report. 27
- Development of the Assisting Hand Assessment for adolescents (Ad-AHA) and validation of the AHA from 18 months to 18 years. 27
- Effect of Segmental Trunk Support on Posture and Reaching in Children With Cerebral Palsy. 28

- Evaluation of postural stability in children with hemiplegic cerebral palsy. 28
- Footwear Decreases Gait Asymmetry during Running. 28
- Gait characteristics, balance performance and falls in ambulant adults with cerebral palsy: An observational study. 29
- Leg and Joint Stiffness in Children with Spastic Diplegic Cerebral Palsy during Level Walking. 29
- Mini-MACS: development of the Manual Ability Classification System for children younger than 4 years of age with signs of cerebral palsy. 30
- Multiple gait patterns within the same Winters class in children with hemiplegic cerebral palsy. 30
- Partial correlation between lower muscle thickness, 10-meter walk test, and the timed up & go test in children with spastic cerebral palsy. 30
- Predictors of Independent Walking in Young Children With Cerebral Palsy. 31
- Reliability and Construct Validity of the 6-Minute Racetrack Test in Children and Youth with Cerebral Palsy, GMFCS Levels III and IV. 31
- Site-Specific Transmission of a Floor-Based, High-Frequency, Low-Magnitude Vibration Stimulus in Children With Spastic Cerebral Palsy. 32
- The influence of seat heights and foot placement positions on postural control in children with cerebral palsy during a sit-to-stand task. 32
- Windswept hip deformity in children with cerebral palsy: a population-based prospective follow-up. 33

Cognition

- Measuring intellectual ability in cerebral palsy: The comparison of three tests and their neuroimaging correlates. 33
- Brain State Before Error Making in Young Patients With Mild Spastic Cerebral Palsy. 34

Traitement - Rééducation motrice et cognitive

- Protocol for a prospective observational study of conventional treatment and traditional Korean medicine combination treatment for children with cerebral palsy. 34

Pharmacologie Efficacite Tolérance

- Clinical Trial of Erythropoietin in Young Children With Cerebral Palsy. 34
- Comparison between an Ascenda and a silicone catheter in intrathecal baclofen therapy in pediatric patients: analysis of complications. 35
- Evaluating Functional Outcomes of Botulinum Toxin Type A Injection Combined with Occupational Therapy in the Upper Limbs of Children with Cerebral Palsy: A 9-Month Follow-Up from the Perspectives of Both Child and Caregiver. 35

Chirurgie

- Blood Transfusion Incidence, Risk Factors, and Associated Complications in Surgical Treatment of Hip Dysplasia. 36
- Changes in gait which occur before and during the adolescent growth spurt in children treated by selective dorsal rhizotomy. 37
- Combined Anterior and Posterior Lumbar Rhizotomy for Treatment of Mixed Dystonia and Spasticity in Children With Cerebral Palsy. 37
- Correction of gait after derotation osteotomies in cerebral palsy: Are the effects predictable? 38
- Effects of Soft Tissue Surgery on Pelvic and Hip Rotation in Patients with Spastic Diplegia: A Meta-Analysis. 38
- Electromagnetic bone segment tracking to control femoral derotation osteotomy – A saw bone study. 38
- Factors associated with recurrence after femoral derotation osteotomy in cerebral palsy. 39
- Hip dislocation in cerebral palsy: evolution of the contralateral side after reconstructive surgery. 39
- Incidence of and Risk Factors for Loss of 1 Blood Volume During Spinal Fusion Surgery in Patients With Cerebral Palsy. 40
- Multilevel surgery in adults with cerebral palsy. 40
- Predictors of outcome after single-event multilevel surgery in children with cerebral palsy: a retrospective ten-year follow-up study. 40
- Outcomes of Isolated Varus Derotational Osteotomy in Children With Cerebral Palsy Hip Dysplasia and Predictors of Resubluxation. 41
- Performing a Definitive Fusion in Juvenile CP Patients is a Good Surgical Option. 41

Short-term and Long-term Clinical Results of the Surgical Correction of Thumb-in-Palm Deformity in Patients With Cerebral Palsy. 42
Screw augmentation for spinopelvic fixation in neuromuscular spine deformities: technical note. 42
Surgical Treatment Guidelines for Digital Deformity Associated With Intrinsic Muscle Spasticity (Intrinsic Plus Foot) in Adults With Cerebral Palsy. 43
The Long-term Outcome of Early Spine Fusion for Scoliosis in Children with Cerebral Palsy. 43

Réadaptation fonctionnelle

Bilateral muscle strength symmetry and performance are improved following walk training with restricted blood flow in an elite paralympic sprint runner: Case study. 44
Capturing neuroplastic changes after bimanual intensive rehabilitation in children with unilateral spastic cerebral palsy: A combined DTI, TMS and fMRI pilot study. 44
Constraint-induced movement therapy improves upper limb activity and participation in hemiplegic cerebral palsy: a systematic review. 45
Does therapeutic electrical stimulation improve function in children with disabilities? A comprehensive literature review. 45
Effectiveness of Rehabilitation Interventions to Improve Gait Speed in Children With Cerebral Palsy: Systematic Review and Meta-analysis. 46
Effects of strength training on mobility in adults with cerebral palsy: A systematic review. 46
Evaluation of the effectiveness of robotic gait training and gait-focused physical therapy programs for children and youth with cerebral palsy: a mixed methods RCT. 47
Intensive upper limb intervention with self-management training is feasible and promising for older children and adolescents with unilateral cerebral palsy. 47
Muscle Recruitment and Coordination following Constraint-Induced Movement Therapy with Electrical Stimulation on Children with Hemiplegic Cerebral Palsy: A Randomized Controlled Trial. 48
Resting State and Diffusion Neuroimaging Predictors of Clinical Improvements Following Constraint-Induced Movement Therapy in Children With Hemiplegic Cerebral Palsy. 48
Site-Specific Transmission of a Floor-Based, High-Frequency, Low-Magnitude Vibration Stimulus in Children With Spastic Cerebral Palsy. 48
The effects of forward and backward walking according to treadmill inclination in children with cerebral palsy. 49
The impact of strength training on skeletal muscle morphology and architecture in children and adolescents with spastic cerebral palsy: A systematic review. 49
Treadmill training with an incline reduces ankle joint stiffness and improves active range of movement during gait in adults with cerebral palsy. 50
Wide-pulse-high-frequency neuromuscular electrical stimulation in cerebral palsy. 50

Orthèse

Effect of supporting 3D-garment on gait postural stability in children with bilateral spastic cerebral palsy. 51
Minimising impairment: Protocol for a multicentre randomised controlled trial of upper limb orthoses for children with cerebral palsy. 51
The Effects of Varying Ankle Foot Orthosis Stiffness on Gait in Children with Spastic Cerebral Palsy Who Walk with Excessive Knee Flexion. 52

Stimulation cérébrale - Stimulation neurosensorielle

Deep brain stimulation in cerebral palsy: Challenges and opportunities. 52
Multiday Transcranial Direct Current Stimulation Causes Clinically Insignificant Changes in Childhood Dystonia: A Pilot Study. 53

Réalité virtuelle - Jeux video

Development and Reliability Evaluation of the Movement Rating Instrument for Virtual Reality Video Game Play. 53
Using Free Internet Videogames in Upper Extremity Motor Training for Children with Cerebral Palsy. 53

Thérapie cellulaire Médecine régénérative

A Dichotomy of Information-Seeking and Information-Trusting: Stem Cell Interventions and Children with Neurodevelopmental Disorders. 54
Concise Review: Stem Cell Interventions for People With Cerebral Palsy: Systematic Review With Meta-Analysis. 54
First Autologous Cord Blood Therapy for Pediatric Ischemic Stroke and Cerebral Palsy Caused by Cephalic Molding during Birth: Individual Treatment with Mononuclear Cells. 55
Involvement of Immune Responses in the Efficacy of Cord Blood Cell Therapy for Cerebral Palsy. 55
Preterm white matter brain injury is prevented by early administration of umbilical cord blood cells. 56

Douleur

Associations between recurrent musculoskeletal pain and visits to the family doctor (GP) and specialist multi-professional team in 74 Norwegian youth with cerebral palsy. 56
Defining mild, moderate, and severe pain in young people with physical disabilities. 56
Hip health at skeletal maturity: a population-based study of young adults with cerebral palsy. 57
Pain and hospital admissions are important factors associated with quality of life in non-ambulatory children. 57

Fatigue

Construction and validation of the fatigue impact and severity self-assessment for youth and young adults with cerebral palsy. 58

Autres Troubles /troubles concomitants

Assessment of Abilities and Comorbidities in Children With Cerebral Palsy. 58

Nutrition – Troubles nutritionnels

A Cross-sectional Survey of Growth and Nutritional Status in Children With Cerebral Palsy in West China. 58
Serum Leptin as a Nutritional Biomarker in Children with Cerebral Palsy. 59

Sphère bucco-dentaire

Americans with Disabilities Act: Its Importance in Special Care Dentistry. 59
Bilateral transcervical submandibular gland excision for drooling: A study of the mature scar and long-term effects. 60
Managing children with sialorrhoea (drooling): Experience from the first 301 children in our saliva control clinic. 60
Sialorrhea in children with cerebral palsy. 61

Troubles urinaires

[Preliminary study: Lower urinary tract dysfunction and anorectal disorders in children with cerebral palsy]. 61

Troubles de la vision

Risk of fall (RoF) intervention by affecting visual egocenter through gait analysis and yoked prisms. 62
Use of prism adaptation in children with unilateral brain lesion: Is it feasible? 62

Qualité de vie et rapport au monde

Environmental needs in childhood disability analysed by the WHO ICF, Child and Youth Version. 62

• **Qualité de vie**

Quality of life in young adults with cerebral palsy. 63

Quality of Life of Children with Cystic Periventricular Leukomalacia – A Prospective Analysis with the Child Health Questionnaire-Parent Form 50. 63

• **Vie quotidienne**

64 Cognitive Orientation to daily Occupational Performance (CO-OP): A New Approach for Children with Cerebral Palsy.

Creating early opportunities to learn and move for infants with cerebral palsy. 64

Parents' experience of undertaking an intensive cognitive orientation to daily occupational performance (CO-OP) group for children with cerebral palsy. 64

Teaching phonics to groups of middle school students with autism, intellectual disabilities and complex communication needs. 65

• **Activité physique - Sport**

Exercise Intensity during Power Wheelchair Soccer. 65

Leisure-Time Physical Activity in adults with Cerebral Palsy. 66

Paralympic athletes' perceptions of their experiences of sports-related injuries, risk factors and preventive possibilities. 66

Sedentary and Active Time in Toddlers with and without Cerebral Palsy. 67

• **Prise en charge et Accompagnement**

Is a family-centred initiative a family-centred service? A case of a Conductive Education setting for children with cerebral palsy. 67

• **Domotique**

Empirical evaluation of circling interface with head-mounted mouse emulator users. 68

Manifestations et congrès

Septembre 2016

AACPDM 70th Annual Meeting

20-24 Septembre 2016

Hollywood, Florida, USA

<http://www.aacpdm.org/meetings/2016>

European paediatric stroke symposium

Neonatal Arteriel Ischemic Stroke (NAIS from birth to childhood)

21-22 septembre 2016

Saint Etienne, France

<http://www.chu-st-etienne.fr/avcpediatrie/>

http://www.swiss-paediatics.org/sites/default/files/2016.09.21_proamme_congres_avc_enfantv2.pdf

6th International Conference on Clinical Neonatology

22-24 Septembre 2016

Turin, Italie

<https://www.eiseverywhere.com/ehome/105597/234360/>

Octobre 2016

31ème Congrès de la Société française de Médecine Physique et de réadaptation (SOFMER)

13-15 Octobre 2016

Saint Etienne, France

<http://saint-etienne.sofmer2016.com/>

Novembre 2016

Journées d'études, Polyhandicap 2016

21-22 novembre 2016

Paris, France

<http://www.institutmc.org/index.php/journees-d-etudes-polyhandicap-2016-21-et-22-novembre-2016>

Décembre 2016

Journées d'Etude annuelles du CDI

12-13 décembre 2016

Paris, France

<http://www.institutmc.org/index.php/journee-d-etude-annuelles-du-cdi-12-et-13-decembre-2016>

Mai 2017

29th Annual EACD Meeting, 7-20 May, 2017, Amsterdam

17-20 mai 2017

Amsterdam, Pays Bas

<http://www.eacd2017.org/>

Publications scientifiques

Méthodologie de la recherche

Le profil de veille a été mis en place sur Pubmed avec le mot clé "Cerebral Palsy" pour des publications majoritairement en français ou en anglais, avec abstract ou full text

Free article indique le lien vers les articles dont le texte intégral est librement disponible

Epidémiologie

Epidemiological analysis of diseases of children and adolescents requiring neurological and mobility rehabilitation in the Świętokrzyskie Rehabilitation Center in Czarniecka Góra, Poland.

Grabowski ML, Kosińska B, Knap JP, Lewandowski Z

Ann Agric Environ Med. 2016 Jun 2;23(2):259-63. doi: 10.5604/12321966.1203887.

INTRODUCTION AND OBJECTIVE: Epidemiological analysis of the dynamics of admissions and patient characteristics is presented concerning 5,955 children and adolescents (3-18 years of age) hospitalized in 2007-2013 with neurological and mobility diseases in Świętokrzyskie Rehabilitation Centre (ŚRC) in southern Poland.

MATERIALS AND METHOD: Within the period of 7 years, 18,647 patients were admitted to the ŚRC, of whom 9,546 were admitted to the daily ward and 9,109 to the stationary wards. 5,955 were children and adolescents aged 3-18, 1,499 were children aged 3-13 and almost three times more were patients aged 14-18. The correlation between the number of admissions in each year and the number of those hospitalized depending on the age and diagnosis was examined.

RESULTS: In the discussed period, in both age ranges, the group of deforming dorsopathies dominated, while cerebral palsy was the second most common cause of hospitalization, and the and post-traumatic disorder the smallest number. In the diagnoses of cerebral palsy and post-traumatic disease, boys constituted most of the hospitalized. In contrast, girls dominated in the group of deforming dorsopathies.

DISCUSSION: Analysis of the material of 5,955 patients revealed a number of quantitative data which assisted in the analysis of the epidemiological situation of this group of diseases - necessary for the planning of highly specialized treatment and rehabilitation. The greatest needs in terms of admissions to the ŚRC concerned the group of adolescents aged 14-18. The results of combined rehabilitation indicated the full use of places in the Świętokrzyskie Rehabilitation Center and also indicated the need for similar provincial and even regional centres.

[Free Article](#)

PMID: 27294629 [PubMed - in process]

MRI classification system (MRICS) for children with cerebral palsy: development, reliability, and recommendations.

Himmelman K, Horber V, De La Cruz J, Horridge K, Mejaski-Bosnjak V, Hollody K, Krägeloh-Mann i; SCPE Working Group.

AIM: To develop and evaluate a classification system for magnetic resonance imaging (MRI) findings of children with cerebral palsy (CP) that can be used in CP registers.

METHOD: The classification system was based on pathogenic patterns occurring in different periods of brain development. The MRI classification system (MRICS) consists of five main groups: maldevelopments, predominant white matter injury, predominant grey matter injury, miscellaneous, and normal findings. A detailed manual for the descriptions of these patterns was developed, including test cases (www.scpnetwork.eu/en/my-scp/rtm/neuroimaging/cp-neuroimaging/). A literature review was performed and MRICS was compared with other classification systems. An exercise was carried out to check applicability and interrater reliability.

Professionals working with children with CP or in CP registers were invited to participate in the exercise and chose to classify either 18 MRIs or MRI reports of children with CP.

RESULTS: Classification systems in the literature were compatible with MRICS and harmonization possible. Interrater reliability was found to be good overall ($k=0.69$; $0.54-0.82$) among the 41 participants and very good ($k=0.81$; $0.74-0.92$) using the classification based on imaging reports.

INTERPRETATION: Surveillance of Cerebral Palsy in Europe (SCPE) proposes the MRICS as a reliable tool. Together with its manual it is simple to apply for CP registers.

© 2016 Mac Keith Press.

PMID: 27325153 [PubMed - as supplied by publisher]

The Role of Information Systems to Manage Cerebral Palsy.

Ajami S, Maghsoudlorad AA.

Iran J Child Neurol. 2016 Spring;10(2):1-9.

Objective In healthcare system, it is necessary to have exact and accurate information in order to address health care needs and requirements of society members as well as expectations of policy makers, planners and decision makers. The aim of this narrative review article was to explain the role of information systems in cerebral palsy management and identify the advantages and barriers to the development of cerebral palsy registry system. Data were collected using databases such as of Science Direct, PubMed, Proquest, Springer, and SID (Scientific Information Database). Overall, 65 sources were selected. One of the biggest challenges for children with physical and motor disabilities in rehabilitation center is access to a system, which provides a comprehensive data set reflecting all information on a patient's care. Thus, data and information management in children with physical and motor disability such as cerebral palsy facilitates access to data and cerebral palsy data comparison as well as the monitoring incidence rate of cerebral palsy, enhancing health care quality; however, there are always numerous barriers to establish the system. One of the ways to overcome these problems is the establishment of a standard framework of minimum data sets and exact definition of its data components. Reliable standards in the use of applications as well as user-friendly software will ensure patients' data extraction and registration.

[Free PMC Article](#)

PMCID: PMC4885149

PMID: 27247578 [PubMed]

Prévalence- Incidence

Cerebellar injury in preterm children with cerebral palsy after intraventricular hemorrhage: Prevalence and relationship to functional outcomes.

Kitai Y, Hirai S, Ohmura K, Ogura K, Arai H.

Brain Dev. 2015 Sep;37(8):758-63. doi: 10.1016/j.braindev.2014.12.009. Epub 2015 Jan 5.

OBJECTIVES: To elucidate the prevalence of cerebellar injury and its relationship to functional outcomes in preterm children with cerebral palsy (CP) after intraventricular hemorrhage (IVH).

PARTICIPANTS: We selected 69 children (40 males and 29 females, aged between 6 and 13 years) out of 2049 with cerebral palsy who visited Morinomiya Hospital, the regional center hospital for CP in West Japan. The inclusion criteria were (1) gestational age under 36 weeks at birth, (2) clear history of postnatal intraventricular hemorrhage,

and (3) age at investigation over 6 years old. Those without sufficient imaging study or functional evaluation were excluded.

METHODS: The participants were divided into four groups according to the presence of post-hemorrhagic hydrocephalus (PH) and cerebellar injury (CI): PH+/CI+, PH+/CI-, PH-/CI+, and PH-/CI-. Type of CP, ability to walk, verbal function, the incidence of severe visual impairment, and the complication of epilepsy were investigated and compared among the groups.

RESULTS: The gestational ages of the participants were between 22 and 34 weeks, and their birth weight was between 412 and 1788 g. PH and CI were found in 39 (57%) and 40 (58%) children, respectively. Both the PH+/CI+ group (n=31) and the PH-/CI+ group (n=9) showed significantly lower walking and verbal abilities and a higher incidence of epilepsy than the PH-/CI- group (n=21), while the PH+/CI- group showed no significant difference from the PH-/CI- group. Severe visual impairment was found only in the PH+/CI+ group and the PH-/CI+ group.

CONCLUSIONS: The prevalence of CI in preterm children with CP after IVH (58%) was almost the same as that of PH. CI is one of the most significant complications in preterm infants, affecting motor and verbal functions and being associated with epilepsy more than PH.

Copyright © 2014 The Japanese Society of Child Neurology. Published by Elsevier B.V. All rights reserved.

PMID: 25571998 [PubMed - indexed for MEDLINE]

Disabling chronic conditions in childhood and socioeconomic disadvantage: asystematic review and meta-analyses of observational studies.

Spencer NJ, Blackburn CM, Read JM.

BMJ Open. 2015 Sep 3;5(9):e007062. doi: 10.1136/bmjopen-2014-007062.

OBJECTIVE: To determine the association of socioeconomic disadvantage with the prevalence of childhood disabling chronic conditions in high-income countries.

STUDY DESIGN: Systematic review and meta-analyses.

DATA SOURCES: 6 electronic databases, relevant websites, reference lists and experts in the field.

STUDY SELECTION: 160 observational studies conducted in high-income countries with data on socioeconomic status and disabling chronic conditions in childhood, published between 1 January 1991 and 31 December 2013.

DATA EXTRACTION AND SYNTHESIS: Abstracts were reviewed, full papers obtained, and papers identified for inclusion by 2 independent reviewers. Inclusion decisions were checked by a third reviewer. Where reported, ORs were extracted for low versus high socioeconomic status. For studies reporting raw data but not ORs, ORs were calculated. Narrative analysis was undertaken for studies without data suitable for meta-analysis.

RESULTS: 126 studies had data suitable for meta-analysis. ORs for risk estimates were: all-cause disabling chronic conditions 1.72 (95% CI 1.48 to 2.01); psychological disorders 1.88 (95% CI 1.68 to 2.10); intellectual disability 2.41 (95% CI 2.03 to 2.86); activity-limiting asthma 2.20 (95% CI 1.87 to 2.85); cerebral palsy 1.42 (95% CI 1.26 to 1.61); congenital abnormalities 1.41 (95% CI 1.24 to 1.61); epilepsy 1.38 (95% CI 1.20 to 1.59); sensory impairment 1.70 (95% CI 1.39 to 2.07). Heterogeneity was high across most estimates ($I^2 > 75\%$). Of the 34 studies without data suitable for meta-analysis, 26 reported results consistent with increased risk associated with low socioeconomic status.

CONCLUSIONS: The findings indicate that, in high-income countries, childhood disabling chronic conditions are associated with social disadvantage. Although evidence of an association is consistent across different countries, the review provides limited evidence to explain the association; future research, using longitudinal data, will be required to distinguish low socioeconomic status as the cause or consequence of childhood disabling chronic conditions and the aetiological pathways and mechanisms.

Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to <http://group.bmj.com/group/rights-licensing/permissions>.

[Free PMC Article](#)

PMCID: PMC4563224

PMID: 26338834 [PubMed - indexed for MEDLINE]

More than two-thirds of adolescents who received active perinatal care after extremely preterm birth had mild or no disabilities.

Holsti A, Adamsson M, Serenius F, Hägglöf B, Farooqi A.

Acta Paediatr. 2016 Jun 8. doi: 10.1111/apa.13499. [Epub ahead of print]

AIM: Active perinatal care (APC) increases the survival of extremely preterm (EPT) infants, but may increase the rate of disabilities. We examined neurodevelopmental outcomes in adolescents aged 10-15 years who were born EPT and received APC in two Swedish tertiary care centres.

METHODS: Cognitive function was assessed using the Wechsler Intelligence Scale for Children and neurosensory impairments were assessed by reviewing the case records and a standard parent health questionnaire. The outcomes were compared to term-born controls.

RESULTS: We assessed 132 EPT adolescents and 103 controls. The rates of cerebral palsy, moderate to severe visual impairment and moderate to severe hearing impairment were 9%, 4% and 6%, respectively, for the EPT children and zero for the controls. Serious cognitive impairment was present in 31% of the EPT adolescents and 5% of the controls. Combining impairments across domains showed that 34% of EPT adolescents had moderate and severe disabilities compared with 5% of the controls. Impairments were more common at 23-24 weeks of gestational age (43%) than at 25 weeks (28.4%).

CONCLUSION: Just over two-thirds (66%) of adolescents born EPT who received APC had mild or no disabilities. Our results are relevant for healthcare providers and clinicians counselling families.

This article is protected by copyright. All rights reserved.

PMID: 27275954 [PubMed - as supplied by publisher]

Facteurs de risque – Causes

Altered autonomic control in preterm newborns with impaired neurological outcomes.

Thiriez G, Mougey C, Vermeylen D, Wermenbol V, Lanquart JP, Lin JS, Franco P.

Clin Auton Res. 2015 Aug;25(4):233-42. doi: 10.1007/s10286-015-0298-6. Epub 2015 Aug 8.

PURPOSE: Very preterm newborns are at high risk of neurological injury. The objective of this work was to study the impact of neurological aggression on the autonomic nervous system.

METHODS: We studied polysomnography recordings, at term corrected gestational age, for 38 preterm infants born at less than 28 weeks or weighing less than 1 kg. These infants were seen by a neuropediatrician, average age at follow up was 54.4 months. We created two groups: one with children who did not have any neurological disorder, including cerebral palsy (CP), language or mental retardation, visual or hearing disability, and attention disorder; the second group contained children with at least one of these impairments. From the polysomnography recordings, using coarse-graining spectral analysis, we compared heart rate variability indices between preterm infants with normal and abnormal neurological outcomes.

RESULTS: Twenty infants had an impaired neurological outcome. Regarding the clinical characteristics, there were more babies born from smoking mothers ($p = 0.025$), with early-onset neonatal sepsis ($p = 0.04$), and abnormal results on cerebral magnetic resonance imaging ($p = 0.014$) in the group with impaired neurological outcomes. Spectral parameters were significantly different between active and quiet sleep. Total powers, harmonic and non-harmonic powers, high frequency and low frequency powers were higher in active sleep compared with those in quiet sleep. Preterm babies with impaired neurological development, in particular those with CP, had lower total power and non-harmonic power especially in active sleep than those with normal neurological outcome.

CONCLUSION: These findings suggest that, in very preterm infants, perinatal neurological injuries could be associated with abnormal maturation of the autonomic nervous system.

PMID: 26253935 [PubMed - indexed for MEDLINE]

Analysis of antenatal-onset cerebral palsy secondary to transient ischemia in utero using a national database in Japan

Fukushima K, Morokuma S, Kitadai Y, Tazaki Y, Sumie M, Nakanami N, Ushiro S, Matsuda Y, Tsukimori K.

J Obstet Gynaecol Res. 2016 Jun 8. doi: 10.1111/jog.13046. [Epub ahead of print]

AIM: We conducted a retrospective analysis of summary medical reports of children diagnosed with cerebral palsy (CP) to identify clinical features of antenatal onset of CP secondary to transient ischemia in utero.

METHODS: The 658 brief summary reports available in the Japan Obstetric Compensation System for Cerebral Palsy were screened, and we identified cases of singleton pregnancy, delivered at gestational age ≥ 33 weeks and those with cord blood gas pH ≥ 7.20 . Of the 137 cases identified, 84 were excluded for the following reasons: no evidence

of ischemic brain lesion, clear post-natal causative factor of CP, presence of a congenital condition, and sentinel hypoxic event, such as uterine rupture. The demographic profiles of the 53 cases included in our analysis were compared to identify those with and without an abnormal variability in fetal heart rate.

RESULTS: Between-group comparison identified an association between abnormal heart rate variability and a lower Apgar score at 1 min (2 vs 6; $P < 0.001$) and 5 min (5.5 vs 8; $P = 0.002$), and more frequent episodes of fetal movement loss (41% vs 10%; $P = 0.027$). An hypoxic event ≤ 1 week before delivery was more likely to be associated with abnormal heart rate variability (89%) and low Apgar score (82%), while events at > 1 week were associated with development of polyhydramnios (44%).

CONCLUSION: In utero transient ischemic events can contribute to term or near-term CP. Careful follow-up is recommended for fetuses with a history of fetal movement loss, abnormal variability in heart rate, and polyhydramnios of unknown causes.

© 2016 Japan Society of Obstetrics and Gynecology.

PMID: 27279463 [PubMed - as supplied by publisher]

Asphyxia, Neurologic Morbidity, and Perinatal Mortality in Early-Term and Postterm Birth.

Seikku L, Gissler M, Andersson S, Rahkonen P, Stefanovic V, Tikkanen M, Paavonen J, Rahkonen L

Pediatrics. 2016 Jun;137(6). pii: e20153334. doi: 10.1542/peds.2015-3334.

BACKGROUND AND OBJECTIVES: Neonatal outcomes vary by gestational age. We evaluated the association of early-term, full-term, and postterm birth with asphyxia, neurologic morbidity, and perinatal mortality.

METHODS: Our register-based study used retrospective data on 214 465 early-term (37(+0)-38(+6) gestational weeks), 859 827 full-term (39(+0)-41(+6)), and 55 189 postterm ($\geq 42(+0)$) live-born singletons during 1989-2008 in Finland. Asphyxia parameters were umbilical cord pH and Apgar score at 1 and 5 minutes. Neurologic morbidity outcome measures were cerebral palsy (CP), epilepsy, intellectual disability, and sensorineural defects diagnosed by the age of 4 years. Newborns with major congenital anomalies were excluded from perinatal deaths.

RESULTS: Multivariate analysis showed that, compared with full-term pregnancies, early-term birth increased the risk for low Apgar score (<4) at 1 and 5 minutes (odds ratio 1.03, 95% confidence interval 1.03-1.04 and 1.24, 1.04-1.49, respectively), CP (1.40, 1.27-1.55), epilepsy (1.14, 1.06-1.23), intellectual disability (1.39, 1.27-1.53), sensorineural defects (1.24, 1.17-1.31), and perinatal mortality (2.40, 2.14-2.69), but risk for low umbilical artery pH ≤ 7.10 was decreased (0.83, 0.79-0.87). Postterm birth increased the risk for low Apgar score (<4) at 1 minute (1.26, 1.26-1.26) and 5 minutes (1.80, 1.43-2.34), low umbilical artery pH ≤ 7.10 (1.26, 1.19-1.34), and intellectual disability (1.19, 1.00-1.43), whereas risks for CP (1.03, 0.84-1.26), epilepsy (1.00, 0.87-1.15), sensorineural defects (0.96, 0.86-1.07), and perinatal mortality (0.91, 0.69-1.22) were not increased.

CONCLUSIONS: Early-term birth was associated with low Apgar score, increased neurologic morbidity, and perinatal mortality. Asphyxia and intellectual disability were more common among postterm births, but general neurologic morbidity and perinatal mortality were not increased.

Copyright © 2016 by the American Academy of Pediatrics.

PMID: 27235446 [PubMed - in process]

Cerebrovascular adaptations to chronic hypoxia in the growth restricted lamb.

Castillo-Melendez M, Yawno T, Allison BJ, Jenkin G, Wallace EM, Miller SL.

Int J Dev Neurosci. 2015 Oct;45:55-65. doi: 10.1016/j.ijdevneu.2015.01.004. Epub 2015 Jan 29.

Chronic moderate hypoxia induces angiogenic adaptation in the brain, reflecting a modulatory role for oxygen in determining cerebrovascular development. Chronic intrauterine fetal hypoxia, such as occurs in intrauterine growth restriction (IUGR) is likely to lead to a reduction in oxygen delivery to the brain and long-term neurological abnormalities. Thus we investigated whether vascular remodeling and vascular abnormalities were evident in the brain of IUGR newborn lambs that were chronically hypoxic in utero. Single uterine artery ligation (SUAL) surgery was performed in fetuses at ~ 105 days gestation (term ~ 145 days) to induce placental insufficiency and IUGR. Ewes delivered naturally at term and lambs were euthanased 24h later. IUGR brains ($n = 9$) demonstrated a significant reduction in positive staining for the number of blood vessels (laminin immunohistochemistry) compared with control ($n = 8$): from 1650 ± 284 to 416 ± 47 cells/mm² in subcortical white matter (SCWM) 1793 ± 298 to 385 ± 20 cells/mm² in periventricular white matter (PVWM), and 1717 ± 161 to 405 ± 84 cells/mm² in the subventricular zone (SVZ). The decrease in vascular density was associated with a significant decrease in VEGF

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 13 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

immunoreactivity. The percentage of blood vessels exhibiting endothelial cell proliferation (Ki67 positive) varied regionally between 14 to 22% in white matter of control lambs, while only 1-3% of blood vessels in IUGR brains showed proliferation. A 66% reduction in pericyte coverage (α -SMA and desmin) of blood vessels was observed in SCWM, 71% in PVWM, and 73% in SVZ of IUGR lambs, compared to controls. A reduction in peri-vascular astrocytes (GFAP and laminin) was also observed throughout the white matter of IUGR lambs, and extravasation of albumin into the brain parenchyma was present, indicative of increased permeability of the blood brain barrier. Chronic hypoxia associated with IUGR results in a reduction in vascular density in the white matter of IUGR newborn brains. Vascular pericyte coverage and peri-vascular astrocytes, both of which are essential for stabilisation of blood vessels and the maintenance of vascular permeability, were also decreased in the white matter of IUGR lambs. In turn, these vascular changes could lead to inadequate oxygen supply and contribute to under-perfusion and increased vulnerability of white matter in IUGR infants.

Copyright © 2015 Elsevier Ltd. All rights reserved.

PMID: 25639519 [PubMed - indexed for MEDLINE]

Effect of Intra- and Extrauterine Growth on Long-Term Neurologic Outcomes of Very Preterm Infants.

Guellec I, Lapillonne A, Marret S, Picaud JC, Mitanchez D, Charkaluk ML, Fresson J, Arnaud C, Flamand C, Cambonie G, Kaminski M, Roze JC, Ancel PY; Étude Épidémiologique sur les Petits Âges Gestationnels (EPIPAGE; [Epidemiological Study on Small Gestational Ages]) Study Group.

J Pediatr. 2016 Jun 15. pii: S0022-3476(16)30235-9. doi: 10.1016/j.jpeds.2016.05.027. [Epub ahead of print]

OBJECTIVE: To determine whether extrauterine growth is associated with neurologic outcomes and if this association varies by prenatal growth profile.

STUDY DESIGN: For 1493 preterms from the EPIPAGE (Étude Épidémiologique sur les Petits Âges Gestationnels [Epidemiological Study on Small Gestational Ages]) cohort, appropriate for gestational-age (AGA) was defined by birth weight >-2 SD and small for gestational-age (SGA) by birth weight ≤-2 SD. Extra-uterine growth was defined by weight gain or loss between birth and 6 months by z-score change. Growth following-the-curve (FTC) was defined as weight change -1 to $+1$ SD, catch-down-growth (CD) as weight loss ≥ 1 SD, and catch-up-growth (CU) as weight gain ≥ 1 SD. At 5 years, a complete medical examination ($n = 1305$) and cognitive evaluation with the Kauffman Assessment Battery for Children ($n = 1130$) were performed. Behavioral difficulties at 5 years and school performance at 8 years were assessed ($n = 1095$).

RESULTS: Overall, 42.5% of preterms were AGA-FTC, 20.2% AGA-CD, 17.1% AGA-CU, 5.6% SGA-FTC, and 14.5% SGA-CU. Outcomes did not differ between CU and FTC preterm AGA infants. Risk of cerebral palsy was greater for AGA-CD compared with AGA-FTC (aOR 2.26 [95% CI 1.37-3.72]). As compared with children with SGA-CU, SGA-FTC children showed no significant increased risk of cognitive deficiency (aOR 1.41[0.94-2.12]) or school difficulties (aOR 1.60 [0.84-3.03]). Compared with AGA-FTC, SGA showed increased risk of cognitive deficiency (SGA-FTC aOR 2.19 [1.25-3.84]) and inattention-hyperactivity (SGA-CU aOR 1.65 [1.05-2.60]).

CONCLUSION: Deficient postnatal growth was associated with poor neurologic outcome for AGA and SGA preterm infants. CU growth does not add additional benefits. Regardless of type of postnatal growth, SGA infants showed behavioral problems and cognitive deficiency.

Copyright © 2016 Elsevier Inc. All rights reserved.

PMID: 27318373 [PubMed - as supplied by publisher]

Neurodevelopmental Outcome of Extremely Low Birth Weight Children at Corrected Age of Two Years.

Mukhopadhyay K, Mahajan R, Malhi P, Kumar A.

Indian Pediatr. 2016 May 8;53(5):391-3.

OBJECTIVE: To assess the neurodevelopmental, cognitive and behavioral function of extremely low birth weight babies (ELBW) till corrected age of two years.

METHODS: 79 ELBW babies were enrolled and followed at 1 year ($n=50$), 18 months ($n=47$) and 2 years ($n=36$). Adverse composite outcome was defined as death or moderate-to-severe neurodevelopmental impairment (defined as either cerebral palsy or DQ score <70 or deafness or blindness).

RESULTS: At 1 year, 24% were neurologically abnormal. At 18 months, average score (>85) was seen in 25 (54%) children in motor and 8 (17%) in mental development. Abnormal behavioral score (≥ 12) was seen in 89% children. Adverse composite outcome was present in 28 (35.4%) babies.

CONCLUSIONS: ELBW neonates are at a high risk of neurodevelopmental and behavioral impairment.
PMID: 27254046 [PubMed - in process]

Prolonged latency of preterm prelabour rupture of membranes and neurodevelopmental outcomes: a secondary analysis.

Drassinower D, Friedman AM, Običan SG, Levin H, Gyamfi-Bannerman C
BJOG. 2016 May 31. doi: 10.1111/1471-0528.14133. [Epub ahead of print]

OBJECTIVE: To determine whether prolonged latency after preterm prelabour rupture of membranes (PPROM) is associated with an increased risk for adverse neurodevelopmental outcomes.

DESIGN: This is a secondary analysis of the randomised controlled trial of magnesium sulphate for the prevention of cerebral palsy.

SETTING: Multicentre trial.

POPULATION: A total of 1305 women with PPRM were analysed, 1056 of whom had an interval of <3 weeks between diagnosis and delivery and 249 of whom had an interval of ≥3 weeks between diagnosis and delivery.

METHODS: We evaluated whether the time interval between diagnosis of PPRM and delivery was associated with an increased risk for adverse neurodevelopmental outcomes. Latency was analysed as a continuous variable and categorised by weeks of latency.

MAIN OUTCOME MEASURES: The primary outcome was motor and mental Bayley scores of <70 at 2 years of age. Secondary outcomes included motor and mental Bayley scores <85 and mean Bayley scores. Logistic regression was used to control for confounding factors.

RESULTS: In the univariate analysis, motor and mental Bayley scores of <70 were similar in the <3 weeks (16.8 and 14.4%) and ≥3 weeks (15.3 and 14.1%) groups. In the regression analysis adjusting for confounding factors, PPRM for ≥3 weeks was an independent risk factor for motor (adjusted odds ratio (aOR) 2.12; 95% confidence interval, 95% CI 1.29-3.49) and mental (aOR 1.83, 95% CI 1.13-3.00) Bayley scores of <70. Neonatal sepsis, gestational age at delivery, maternal education, and race were significantly associated with neurodevelopmental outcomes.

CONCLUSIONS: Whereas delivery at later gestational age is associated with improved prognosis for many outcomes, prolonged exposure to an intrauterine environment of PPRM is an independent risk factor for adverse neurodevelopmental outcomes.

TWEETABLE ABSTRACT: Prolonged PPRM was associated with motor and mental Bayley scores of <70.

© 2016 Royal College of Obstetricians and Gynaecologists.

PMID: 27245741 [PubMed - as supplied by publisher]

Significant discrepancies were found in pooled estimates of searching with Chinese indexes versus searching with English indexes.

Xue J, Chen W, Chen L, Gaudet L, Moher D, Walker M, Wen SW.

J Clin Epidemiol. 2016 Feb;70:246-53. doi: 10.1016/j.jclinepi.2015.09.014. Epub 2015 Sep 26.

OBJECTIVE: To assess the impact of search strategies for a different language on systematic review results, using English index searches versus Chinese index searches for Chinese literature pertaining to cerebral palsy (CP) as an example.

METHODS: We conducted two parallel searches with the same search strategy. Both searches looked for studies published in the Chinese language that examined risk factors for CP. The first was conducted in standard English indexes and the second was in standard Chinese indexes. We compared the results using the two searches using a Z-test. Egger's test and Begg's test were used to assess the potential publication bias.

RESULTS: Using the English indexes, nine studies were identified. Using the identical search and inclusion/exclusion criteria in the Chinese indexes, 17 studies were returned. The association between intracranial hemorrhage and CP was much stronger in the studies found in the search by the English indexes (odds ratio [OR] 61.73, 95% confidence interval (CI) 19.48-195.61) than the results from studies identified by the Chinese indexes (OR 9.57, 95% CI 2.42-37.88). The association between hypertension and CP was not significant in studies found using the English indexes (OR 1.67, 95% CI 0.34-8.30) but was significant in studies identified by searching the Chinese indexes (OR 2.25, 95% CI 1.06-4.77). Egger's test suggested that, for the risk factor of preterm birth, some small studies with negative results might have been missed by the search using the English indexes (Egger's test: P = 0.00).

CONCLUSIONS: Searching Chinese literature using English indexes has the potential to fail to identify a substantial number of publications. This bias can result in significant discrepancies in the pooled estimates of risk factors for CP.

Copyright © 2016 Elsevier Inc. All rights reserved.

PMID: 26410113 [PubMed - indexed for MEDLINE]

The whole spectrum of cystic periventricular leukomalacia of the preterm infant: results from a large consecutive case series.

Resch B, Resch E, Maurer-Fellbaum U, Pichler-Stachl E, Riccabona M, Hofer N, Urlesberger B.

Childs Nerv Syst. 2015 Sep;31(9):1527-32. doi: 10.1007/s00381-015-2786-3. Epub 2015 Jun 23.

PURPOSE: The purpose of this study is to describe features of cystic periventricular leukomalacia (PVL) in a large consecutive cohort study including long-term neurodevelopmental follow-up.

METHODS: We performed a retrospective single-centre cohort study including all preterm infants ≤ 35 weeks of gestational age with PVL diagnosed by ultrasound scans (US) from a tertiary care university hospital between 1988 and 2012.

RESULTS: The majority of 160 consecutively diagnosed cases had a gestational age between 28 and 32 weeks (60.6%), and male sex was predominant (60.6%). The most common associated clinical findings included respiratory distress syndrome, preterm premature rupture of the membranes, and chorioamnionitis (57.5, 49.4, and 39.4%, respectively). Infants presented with apnoeas in 66.3 and neonatal seizures in 23.1%. Any kind of respiratory support was present in 75.0%. Associated low-grade intraventricular haemorrhage was evident in 33.1, high-grade haemorrhage in 9.4%. Cysts were located on both hemispheres in 75% and PVL grades 3 and 4 were predominant (75.6%). Neurodevelopmental follow-up of 146 cases at a median age of 72 months revealed normal development in 11.0, mental retardation in 50.0, and cerebral palsy in 83.6%. Visual impairment was diagnosed in 21.9% and hearing impairment in one case. A quarter of cases (27.4%) developed seizure disorders. Outcome data were significantly better in unilateral compared to bilateral PVL.

CONCLUSIONS: Long-term neurodevelopmental outcome of bilateral PVL always was adverse and different from unilateral PVL. The latter might be negatively influenced by associated intra- and periventricular haemorrhages.

PMID: 26099229 [PubMed - indexed for MEDLINE]

Génétique

The association between antioxidant enzyme polymorphisms and cerebral palsy after perinatal hypoxic-ischaemic encephalopathy.

Esih K, Goričar K, Dolžan V, Rener-Primec Z.

Eur J Paediatr Neurol. 2016 Jun 2. pii: S1090-3798(16)30075-7. doi: 10.1016/j.ejpn.2016.05.018. [Epub ahead of print]

BACKGROUND: Hypoxic-ischaemic perinatal brain injury leads to the formation of reactive oxygen species (ROS) and the resultant cell and tissue damage may cause neurological sequelae such as cerebral palsy and/or epilepsy. A decrease in the capacity for defending against ROS may increase the susceptibility to cerebral palsy. The aim of this study was to investigate the impact of common functional polymorphisms in the antioxidant genes SOD2, GPX1 and CAT, associated with a decreased capacity for defending against ROS, in patients with perinatal hypoxic-ischaemic encephalopathy (HIE).

METHODS: 80 patients previously diagnosed with perinatal HIE were included. Genomic DNA was isolated from buccal swabs and genotyped for SOD2 rs4880, GPX1 rs1050450 and CAT rs1001179 using real-time PCR-based methods.

RESULTS: Among patients with neonatal HIE, carriers of at least one polymorphic CAT rs1001179 T allele were significantly associated with development of cerebral palsy compared to non-carriers (univariate logistic regression, $p = 0.026$; OR = 3.36; 95% CI = 1.16-9.76). This difference remained statistically significant after accounting for prematurity. The investigated SOD2 and GPX1 polymorphisms were not associated with cerebral palsy after perinatal HIE.

CONCLUSION: CAT rs1001179 polymorphism could be used to identify children that have a higher susceptibility to cerebral palsy after perinatal HIE.

Copyright © 2016 European Paediatric Neurology Society. Published by Elsevier Ltd. All rights reserved.

Lésions - Prévention des lésions

+Données fondamentales

New means to assess neonatal inflammatory brain injury.

Jin C, Londono I, Mallard C, Lodygensky GA.

J Neuroinflammation. 2015 Sep 25;12:180. doi: 10.1186/s12974-015-0397-2.

Preterm infants are especially vulnerable to infection-induced white matter injury, associated with cerebral palsy, cognitive and psychomotor impairment, and other adverse neurological outcomes. The etiology of such lesions is complex and multifactorial. Furthermore, timing and length of exposure to infection also influence neurodevelopmental outcomes. Different mechanisms have been posited to mediate the observed brain injury including microglial activation followed by subsequent release of pro-inflammatory species, glutamate-induced excitotoxicity, and vulnerability of developing oligodendrocytes to cerebral insults. The prevalence of such neurological impairments requires an urgent need for early detection and effective neuroprotective strategies. Accordingly, noninvasive methods of monitoring disease progression and therapy effectiveness are essential. While diagnostic tools using biomarkers from bodily fluids may provide useful information regarding potential risks of developing neurological diseases, the use of magnetic resonance imaging/spectroscopy has emerged as a promising candidate for such purpose. Various pharmacological agents have demonstrated protective effects in the immature brain in animal models; however, few studies have progressed to clinical trials with promising results.

[Free PMC Article](#)

PMCID: PMC4583178

PMID: 26407958 [PubMed - indexed for MEDLINE]

Pretreatment with Resveratrol Prevents Neuronal Injury and Cognitive Deficits Induced by Perinatal Hypoxia-Ischemia in Rats.

Arteaga O, Revuelta M, Urigüen L, Álvarez A, Montalvo H,

PLoS One. 2015 Nov 6;10(11):e0142424. doi: 10.1371/journal.pone.0142424. eCollection 2015. Hilario E(1).

Despite advances in neonatal care, hypoxic-ischemic brain injury is still a serious clinical problem, which is responsible for many cases of perinatal mortality, cerebral palsy, motor impairment and cognitive deficits. Resveratrol, a natural polyphenol with important anti-oxidant and anti-inflammatory properties, is present in grapevines, peanuts and pomegranates. The aim of the present work was to evaluate the possible neuroprotective effect of resveratrol when administered before or immediately after a hypoxic-ischemic brain event in neonatal rats by analyzing brain damage, the mitochondrial status and long-term cognitive impairment. Our results indicate that pretreatment with resveratrol protects against brain damage, reducing infarct volume, preserving myelination and minimizing the astroglial reactive response. Moreover its neuroprotective effect was found to be long lasting, as behavioral outcomes were significantly improved at adulthood. We speculate that one of the mechanisms for this neuroprotection may be related to the maintenance of the mitochondrial inner membrane integrity and potential, and to the reduction of reactive oxygen species. Curiously, none of these protective features was observed when resveratrol was administered immediately after hypoxia-ischemia.

[Free PMC Article](#)

PMCID: PMC4636303

PMID: 26544861 [PubMed - indexed for MEDLINE]

+Données cliniques

Influence of one-year neurologic outcome of treatment on newborns with moderate and severe hypoxic-ischemic encephalopathy by rhuEP0 combined with ganglioside (GM1).

Zhu XY, Ye MY, Zhang AM, Wang WD, Zeng F, Li JL, Fang F.

OBJECTIVE: To observe the one-year neurologic prognostic outcome of newborns with moderate and severe hypoxic-ischemic encephalopathy (HIE) who received recombinant human erythropoietin (rhuEPO) combined with exogenous monosialotetrahexosylganglioside (GM1) treatment to provide new guidelines for clinical treatment.

PATIENTS AND METHODS: Seventy-six newborns with moderate and severe HIE were selected from February 2011 to February 2014 in our hospital. This study received the informed consent of our hospital's Ethics Committee and the newborns' guardians. The newborns were divided to an observation group (n = 34 cases) and a control group (n = 42 cases). All newborns underwent hypothermia and conventional treatment for their conditions. The control group received GMI treatment and observation group received rhuEPO combined with GMI treatment. The curative differences and neural behavior from these two groups were compared.

RESULTS: The excellent, efficient proportion and total effective rate of the newborns from the observation group were higher than the control group. The death rate, cerebral palsy and the invalid ratio of the newborns from the observation group were lower than that of the control group. Awareness, muscle tension, primitive reflex and increased intracranial pressure recovery time of the newborns in the observation group were less than those of the control group. The Neonatal Behavior Neurological Assessment (NBNA) score of both groups after the treatment of 7, 14 and 28 days were significantly higher and increased with time (p < 0.05). The MDI, PDI and DQ score of newborns from the two groups all increased after treatment of 3, 6 and 12 months than those of before, which increased with time (p < 0.05).

CONCLUSIONS: The rhuEPO + GMI treatment in newborns with HIE improves short-term clinical effects and long-term neurological symptoms.

PMID: 26531285 [PubMed - indexed for MEDLINE]

Effect of Early Prophylactic High-Dose Recombinant Human Erythropoietin in Very Preterm Infants on Neurodevelopmental Outcome at 2 Years: A Randomized Clinical Trial.

Natalucci G, Latal B, Koller B, Rügger C, Sick B, Held L, Bucher HU, Fauchère JC; Swiss EPO Neuroprotection Trial Group.

JAMA. 2016 May 17;315(19):2079-85. doi: 10.1001/jama.2016.5504.

IMPORTANCE: Very preterm infants are at risk of developing encephalopathy of prematurity and long-term neurodevelopmental delay. Erythropoietin treatment is neuroprotective in animal experimental and human clinical studies.

OBJECTIVE: To determine whether prophylactic early high-dose recombinant human erythropoietin (rhEPO) in preterm infants improves neurodevelopmental outcome at 2 years' corrected age.

DESIGN, SETTING, AND PARTICIPANTS: Preterm infants born between 26 weeks 0 days' and 31 weeks 6 days' gestation were enrolled in a randomized, double-blind, placebo-controlled, multicenter trial in Switzerland between 2005 and 2012. Neurodevelopmental assessments at age 2 years were completed in 2014.

INTERVENTIONS: Participants were randomly assigned to receive either rhEPO (3000 IU/kg) or placebo (isotonic saline, 0.9%) intravenously within 3 hours, at 12 to 18 hours, and at 36 to 42 hours after birth.

MAIN OUTCOMES AND MEASURES: Primary outcome was cognitive development assessed with the Mental Development Index (MDI; norm, 100 [SD, 15]; higher values indicate better function) of the Bayley Scales of Infant Development, second edition (BSID-II) at 2 years corrected age. The minimal clinically important difference between groups was 5 points (0.3 SD). Secondary outcomes were motor development (assessed with the Psychomotor Development Index), cerebral palsy, hearing or visual impairment, and anthropometric growth parameters.

RESULTS: Among 448 preterm infants randomized (mean gestational age, 29.0 [range, 26.0-30.9] weeks; 264 [59%] female; mean birth weight, 1210 [range, 490-2290] g), 228 were randomized to rhEPO and 220 to placebo. Neurodevelopmental outcome data were available for 365 (81%) at a mean age of 23.6 months. In an intention-to-treat analysis, mean MDI was not statistically significantly different between the rhEPO group (93.5 [SD, 16.0] [95% CI, 91.2 to 95.8]) and the placebo group (94.5 [SD, 17.8] [95% CI, 90.8 to 98.5]) (difference, -1.0 [95% CI, -4.5 to 2.5]; P = .56). No differences were found between groups in the secondary outcomes.

CONCLUSIONS AND RELEVANCE: Among very preterm infants who received prophylactic early high-dose rhEPO for neuroprotection, compared with infants who received placebo, there were no statistically significant differences in neurodevelopmental outcomes at 2 years. Follow-up for cognitive and physical problems that may not become evident until later in life is required.

TRIAL REGISTRATION: clinicaltrials.gov Identifier: NCT00413946.
PMID: 27187300 [PubMed - indexed for MEDLINE]

Hyaluronidase and Hyaluronan Oligosaccharides Promote Neurological Recovery after Intraventricular Hemorrhage.

Vinukonda G, Dohare P, Arshad A, Zia MT, Panda S, Korumilli R, Kayton R, Hascall VC, Lauer ME, Ballabh P
J Neurosci. 2016 Jan 20;36(3):872-89. doi: 10.1523/JNEUROSCI.3297-15.2016.

Intraventricular hemorrhage (IVH) in premature infants results in inflammation, arrested oligodendrocyte progenitor cell (OPC) maturation, and reduced myelination of the white matter. Hyaluronan (HA) inhibits OPC maturation and complexes with the heavy chain (HC) of glycoprotein inter- α -inhibitor to form pathological HA (HC-HA complex), which exacerbates inflammation. Therefore, we hypothesized that IVH would result in accumulation of HA, and that either degradation of HA by hyaluronidase treatment or elimination of HCs from pathological HA by HA oligosaccharide administration would restore OPC maturation, myelination, and neurological function in survivors with IVH. To test these hypotheses, we used the preterm rabbit model of glycerol-induced IVH and analyzed autopsy samples from premature infants. We found that total HA levels were comparable in both preterm rabbit pups and human infants with and without IVH, but HA receptors--CD44, TLR2, TLR4--were elevated in the forebrain of both humans and rabbits with IVH. Hyaluronidase treatment of rabbits with IVH reduced CD44 and TLR4 expression, proinflammatory cytokine levels, and microglia infiltration. It also promoted OPC maturation, myelination, and neurological recovery. HC-HA and tumor necrosis factor-stimulated gene-6 were elevated in newborns with IVH; and depletion of HC-HA levels by HA oligosaccharide treatment reduced inflammation and enhanced myelination and neurological recovery in rabbits with IVH. Hence, hyaluronidase or HA oligosaccharide treatment represses inflammation, promotes OPC maturation, and restores myelination and neurological function in rabbits with IVH. These therapeutic strategies might improve the neurological outcome of premature infants with IVH. Significance statement: Approximately 12,000 premature infants develop IVH every year in the United States, and a large number of survivors with IVH develop cerebral palsy and cognitive deficits. The onset of IVH induces inflammation of the periventricular white matter, which results in arrested maturation of OPCs and myelination failure. HA is a major component of the extracellular matrix of the brain, which regulates inflammation through CD44 and TLR2/4 receptors. Here, we show two mechanism-based strategies that effectively enhanced myelination and neurological recovery in preterm rabbit model of IVH. First, degrading HA by hyaluronidase treatment reduced CD44 and TLR4 expression, proinflammatory cytokines, and microglial infiltration, as well as promoted oligodendrocyte maturation and myelination. Second, intraventricular injection of HA oligosaccharide reduced inflammation and enhanced myelination, conceivably by depleting HC-HA levels.

Copyright © 2016 the authors 0270-6474/16/360873-18\$15.00/0.

PMCID: PMC4719021 [Available on 2016-07-20]

PMID: 26791217 [PubMed - indexed for MEDLINE]

[Prenatal treatment with magnesium sulphate: Initial clinical outcomes in pre-term infants less than 29 weeks and correlation with neonatal magnesium levels]. [Article in Spanish]

García Alonso L, Pumarada Prieto M, González Colmenero E, Concheiro Guisán A, Suárez Albo M, Durán Fernández-Feijoo C, González Durán L, Fernández Lorenzo JR.

An Pediatr (Barc). 2016 Jun 6. pii: S1695-4033(16)30184-9. doi: 10.1016/j.anpedi.2016.04.015. [Epub ahead of print]

INTRODUCTION: Antenatal magnesium sulphate (MgSO₄) administration has shown to be effective in minimising cerebral palsy and severe motor dysfunction at the age of 2 years. The aim of this study is to analyse the initial clinical outcome of preterm neonates less than 29 weeks who have received prenatal MgSO₄, as well as to determine the relationship between the magnesium dose delivered to the mother and the magnesium concentration in the neonates.

MATERIAL AND METHODS: A prospective cohort study was conducted on neonates of less than 29 weeks gestation admitted to the Neonatal Intensive Care Unit (NICU) of Hospital Universitario de Vigo from December 2012 to July 2015. Comparative analysis was performed on the perinatal outcomes, neonatal morbidity, mortality, and magnesium levels between the groups of neonates exposed to magnesium sulphate and the control group.

RESULTS: A total of 42 neonates were included in the study. The mothers of 28 of them had received MgSO₄ as a neuroprotective agent. Statistical significance was obtained in the mortality variable. There were no significant differences in the rest of studied variables. There was a significant correlation between the full dose of MgSO₄ received by the mother and the levels of magnesium in the neonate in the first 24 hours of life ($r(2) 0.436; P < .001$).

CONCLUSIONS: A lower mortality was observed in the group that had been exposed to MgSO₄. No significant side effects were found as a result of administering of MgSO₄. The MgSO₄ dose received by mother has a linear relationship with the magnesium levels obtained in neonates.

Copyright © 2016 Asociación Española de Pediatría. Published by Elsevier España, S.LU. All rights reserved.

[Free Article](#)

PMID: 27282203 [PubMed - as supplied by publisher]

Detection – Diagnostic

+Données fondamentales

Nanoscale effects in dendrimer-mediated targeting of neuroinflammation.

Nance E, Zhang F, Mishra MK, Zhang Z, Kambhampati SP, Kannan RM, Kannan S.

Biomaterials. 2016 May 26;101:96-107. doi: 10.1016/j.biomaterials.2016.05.044. [Epub ahead of print]

Neuroinflammation, mediated by activated microglia and astrocytes, plays a key role in the pathogenesis of many neurological disorders. Systemically-administered dendrimers target neuroinflammation and deliver drugs with significant efficacy, without the need for ligands. Elucidating the nanoscale aspects of targeting neuroinflammation will enable superior nanodevices for eventual translation. Using a rabbit model of cerebral palsy, we studied the in vivo contributions of dendrimer physicochemical properties and disease pathophysiology on dendrimer brain uptake, diffusion, and cell specific localization. Neutral dendrimers move efficiently within the brain parenchyma and rapidly localize in glial cells in regions of injury. Dendrimer uptake is also dependent on the extent of blood-brain-barrier breakdown, glial activation, and disease severity (mild, moderate, or severe), which can lend the dendrimer to be used as an imaging biomarker for disease phenotype. This new understanding of the in vivo mechanism of dendrimer-mediated delivery in a clinically-relevant rabbit model provides greater opportunity for clinical translation of targeted brain injury therapies.

Copyright © 2016 Elsevier Ltd. All rights reserved.

PMID: 27267631 [PubMed - as supplied by publisher]

+Données cliniques

Alterations in regional shape on ipsilateral and contralateral cortex contrast in children with unilateral cerebral palsy and are predictive of multiple outcomes.

Pagnozzi AM(1),(2), Dowson N(1), Fiori S(3), Doecke J(1), Bradley AP(2), Boyd RN(4), Rose S(1).

Hum Brain Mapp. 2016 Jun 3. doi: 10.1002/hbm.23262. [Epub ahead of print]

Congenital brain lesions result in a wide range of cerebral tissue alterations observed in children with cerebral palsy (CP) that are associated with a range of functional impairments. The relationship between injury severity and functional outcomes, however, remains poorly understood. This research investigates the differences in cortical shape between children with congenital brain lesions and typically developing children (TDC) and investigates the correlations between cortical shape and functional outcome in a large cohort of patients diagnosed with unilateral CP. Using 139 structural magnetic resonance images, including 95 patients with clinically diagnosed CP and 44 TDC, cortical segmentations were obtained using a modified expectation maximization algorithm. Three shape characteristics (cortical thickness, curvature, and sulcal depth) were computed within a number of cortical regions. Significant differences in these shape measures compared to the TDC were observed on both the injured hemisphere of children with CP ($P < 0.004$), as well as on the apparently uninjured hemisphere, illustrating potential compensatory mechanisms in these children. Furthermore, these shape measures were significantly correlated with several functional outcomes, including motor, cognition, vision, and communication ($P < 0.012$), with three out of these four models performing well on test set validation. This study highlights that cortical neuroplastic effects may

be quantified using MR imaging, allowing morphological changes to be studied longitudinally, including any influence of treatment. Ultimately, such approaches could be used for the long term prediction of outcomes and the tailoring of treatment to individuals. *Hum Brain Mapp*, 2016. © 2016 Wiley Periodicals, Inc.

© 2016 Wiley Periodicals, Inc.

PMID: 27259165 [PubMed - as supplied by publisher]

Automated, quantitative measures of grey and white matter lesion burden correlates with motor and cognitive function in children with unilateral cerebral palsy.

Pagnozzi AM, Dowson N, Doecke J, Fiori S, Bradley AP, Boyd RN, Rose S.

Neuroimage Clin. 2016 May 29;11:751-9. doi: 10.1016/j.nicl.2016.05.018. eCollection 2016.

White and grey matter lesions are the most prevalent type of injury observable in the Magnetic Resonance Images (MRIs) of children with cerebral palsy (CP). Previous studies investigating the impact of lesions in children with CP have been qualitative, limited by the lack of automated segmentation approaches in this setting. As a result, the quantitative relationship between lesion burden has yet to be established. In this study, we perform automatic lesion segmentation on a large cohort of data (107 children with unilateral CP and 18 healthy children) with a new, validated method for segmenting both white matter (WM) and grey matter (GM) lesions. The method has better accuracy (94%) than the best current methods (73%), and only requires standard structural MRI sequences. Anatomical lesion burdens most predictive of clinical scores of motor, cognitive, visual and communicative function were identified using the Least Absolute Shrinkage and Selection operator (LASSO). The improved segmentations enabled identification of significant correlations between regional lesion burden and clinical performance, which conform to known structure-function relationships. Model performance was validated in an independent test set, with significant correlations observed for both WM and GM regional lesion burden with motor function ($p < 0.008$), and between WM and GM lesions alone with cognitive and visual function respectively ($p < 0.008$). The significant correlation of GM lesions with functional outcome highlights the serious implications GM lesions, in addition to WM lesions, have for prognosis, and the utility of structural MRI alone for quantifying lesion burden and planning therapy interventions.

[Free PMC Article](#)

PMCID: PMC4908311

Extent of altered white matter in unilateral and bilateral periventricular white matter lesions in children with unilateral cerebral palsy.

Scheck SM, Fripp J, Reid L, Pannek K, Fiori S, Boyd RN, Rose SE.

Res Dev Disabil. 2016 Jun 6;55:368-376. doi: 10.1016/j.ridd.2016.04.007. [Epub ahead of print]

AIMS: To investigate the extent of white matter damage in children with unilateral cerebral palsy (UCP) caused by periventricular white matter lesions comparing between unilateral and bilateral lesions; and to investigate a relationship between white matter microstructure and hand function.

METHODS AND PROCEDURES: Diffusion MRI images from 46 children with UCP and 18 children with typical development (CTD) were included. Subjects were grouped by side of hemiparesis and unilateral or bilateral lesions. A voxel-wise white matter analysis was performed to identify regions where fractional anisotropy (FA) was significantly different between UCP groups and CTD; and where FA correlated with either dominant or impaired hand function (using Jebsen Taylor Hand Function Test).

OUTCOMES AND RESULTS: Children with unilateral lesions had reduced FA in the corticospinal tract of the affected hemisphere. Children with bilateral lesions had widespread reduced FA extending into all lobes. In children with left hemiparesis, impaired hand function correlated with FA in the contralateral corticospinal tract. Dominant hand function correlated with FA in the posterior thalamic radiations as well as multiple other regions in both left and right hemiparesis groups.

CONCLUSIONS AND IMPLICATIONS: Periventricular white matter lesions consist of focal and diffuse components. Focal lesions may cause direct motor fibre insult resulting in motor impairment. Diffuse white matter injury is heterogeneous, and may contribute to more global dysfunction.

Copyright © 2016 Elsevier Ltd. All rights reserved.

PMID: 27280312 [PubMed - as supplied by publisher]

Formal training in general movement assessment is required to effectively evaluate infants with perinatal asphyxia in outpatient settings.

Brown AK, Greisen G, Haugsted U, Jonsbo F.

Acta Paediatr. 2016 May 31. doi: 10.1111/apa.13491. [Epub ahead of print]

AIM: General movement assessment (GMA) can help to identify children with a high risk of developing neurological dysfunction, such as cerebral palsy, and certified training is provided in this specialism. The aim of this study was to investigate the feasibility and reliability of using video recordings to assess GMA, in a busy Danish outpatient clinic.

METHODS: The study comprised 30 term infants born with perinatal asphyxia, who were video recorded at three months. They were assessed by two certified GMA observers and re-assessed two weeks later. Inter-observer and intra-observer agreements were analysed using proportional agreement and nominal kappa statistics were used to calculate 95% confidence intervals (95% CI).

RESULTS: We found substantial and almost perfect inter-observer and intra-observer reliability. Intra-observer agreement was 0.85 (95% CI: 0.65-1.00; $p < 0.0001$) and 0.85 (95% CI: 0.62-1.00; $p < 0.0001$) and inter-observer agreement was 0.71 (95% CI: 0.45-0.96; $p < 0.0001$) at time point one and 0.85 (95% CI: 0.63 -1.00; $p < 0.0001$) two weeks later. All video recordings were completed within our multidisciplinary outpatient clinic without delay.

CONCLUSION: This study demonstrated the reliability of the GMA method in a busy multidisciplinary Danish paediatric outpatient setting, when assessors had been formally trained in the method and used it regularly.

This article is protected by copyright. All rights reserved.

PMID: 27240948 [PubMed - as supplied by publisher]

MR angiography findings in infants with neonatal arterial ischemic stroke in the middle cerebral artery territory: A prospective study using circle of Willis MR angiography.

Husson B, Hertz-Pannier L, Adamsbaum C, Renaud C, Presles E, Dinomais M, Kossorotoff M, Landrieu P, Chabrier S

Eur J Radiol. 2016 Jul;85(7):1329-35. doi: 10.1016/j.ejrad.2016.05.002. Epub 2016 May 6.

AIM: Neonatal arterial ischemic stroke (NAIS) results from a focal disruption of the blood flow in a cerebral artery by a not well understood mechanism. Our objective is to describe the acute MRangiography (MRA) findings in infants with an NAIS in the middle cerebral artery (MCA) territory and correlate them with early parenchymal infarcts and motor outcome.

METHODS: Among one hundred prospectively followed neonates with NAIS, we studied thirty-seven patients with an MCA infarct explored with circle of Willis MRA. MCA flow characteristics were documented, along with infarct location/extent and motor outcome at age 7 years.

RESULTS: Twenty-three (62%) of the children showed arterial changes, all ipsilateral to the NAIS, with occlusion in six, thrombus-type flow defect in nine, and unilateral increased flow in enlarged insular arteries in the remaining eight. There was a statistically significant correlation between parenchymal and arterial MR findings ($p = 0.0002$). A normal MRA had a negative predictive value of 100% (95% CI: 76.8-100) in ruling out a main branch infarct. Patients with abnormal MRA tended to be at increased risk for cerebral palsy (OR=3.1). Occlusion was associated with a worse outcome ($p = 0.04$).

INTERPRETATION: MRangiography shows arterial abnormalities suggesting that embolism is a frequent cause of NAIS.

Copyright © 2016 Elsevier Ireland Ltd. All rights reserved.

PMID: 27235881 [PubMed - in process]

Neonatal brain hemorrhage (NBH) of prematurity: translational mechanisms of the vascular-neural network.

Lekic T, Klebe D, Poblete R, Krafft PR, Rolland WB, Tang J, Zhang JH.

Curr Med Chem. 2015;22(10):1214-38.

Neonatal brain hemorrhage (NBH) of prematurity is an unfortunate consequence of preterm birth. Complications result in shunt dependence and long-term structural changes such as posthemorrhagic hydrocephalus, periventricular leukomalacia, gliosis, and neurological dysfunction. Several animal models are available to study this condition, and many basic mechanisms, etiological factors, and outcome consequences, are becoming understood. NBH is an important clinical condition, of which treatment may potentially circumvent shunt complication, and improve functional recovery (cerebral palsy, and cognitive impairments). This review highlights key

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 22 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

pathophysiological findings of the neonatal vascular-neural network in the context of molecular mechanisms targeting the posthemorrhagic hydrocephalus affecting this vulnerable infant population.

PMCID: PMC4495901

PMID: 25620100 [PubMed - indexed for MEDLINE]

Neonatal DTI early after birth predicts motor outcome in preterm infants with periventricular hemorrhagic infarction.

Roze E, Benders MJ, Kersbergen KJ, van der Aa NE, Groenendaal F, van Haastert IC, Leemans A, de Vries LS.

Pediatr Res. 2015 Sep;78(3):298-303. doi: 10.1038/pr.2015.94. Epub 2015 May 15.

BACKGROUND: To determine the association between early neonatal diffusion tensor imaging (DTI) and the development of unilateral spastic cerebral palsy (USCP) in preterm infants with periventricular hemorrhagic infarction (PVHI).

METHODS: Preterm infants with PVHI were assessed with early (≤ 4 wk after birth) and term-equivalent age MRI-DTI. Involvement of corticospinal tracts was assessed by visual assessment of the posterior limb of the internal capsule (PLIC) on DTI (classified asymmetrical, equivocal, or symmetrical) and by an atlas-based approach calculating fractional anisotropy asymmetry index in the PLIC. Motor outcome was assessed at ≥ 15 mo corrected age.

RESULTS: Seven out of 23 infants with PVHI developed USCP. Their PLIC was visually scored as asymmetrical in 6 and equivocal in 1 on the early DTI. Thirteen out of 16 infants with a symmetrical motor development had a symmetrical PLIC on early DTI, the remaining 3 were equivocal. All infants with USCP had a fractional anisotropy asymmetry index of >0.05 (optimal cut-off value) on early DTI. In infants with a symmetrical motor development ($n = 16$), 14 had an asymmetry index ≤ 0.05 while 2 had an index >0.05 .

CONCLUSION: DTI in preterm infants with PVHI within a few weeks after birth is associated with later motor development.

PMID: 25978802 [PubMed - indexed for MEDLINE]

Usefulness of the most popular neurodevelopmental tests in preschool assessment of children born with very low birth weight.

Gilarska M, Klimek M, Nitecka M, Dutkowska G, Gasinska M, Kwinta P.

Minerva Pediatr. 2016 Jun 8. [Epub ahead of print]

BACKGROUND: The aim of our study was multifaceted neurodevelopmental examination of children born prematurely with very low birth weight (VLBW) in order to evaluate the usefulness of popularly used tests. The second aim of the study was exploration of risk and protective factors of neurodevelopmental impairment.

METHODS: Eighty-nine VLBW patients were evaluated at the age of 50 months. All children underwent anthropometric measurements and psychomotor tests: functional independence measure scale (WeeFIM), Gross Motor Function Measurement (GMFM), non-verbal psychometric evaluation (Leiter test), Developmental Test of Visual Perception (DTVP-2), temperament questionnaire (EAS-C) and children vocabulary test (TSD).

RESULTS: Most severe deficits in ex-preterms' neurodevelopment were associated with verbal abilities, visual perception and temper abnormalities. WeeFIM, DTVP-2, Leiter and vocabulary tests' results correlated with each other. The lowest percent of children with deficits in WeeFIM test indicates, that it seems to be the most valuable tool for identification of the most seriously impaired children. Due to the highest percent of children with visual perception deficits, DTVP test seems to be good second choice in assessment of children born prematurely. In motor assessment GMFM appears to be more adequate than cerebral palsy (CP) diagnosis. Almost one fifth of VLBW did not reach 85% in Gross Motor Function Measurement, although only 9% of children had CP.

CONCLUSION: Children born with VLBW had deficits in every part of psychometric evaluation. We believe that the most useful tests in assessment VLBW patients are WeeFIM, GMFM and DTVP. Children with severe prematurity complications could require more precise evaluation.

PMID: 27271040 [PubMed - as supplied by publisher]

Using ventricular modeling to robustly probe significant deep gray matter pathologies: Application to cerebral palsy

Pagnozzi AM, Shen K, Doecke JD, Boyd RN, Bradley AP, Rose S, Dowson N.

Understanding the relationships between the structure and function of the brain largely relies on the qualitative assessment of Magnetic Resonance Images (MRIs) by expert clinicians. Automated analysis systems can support these assessments by providing quantitative measures of brain injury. However, the assessment of deep gray matter structures, which are critical to motor and executive function, remains difficult as a result of large anatomical injuries commonly observed in children with Cerebral Palsy (CP). Hence, this article proposes a robust surrogate marker of the extent of deep gray matter injury based on impingement due to local ventricular enlargement on surrounding anatomy. Local enlargement was computed using a statistical shape model of the lateral ventricles constructed from 44 healthy subjects. Measures of injury on 95 age-matched CP patients were used to train a regression model to predict six clinical measures of function. The robustness of identifying ventricular enlargement was demonstrated by an area under the curve of 0.91 when tested against a dichotomised expert clinical assessment. The measures also showed strong and significant relationships for multiple clinical scores, including: motor function ($r(2) = 0.62$, $P < 0.005$), executive function ($r(2) = 0.55$, $P < 0.005$), and communication ($r(2) = 0.50$, $P < 0.005$), especially compared to using volumes obtained from standard anatomical segmentation approaches. The lack of reliance on accurate anatomical segmentations and its resulting robustness to large anatomical variations is a key feature of the proposed automated approach. This coupled with its strong correlation with clinically meaningful scores, signifies the potential utility to repeatedly assess MRIs for clinicians diagnosing children with CP.

Hum Brain Mapp. 2016. © 2016 Wiley Periodicals, Inc.

© 2016 Wiley Periodicals, Inc.

PMID: 27257958 [PubMed - as supplied by publisher]

Motricité - Mobilité – Posture

An electromyographic protocol that distinguishes spasticity from dystonia.

Beattie C, Gormley M, Wervej R, Wendorf H.

J Pediatr Rehabil Med. 2016 May 31;9(2):125-32. doi: 10.3233/PRM-160373.

PURPOSE: The purpose of this proof of concept study is to demonstrate that electromyographic (EMG) activation patterns of leg muscles differ predictably among patients with predominantly spasticity, patients with predominantly dystonia, and typically developing control subjects during rest, volitional movement, and passively induced movement.

METHODS: Eight control subjects, 6 subjects with dystonia, and 7 subjects with spasticity were recruited, ages 6-25 years. Surface EMG sensors were applied over 4 muscle groups of each leg. EMG recordings and video were obtained during rest, quick stretch, and volitional movement. The number of muscles active during 3 resting, 4 quick stretch, and 8 volitional movement items were averaged and compared across subject groups.

RESULTS: Control subjects showed minimal numbers of muscles active during resting, quick stretch, or volitional movement activities. Spastic subjects showed multiple muscles responding with high amplitude to quick stretch but not to volitional movement activities. Dystonic subjects showed multiple muscles responding to volitional movement activities but not to quick stretch. Analysis with a Kruskal-Wallis test indicated significant differences between the three groups in numbers of muscles activated during quick stretch activities ($p = 0.017$) and volitional movement activities ($p = 0.005$).

CONCLUSION: EMG data collected with this protocol may be useful for distinguishing spastic from dystonic hypertonia.

PMID: 27285805 [PubMed - in process]

Anticipatory postural adjustments associated with a loading perturbation in children with hemiplegic and diplegic cerebral palsy.

hiratori T, Girolami GL, Aruin AS.

Exp Brain Res. 2016 Jun 20. [Epub ahead of print]

Anticipatory postural adjustments (APAs) in preparation for predictable externally induced loading perturbation were studied in children with typically development (TD), hemiplegic (HEMI), and diplegic (DIPL) cerebral palsy. Twenty-seven children (n = 9 in each group) were asked to stand and catch a load dropped from a pre-specified height. Electrical activity of the leg and trunk muscles and center of pressure (COP) displacements were recorded to quantify the APAs. All groups were able to generate APAs prior to the perturbation, but the magnitude was smaller and the onset was delayed in the dorsal (agonist) postural muscles in both HEMI and DIPL as compared to TD. HEMI and DIPL also generated APAs in the antagonist postural muscles. Anticipatory backward COP displacement was significantly different from the baseline value only in the TD and HEMI. HEMI and DIPL displayed a different postural control strategy; HEMI showed no difference in background postural activity from TD, but with diminished APAs in the agonist postural muscles compared to TD, while DIPL showed a higher background postural activity and diminished APAs in the agonist postural muscles compared to TD. These differences are important to consider when designing rehabilitation programs to improve posture and movement control in children with hemiplegic and diplegic cerebral palsy.

PMID: 27324084 [PubMed - as supplied by publisher]

Applications of musculoskeletal ultrasonography in pediatric patients.

Vanderhave KL, Brighton B, Casey V, Montijo H, Scannell B.

J Am Acad Orthop Surg. 2014 Nov;22(11):691-8. doi: 10.5435/JAAOS-22-11-691.

Ultrasonography is an excellent adjunct to other musculoskeletal imaging tools utilized in the pediatric population and in some instances offers advantages over CT and MRI. It permits dynamic examination of anatomic structures and assists in guiding minimally invasive procedures. In the lower extremity, ultrasonography assists in screening for such disorders as developmental dysplasia of the hip and in detecting slipped capital femoral epiphysis and femoral acetabular impingement. In the neonatal spine, ultrasonography can identify unossified vertebral arches. Among other applications in the upper extremity, ultrasonography may be used in the evaluation and examination of peripheral nerve injuries and is a preferred modality for imaging the shoulder in infants with neonatal brachial plexus palsy. It is also considered an optimal adjunct for administration of botulinum toxin-A in children with cerebral palsy. The portability, relative low cost, lack of radiation, and absence of known contraindications enhances the utility of ultrasonography in pediatric orthopaedics.

Copyright 2014 by the American Academy of Orthopaedic Surgeons.

PMID: 25344594 [PubMed - indexed for MEDLINE]

Assisting Hand Assessment and Children's Hand-use Experience Questionnaire - Observed Versus Perceived Bimanual Performance in Children with Unilateral Cerebral Palsy.

Ryll UC, Bastiaenen CH, Eliasson AC.

Phys Occup Ther Pediatr. 2016 Jun 9:1-11. [Epub ahead of print]

AIMS: To explore the differences, relationship, and extent of agreement between the Assisting Hand Assessment (AHA), measuring observed ability to perform bimanual tasks, and the Children's Hand-Use Experience Questionnaire (CHEQ), assessing experienced bimanual performance.

METHODS: This study investigates a convenience sample of 34 children (16 girls) with unilateral cerebral palsy aged 6-18 years (mean 12.1, SD 3.9) in a cross-sectional design.

RESULTS: The AHA and CHEQ subscales share 8-25% of their variance (R²). Bland-Altman plots for AHA and all three CHEQ subscales indicate good average agreement, with a mean difference approaching zero but large 95% confidence intervals. Limits of agreement were extremely wide, indicating considerable disagreement between AHA and CHEQ subscales.

CONCLUSION: AHA and CHEQ seem to measure different though somewhat related constructs of bimanual performance. Results of this investigation reinforce the recommendation to use both instruments to obtain complementary information about bimanual performance including observed and perceived performance of children with unilateral cerebral palsy.

PMID: 27283785 [PubMed - as supplied by publisher]

Biomechanical behavior of valgus foot in children with cerebral palsy: A comparative study.

Guo J(1), Wang L(1), Mo Z(1), Chen W(1), Fan Y(2).

J Biomech. 2015 Sep 18;48(12):3170-7. doi: 10.1016/j.jbiomech.2015.07.004. Epub 2015 Jul 13.

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org 25

Valgus foot (VF) is the most common foot deformity in children with cerebral palsy (CP), which seriously affects the foot balance in standing and posture control in walking. Little information about the locus and stress of internal bones was available. To accurately describe the biomechanical behavior of the internal bones of VF in CP, we compared the locus and stress of internal bones between the normal foot (NF) and VF by finite element models. Compared with the NF, displacement of the talus and navicular drop in VF increased by 109% and 171% in vertical direction respectively, and the locus of talus had a tendency to clockwise rotation and downward movement in coronal plane. In addition, the abduction angle of forefoot in VF increased up to 10.3°, which was twice more than that in the NF. Moreover, the lateral metatarsophalangeal joints were upward tilted 6.3° comparing with touchdown posture of NF, and peak von Mises stress of the internal bones in VF model concentrated on the fourth metatarsal. The simulation showed that locus of the forefoot, downward rotation of talus head and navicular drop were meaningful to quantify the collapse of medial longitudinal arch. It would provide some suggestions to the rehabilitation treatments of the CP children's VF.

Copyright © 2015 Elsevier Ltd. All rights reserved.

PMID: 26209085 [PubMed - indexed for MEDLINE]

Body representation in children with hemiplegic cerebral palsy.

Fontes PL, Cruz TK, Souto DO, Moura R, Haase VG.

Child Neuropsychol. 2016 Jun 10:1-26. [Epub ahead of print]

Clinical observations indicate that many children with hemiplegic cerebral palsy refrain from using or disregard the affected upper limb. The aim of the present study is to investigate deficits in different body representations (body schema, body structural description, and body image) in children with hemiplegic cerebral palsy (HCP) compared to typically-developing (TD) children. Three groups of children participated in this study: 42 TD children (aged 5.17-10.91 years), 23 children with right HCP (aged 5.83-10.92 years), and 22 children with left HCP (aged 5.67-10.90 years). The results demonstrate generalized deficits in all three body representations in children with HCP, and do not offer evidence for an effect of hemiplegia laterality.

PMID: 27282627 [PubMed - as supplied by publisher]

Children with cerebral palsy have uncharacteristic somatosensory cortical oscillations after stimulation of the hand mechanoreceptors.

Kurz MJ, Becker KM, Heinrichs-Graham E, Wilson TW.

Neuroscience. 2015 Oct 1;305:67-75. doi: 10.1016/j.neuroscience.2015.07.072. Epub 2015 Jul 30.

Numerous clinical investigations have reported that children with cerebral palsy (CP) have tactile discrimination deficits that likely limit their ability to plan and manipulate objects. Despite this clinical awareness, we still have a substantial knowledge gap in our understanding of the neurological basis for these tactile discrimination deficits. Previously, we have shown that children with CP have aberrant theta-alpha (4-14 Hz) oscillations in the somatosensory cortices following tactile stimulation of the foot. In this investigation, we evaluated if these aberrant theta-alpha oscillations also extend to the hand. Magnetoencephalography was used to evaluate event-related changes in the theta-alpha and beta (18-34 Hz) somatosensory cortical oscillations in groups of children with CP and typically developing (TD) children following tactile stimulation of their hands. Our results showed that the somatosensory theta-alpha oscillations were relatively intact in children with CP, which is in contrast to our previous results for foot tactile stimulations. We suspect that these inter-study differences may be related to the higher probability that the neural tracts serving the lower extremities are damaged in children with CP, compared to those serving the upper extremities. This inference is plausible since the participating children with CP had Manual Ability Classification System (MACS) levels between I and II. In contrast to the theta-alpha results, children with CP did exhibit a sharp increase in beta activity during the same time period, which was not observed in TD children. This suggests that children with CP still have deficits in the computational aspect of somatosensory processing.

Copyright © 2015 IBRO. Published by Elsevier Ltd. All rights reserved.

PMCID: PMC4558219 [Available on 2016-10-01]

PMID: 26235434 [PubMed - indexed for MEDLINE]

Classifying the manual abilities of young children with cerebral palsy.

Jeevanantham D.

PMID: 27283983 [PubMed - as supplied by publisher]

Dev Med Child Neurol. 2016 Jun 10. doi: 10.1111/dmcn.13186. [Epub ahead of print]

Clinical motion analyses over eight consecutive years in a child with crouch gait: a case report.

Butler EE, Steele KM, Torburn L, Gamble JG, Rose J.

J Med Case Rep. 2016 Jun 15;10:157. doi: 10.1186/s13256-016-0920-9.

BACKGROUND: This case report provides a unique look at the progression of crouch gait in a child with cerebral palsy over an 8-year time period, through annual physical examinations, three-dimensional gait analyses, and evaluation of postural balance. Our patient received regular botulinum toxin-A injections, casting, and physical therapy but no surgical interventions.

CASE PRESENTATION: A white American boy with spastic diplegic cerebral palsy was evaluated annually by clinical motion analyses, including physical examination, joint kinematics, electromyography, energy expenditure, and standing postural balance tests, from 6 to 13 years of age. These analyses revealed that the biomechanical factors contributing to our patient's crouch gait were weak plantar flexors, short and spastic hamstrings, moderately short hip flexors, and external rotation of the tibiae. Despite annual recommendations for surgical lengthening of the hamstrings, the family opted for non-surgical treatment through botulinum toxin-A injections, casting, and exercise. Our patient's crouch gait improved between ages 6 and 9, then worsened at age 10, concurrent with his greatest body mass index, increased plantar flexor weakness, increased standing postural sway, slowest normalized walking speed, and greatest walking energy expenditure. Although our patient's maximum knee extension in stance improved by 14 degrees at 13 years of age compared to 6 years of age, peak knee flexion in swing declined, his ankles became more dorsiflexed, his hips became more internally rotated, and his tibiae became more externally rotated. From 6 to 9 years of age, our patient's minimum stance-phase knee flexion varied in an inverse relationship with his body mass index; from 10 to 13 years of age, changes in his minimum stance-phase knee flexion paralleled changes in his body mass index.

CONCLUSIONS: The motor deficits of weakness, spasticity, shortened muscle-tendon lengths, and impaired selective motor control were highlighted by our patient's clinical motion analyses. Overall, our patient's crouch gait improved mildly with aggressive non-operative management and a supportive family dedicated to regular home exercise. The annual clinical motion analyses identified changes in motor deficits that were associated with changes in the child's walking pattern, suggesting that these analyses can serve to track the progression of children with spastic cerebral palsy.

[Free PMC Article](#)

PMCID: PMC4908800

PMID: 27301473 [PubMed - in process]

Development of the Assisting Hand Assessment for adolescents (Ad-AHA) and validation of the AHA from 18 months to 18 years.

Louwens A, Beelen A, Holmefur M, Krumlinde-Sundholm L.

Dev Med Child Neurol. 2016 Jun 13. doi: 10.1111/dmcn.13168. [Epub ahead of print]

AIM: To develop and evaluate a test activity from which bimanual performance in adolescents with unilateral cerebral palsy (CP) can be observed and scored with the Assisting Hand Assessment (AHA), and to evaluate the construct validity of the AHA test items for the extended age range 18 months to 18 years.

METHOD: A new test activity was developed and evaluated for its ability to elicit bimanual actions in adolescents with (n=20) and without (n=10) unilateral CP. The AHA scores of 126 adolescents (mean age 14y 3mo, SD 2y 6mo; 71 males, 55 females) and 157 children with unilateral CP (mean age 6y 1mo, SD 2y 10mo; 102 males, 55 females) were analysed using the Rasch measurement model.

RESULTS: The test activity elicited bimanual actions in 100% of typically developing adolescents and in 96.8% and 57.9% of adolescents with unilateral CP (moderately and severely limited hand function respectively). The scale demonstrated good construct validity; thus the same scoring criteria can be used for the age range studied.

INTERPRETATION: The new Assisting Hand Assessment for adolescents (Ad-AHA) activity is valid for use with 13- to 18-year-olds to elicit bimanual performance in adolescents with unilateral CP. The same AHA scoring criteria can be used both for children and for adolescents within the age range 18 months to 18 years.

Effect of Segmental Trunk Support on Posture and Reaching in Children With Cerebral Palsy.

Santamaria V, Rachwani J, Saavedra S, Woollacott M.

Pediatr Phys Ther. 2016 Fall;28(3):285-93. doi: 10.1097/PEP.0000000000000273.

PURPOSE: To test the effects of segmental trunk support on seated postural and reaching control in children with cerebral palsy.

METHODS: Seventeen children (age range 2-15 y, Gross Motor Function Classification System levels III-V) were classified with the Segmental Assessment of Trunk Control into mild (complete trunk control/lower lumbar deficits), moderate (thoracic/upper lumbar deficits), and severe (cervical/upper thoracic deficits). Postural and arm kinematics were measured while reaching with trunk support at axillae, mid-ribs, or pelvis.

RESULTS: Children in the mild group did not display changes in posture or reaching across conditions. The moderately involved group showed decrements in postural and reaching performance with pelvic compared with higher supports ($P < .01$). Children in the severe group were unable to maintain posture with pelvic support and showed postural deficiencies with mid-ribs compared with axillae support ($P < .01$).

CONCLUSIONS: Children with cerebral palsy and trunk dysfunction demonstrate improved motor performance when the external assistance matches their intrinsic level of trunk control.

PMID: 27341576 [PubMed - in process]

Evaluation of postural stability in children with hemiplegic cerebral palsy.

Kenis-Coskun O, Giray E, Eren B, Ozkok O, Karadag-Saygi E.

J Phys Ther Sci. 2016 May;28(5):1398-402. doi: 10.1589/jpts.28.1398. Epub 2016 May 31.

[Purpose] Postural stability is the ability of to maintain the position of the body within the support area. This function is affected in cerebral palsy. The aim of the present study was to compare static and dynamic postural stability between children with hemiplegic cerebral palsy and healthy controls.

[Subjects and Methods] Thirty-seven children between the ages of 5 and 14 diagnosed with hemiplegic cerebral palsy (19 right, 18 left) and 23 healthy gender- and age-matched controls were included in the study. Postural stability was evaluated in both of the groups using a Neurocom Balance. Sway velocity was measured both with the eyes open and closed. Sit to stand and turning abilities were also assessed.

[Results] The sway velocities with the eyes open and closed were significantly different between the groups. The weight transfer time in the Sit to Stand test was also significantly slower in children with cerebral palsy. Children with cerebral palsy also showed slower turning times and greater sway velocities during the Step and Quick Turn test on a force plate compared with their healthy counterparts.

[Conclusion] Both static and dynamic postural stability parameters are affected in hemiplegic cerebral palsy. Further research is needed to define rehabilitation interventions to improve these parameters in patients.

[Free PMC Article](#)

PMID: 27313338 [PubMed]

Footwear Decreases Gait Asymmetry during Running.

Hoerzer S, Federolf PA, Maurer C, Baltich J, Nigg BM.

PLoS One. 2015 Oct 21;10(10):e0138631. doi: 10.1371/journal.pone.0138631. eCollection 2015.

Previous research on elderly people has suggested that footwear may improve neuromuscular control of motion. If footwear does in fact improve neuromuscular control, then such an influence might already be present in young, healthy adults. A feature that is often used to assess neuromuscular control of motion is the level of gait asymmetry. The objectives of the study were (a) to develop a comprehensive asymmetry index (CAI) that is capable of detecting gait asymmetry changes caused by external boundary conditions such as footwear, and (b) to use the CAI to investigate whether footwear influences gait asymmetry during running in a healthy, young cohort. Kinematic and kinetic data were collected for both legs of 15 subjects performing five barefoot and five shod over-ground running trials. Thirty continuous gait variables including ground reaction forces and variables of the hip, knee, and ankle

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 28 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

joints were computed for each leg. For each individual, the differences between the variables for the right and left leg were calculated. Using this data, a principal component analysis was conducted to obtain the CAI. This study had two main outcomes. First, a sensitivity analysis suggested that the CAI had an improved sensitivity for detecting changes in gait asymmetry caused by external boundary conditions. The CAI may, therefore, have important clinical applications such as monitoring the progress of neuromuscular diseases (e.g. stroke or cerebral palsy). Second, the mean CAI for shod running (131.2 ± 48.5 ; mean \pm standard deviation) was significantly lower ($p = 0.041$) than the CAI for barefoot running (155.7 ± 39.5). This finding suggests that in healthy, young adults gait asymmetry is reduced when running in shoes compared to running barefoot, which may be a result of improved neuromuscular control caused by changes in the afferent sensory feedback.

[Free PMC Article](#)

PMCID: PMC4619465

PMID: 26488484 [PubMed - indexed for MEDLINE]

Gait characteristics, balance performance and falls in ambulant adults with cerebral palsy: An observational study.

Morgan P, Murphy A, Opheim A, McGinley J

Gait Posture. 2016 Jun 17;48:243-248. doi: 10.1016/j.gaitpost.2016.06.015. [Epub ahead of print]

The relationship between spatiotemporal gait parameters, balance performance and falls history was investigated in ambulant adults with cerebral palsy (CP). Participants completed a single assessment of gait using an instrumented walkway at preferred and fast speeds, balance testing (Balance Evaluation Systems Test; BESTest), and reported falls history. Seventeen ambulatory adults with CP, mean age 37 years, participated. Gait speed was typically slow at both preferred and fast speeds (mean 0.97 and 1.21m/s, respectively), with short stride length and high cadence relative to speed. There was a significant, large positive relationship between preferred gait speed and BESTest total score ($\rho=0.573$; $p<0.05$) and fast gait speed and BESTest total score ($\rho=0.647$, $p<0.01$). The stride lengths of fallers at both preferred and fast speeds differed significantly from non-fallers ($p=0.032$ and $p=0.025$, respectively), with those with a prior history of falls taking shorter strides. Faster gait speed was associated with better performance on tests of anticipatory and postural response components of the BESTest, suggesting potential therapeutic training targets to address either gait speed or balance performance. Future exploration of the implications of slow walking speed and reduced stride length on falls and community engagement, and the potential prognostic value of stride length on identifying falls risk is recommended.

Crown Copyright © 2016. Published by Elsevier B.V. All rights reserved.

PMID: 27341531 [PubMed - as supplied by publisher]

Leg and Joint Stiffness in Children with Spastic Diplegic Cerebral Palsy during Level Walking.

Wang TM, Huang HP, Li JD, Hong SW, Lo WC, Lu TW.

PLoS One. 2015 Dec 2;10(12):e0143967. doi: 10.1371/journal.pone.0143967. eCollection 2015.

Individual joint deviations are often identified in the analysis of cerebral palsy (CP) gait. However, knowledge is limited as to how these deviations affect the control of the locomotor system as a whole when striving to meet the demands of walking. The current study aimed to bridge the gap by describing the control of the locomotor system in children with diplegic CP in terms of their leg stiffness, both skeletal and muscular components, and associated joint stiffness during gait. Twelve children with spastic diplegia CP and 12 healthy controls walked at a self-selected pace in a gait laboratory while their kinematic and forceplate data were measured and analyzed during loading response, mid-stance, terminal stance and pre-swing. For calculating the leg stiffness, each of the lower limbs was modeled as a non-linear spring, connecting the hip joint center and the corresponding center of pressure, with varying stiffness that was calculated as the slope (gradient) of the axial force vs. the deformation curve. The leg stiffness was further decomposed into skeletal and muscular components considering the alignment of the lower limb. The ankle, knee and hip of the limb were modeled as revolute joints with torsional springs whose stiffness was calculated as the slope of the moment vs. the angle curve of the joint. Independent t-tests were performed for between-group comparisons of all the variables. The CP group significantly decreased the leg stiffness but increased the joint stiffness during stance phase, except during terminal stance where the leg stiffness was increased. They appeared to rely more on muscular contributions to achieve the required leg stiffness, increasing the muscular demands in maintaining the body posture against collapse. Leg stiffness plays a critical role in modulating the kinematics and kinetics of the locomotor system during gait in the diplegic CP.

[Free PMC Article](#)

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org 29

PMCID: PMC4667918

PMID: 26629700 [PubMed - indexed for MEDLINE]

Mini-MACS: development of the Manual Ability Classification System for children younger than 4 years of age with signs of cerebral palsy.

Eliasson AC, Ullenhag A, Wahlström U, Krumlinde-Sundholm L.

Dev Med Child Neurol. 2016 Jun 8. doi: 10.1111/dmcn.13162. [Epub ahead of print]

AIM: To develop the Mini-Manual Ability Classification System (Mini-MACS) and to evaluate the extent to which its ratings are valid and reliable when children younger than 4 years are rated by their parents and therapists.

METHOD: The Mini-MACS was created by making adjustments to the MACS. The development involved a pilot project, consensus discussions within an expert group, and the creation of a test version of the Mini-MACS that was evaluated for content validity and interrater reliability. A convenience sample of 61 children with signs of cerebral palsy aged 12 to 51 months (mean age 30.2mo [SD 10.1]) were classified by one parent and two occupational therapists across a total of 64 assessments. Agreement between the parents' and therapists' ratings was evaluated using the intraclass correlation coefficient (ICC) and the percentage of agreement.

RESULTS: The first sentence of the five levels in the MACS was kept, but other descriptions within the Mini-MACS were adjusted to be more relevant for the younger age group. The ICC between parents and therapists was 0.90 (95% confidence interval [CI] 0.79-0.92), and for the two therapists it was 0.97 (95% CI 0.78-0.92). Most parents and therapists found the descriptions in the Mini-MACS suitable and easy to understand.

INTERPRETATION: The Mini-MACS seems applicable for children from 1 to 4 years of age.

© 2016 Mac Keith Press.

PMID: 27273427 [PubMed - as supplied by publisher]

Multiple gait patterns within the same Winters class in children with hemiplegic cerebral palsy.

Agostini V, Nascimbeni A, Gaffuri A, Knaflitz M

Clin Biomech (Bristol, Avon). 2015 Nov;30(9):908-14. doi: 10.1016/j.clinbiomech.2015.07.010. Epub 2015 Jul 29.

BACKGROUND: Previous literature hypothesized that Winters type I are mainly characterized by a hypo-activation of dorsiflexors and type II by hyperactivation of plantarflexors around initial contact. However, it is currently not known if hemiplegic children belonging to the same Winters class really share the same muscle activation patterns, although this information might have relevant clinical implications in the patient management.

METHODS: Gait data of 38 hemiplegic cerebral palsy children (16 Winters type I, 22 Winters type II) were analyzed, focusing on the foot and shank. A 2.5-minute walk test was considered, corresponding to more than 100 gait cycles for each child, analyzing the muscle activation patterns of tibialis anterior and gastrocnemius lateralis. The large stride-to-stride variability of gait data was handled in an innovative way, processing separately: 1) distinct foot-floor contact patterns, and for each specific foot-floor contact pattern 2) distinct muscle "activation modalities", averaging only across gait cycles with the same number of activations, and obtaining, in both cases, the pattern frequency-of-occurrence.

FINDINGS: At least 2 representative foot-floor contact patterns within each Winters group, and up to 4-5 distinct muscle activation patterns were documented.

INTERPRETATION: It cannot be defined a predominant muscle activation pattern specific for a Winters group. For a correct clinical assessment of a hemiplegic child, it is advisable to record and properly analyze gait signals during a longer period of time (2-3 min), rather than (subjectively) selecting a few "clean" gait cycles, since these cycles may not be representative of the patient's gait.

Copyright © 2015 Elsevier Ltd. All rights reserved.

PMID: 26239583 [PubMed - indexed for MEDLINE]

Partial correlation between lower muscle thickness, 10-meter walk test, and the timed up & go test in children with spastic cerebral palsy.

Yun CK, Kim WH, Kim SG.

J Phys Ther Sci. 2016 May;28(5):1611-3. doi: 10.1589/jpts.28.1611. Epub 2016 May 31.

[Purpose] The purpose of this study was to examine the correlation between lower extremity muscle thickness and gait ability through the 10-meter walk and timed up and go tests.

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 30 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

[Subjects and Methods] A total of 28 children (20 males and 8 females) with spastic cerebral palsy undergoing physical therapy at D hospital in D city, South Korea participated in this study. Partial correlation analysis was performed to analyze the correlation between lower extremity muscle thickness and gait ability (10-meter walk test and timed up and go test).

[Results] There was a positive correlation between muscle thickness and the 10-meter walk test (RF=0.41 and VL=0.52). Correlation between the muscle thickness and the timed up and go had a negative correlation (VL=-0.45, MG=-0.51, and LG=-0.39).

[Conclusion] In children with cerebral palsy, knee extensor muscles that are more developed increased gait ability and calf muscles that are more developed increased sit to stand ability.

[Free PMC Article](#)

PMID: 27313383 [PubMed]

Predictors of Independent Walking in Young Children With Cerebral Palsy.

Begnoche DM, Chiarello LA, Palisano RJ, Gracely EJ, McCoy SW, Orlin MN.

Phys Ther. 2016 Feb;96(2):183-92. doi: 10.2522/ptj.20140315. Epub 2015 Jun 18.

BACKGROUND: The attainment of walking is a focus of physical therapy intervention in children with cerebral palsy (CP) and may affect their independence in mobility and participation in daily activities. However, knowledge of determinants of independent walking to guide physical therapists' decision making is lacking.

OBJECTIVE: The aim of this study was to identify child factors (postural control, reciprocal lower limb movement, functional strength, and motivation) and family factors (family support to child and support to family) that predict independent walking 1 year later in young children with CP at Gross Motor Function Classification System (GMFCS) levels II and III.

DESIGN: A secondary data analysis of an observational cohort study was performed.

METHODS: Participants were 80 children with CP, 2 through 6 years of age. Child factors were measured 1 year prior to the walking outcome. Parent-reported items representing family factors were collected 7 months after study onset. The predictive model was analyzed using backward stepwise logistic regression.

RESULTS: A measure of functional strength and dynamic postural control in a sit-to-stand activity was the only significant predictor of taking ≥ 3 steps independently. The positive likelihood ratio for predicting a "walker" was 3.26, and the negative likelihood ratio was 0.74. The model correctly identified a walker or "nonwalker" 75% of the time.

LIMITATIONS: Prediction of walking ability was limited by the lack of specificity of child and family characteristics not prospectively selected and measurement of postural control, reciprocal lower limb movement, and functional strength 1 year prior to the walking outcome.

CONCLUSIONS: The ability to transfer from sitting to standing and from standing to sitting predicted independent walking in young children with CP. Prospective longitudinal studies are recommended to determine indicators of readiness for independent walking.

© 2016 American Physical Therapy Association.

PMCID: PMC4752679 [Available on 2016-08-01]

PMID: 26089044 [PubMed - indexed for MEDLINE]

Reliability and Construct Validity of the 6-Minute Racerunner Test in Children and Youth with Cerebral Palsy, GMFCS Levels III and IV.

Bolster EA, Dallmeijer AJ, de Wolf GS, Versteegt M, Schie PE.

Phys Occup Ther Pediatr. 2016 Jun 17:1-12. [Epub ahead of print]

AIM: To determine the test-retest reliability and construct validity of a novel 6-Minute Racerunner Test (6MRT) in children and youth with cerebral palsy (CP) classified as Gross Motor Function Classification System (GMFCS) levels III and IV. The racerunner is a step-propelled tricycle.

METHODS: The participants were 38 children and youth with CP (mean age 11 y 2 m, SD 3 y 7 m; GMFCS III, n = 19; IV, n = 19). Racerunner capability was determined as the distance covered during the 6MRT on three occasions. The intraclass correlation coefficient (ICC), standard error of measurement (SEM), and smallest detectable differences (SDD) were calculated to assess test-retest reliability.

RESULTS: The ICC for tests 2 and 3 were 0.89 (SDD 37%; 147 m) for children in level III and 0.91 for children in level IV (SDD 52%; 118 m). When the average of two separate test occasions was used, the SDDs were reduced to 26% (104 m; level III) and 37% (118 m; level IV). For tests 1 to 3, the mean distance covered increased from 345 m (SD 148 m) to 413 m (SD 137 m) for children in level III, and from 193 m (SD 100 m) to 239 m (SD 148 m) for children in level IV.

CONCLUSIONS: Results suggest high test-retest reliability. However, large SDDs indicate that a single 6MRT measurement is only useful for individual evaluation when large improvements are expected, or when taking the average of two tests. The 6MRT discriminated the distance covered between children and youth in levels III and IV, supporting construct validity.

PMID: 27314415 [PubMed - as supplied by publisher]

Site-Specific Transmission of a Floor-Based, High-Frequency, Low-Magnitude Vibration Stimulus in Children With Spastic Cerebral Palsy.

Singh H, Whitney DG, Knight CA, Miller F, Manal K, Kolm P, Modlesky CM.

Arch Phys Med Rehabil. 2016 Feb;*97(2):218-23. doi: 10.1016/j.apmr.2015.08.434. Epub 2015 Sep 21.*

OBJECTIVE: To determine the degree to which a high-frequency, low-magnitude vibration signal emitted by a floor-based platform transmits to the distal tibia and distal femur of children with spastic cerebral palsy (CP) during standing.

DESIGN: Cross-sectional study.

SETTING: University research laboratory.

PARTICIPANTS: Children with spastic CP who could stand independently (n=18) and typically developing children (n=10) (age range, 4-12y) participated in the study (N=28).

INTERVENTIONS: Not applicable.

MAIN OUTCOME MEASURES: The vibration signal at the high-frequency, low-magnitude vibration platform (approximately 33Hz and 0.3g), distal tibia, and distal femur was measured using accelerometers. The degree of plantar flexor spasticity was assessed using the Modified Ashworth Scale.

RESULTS: The high-frequency, low-magnitude vibration signal was greater ($P<.001$) at the distal tibia than at the platform in children with CP ($.36\pm.06g$ vs $.29\pm.05g$) and controls ($.40\pm.09g$ vs $.24\pm.07g$). Although the vibration signal was also higher at the distal femur ($.35\pm.09g$, $P<.001$) than at the platform in controls, it was lower in children with CP ($.20\pm.07g$, $P<.001$). The degree of spasticity was negatively related to the vibration signal transmitted to the distal tibia (Spearman $\rho=-.547$) and distal femur (Spearman $\rho=-.566$) in children with CP (both $P<.05$).

CONCLUSIONS: A high-frequency, low-magnitude vibration signal from a floor-based platform was amplified at the distal tibia, attenuated at the distal femur, and inversely related to the degree of muscle spasticity in children with spastic CP. Whether this transmission pattern affects the adaptation of the bones of children with CP to high-frequency, low-magnitude vibration requires further investigation.

Copyright © 2016 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

PMID: 26392035 [PubMed - indexed for MEDLINE]

The influence of seat heights and foot placement positions on postural control in children with cerebral palsy during a sit-to-stand task.

Medeiros DL, Conceição JS, Graciosa MD, Koch DB, Santos MJ, Ries L.

Res Dev Disabil. 2015 Aug-Sep;*43-44:1-10. doi: 10.1016/j.ridd.2015.05.004. Epub 2015 Jul 4.*

This paper aimed to analyze, from both a kinetic and kinematic perspective, the postural control of children with cerebral palsy (CP) able to independently perform the sit-to-stand (STS) task (ICP) and children who needed support (SCP) typically developing children during the STS; and also investigate the influence of seats heights and foot placement positions on postural control of these children. Fourteen children with CP and fourteen typically developing controls were recruited. Based on the Gross Motor Function Classification System (GMFCS) the children with CP were divided into ICP (level I) and SCP (levels II and III). Balance was assessed using the Pediatric Balance Scale. Motor function was rated using the GMFCS. Kinematic and kinetic data were recorded and analyzed during the STS task at two different seat heights and foot placement positions. The SCP exhibited significantly less balance according to the PBS and smaller displacement of their center of pressure (COP) in anteroposterior (COPAP) and mediolateral (COPML) direction relative to the other two groups. ICP demonstrated significant greater in the COPML

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 32 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

displacement than the other groups. Children with CP required more time to complete the STS than controls. Those in the SCP group had lower linear displacement of the shoulder and knee than others during the STS task. During the high bench condition, the linear displacements of the shoulder and knee were reduced also. We conclude that the SCP has less COPAP and COPML oscillation, what means the better postural control during STS than the other two groups, which may be related to the support provided. The ICP exhibited greater COPML oscillations than controls, suggesting that they utilized different strategies in the frontal plane during the STS task. The seat height and foot placement did not influence postural control in children with CP, at least in terms of kinetic parameters. Seat height influenced the kinematic variables, with a high bench reducing linear displacement of the shoulder (vertical and horizontal) and knee (vertical) both in children with CP and control children.

Copyright © 2015 Elsevier Ltd. All rights reserved.

PMID: 26151438 [PubMed - indexed for MEDLINE]

Windswept hip deformity in children with cerebral palsy: a population-based prospective follow-up.

Hägglund G, Lauge-Pedersen H, Persson Bunke M, Rodby-Bousquet E

J Child Orthop. 2016 Jun 18. [Epub ahead of print]

PURPOSE: To analyze the development of windswept hip deformity (WS) in a total population of children with cerebral palsy (CP) up to 20 years of age, the association between WS and hip dislocation, and femoral varus osteotomy and scoliosis, and the impact of a hip surveillance program on the subsequent incidence of WS.

METHODS: This is a prospective study on children with CP in southern Sweden included in the Swedish follow-up programme and registry for CP (CPUP). All children born between 1990 and 1995 with CP were included; those born between 1990 and 1991 did not partake in the hip surveillance program until they were older (3-5 years of age) and served as a historic control group. Children born between 1992 and 1995 were included in the hip surveillance program from about 2 years of age and constituted the study group.

RESULTS: In the control group, 12 of 68 children (18 %) developed WS. In the study group of 139 children, 13 (9 %) developed WS ($p = 0.071$). Of all 25 children with WS, 21 also developed scoliosis and 5 developed a hip dislocation.

The number of children with WS starting in the lower extremities was significantly lower in the study group ($p = 0.028$). No difference between the two groups was seen regarding WS that started in combination with scoliosis.

CONCLUSION: With early inclusion in a hip surveillance program and early treatment of contractures, it appears possible to reduce the frequency of WS starting in the lower extremities.

PMID: 27318818 [PubMed - as supplied by publisher]

Cognition

Measuring intellectual ability in cerebral palsy: The comparison of three tests and their neuroimaging correlates.

Ballester-Plané J, Laporta-Hoyos O, Macaya A, Póo P, Meléndez-Plumed M, Vázquez É, Delgado I, Zubiaurre-Elorza L, Narberhaus A, Toro-Tamargo E, Russi ME, Tenorio V, Segarra D, Pueyo R.

Res Dev Disabil. 2016 Jun 2;56:83-98. doi: 10.1016/j.ridd.2016.04.009. [Epub ahead of print]

Standard intelligence scales require both verbal and manipulative responses, making it difficult to use in cerebral palsy and leading to underestimate their actual performance. This study aims to compare three intelligence tests suitable for the heterogeneity of cerebral palsy in order to identify which one(s) could be more appropriate to use. Forty-four subjects with bilateral dyskinetic cerebral palsy (26 male, mean age 23 years) conducted the Raven's Coloured Progressive Matrices (RCPM), the Peabody Picture Vocabulary Test-3rd (PPVT-III) and the Wechsler Nonverbal Scale of Ability (WNV). Furthermore, a comprehensive neuropsychological battery and magnetic resonance imaging were assessed. The results show that PPVT-III gives limited information on cognitive performance and brain correlates, getting lower intelligence quotient scores. The WNV provides similar outcomes as RCPM, but cases with severe motor impairment were unable to perform it. Finally, the RCPM gives more comprehensive information on cognitive performance, comprising not only visual but also verbal functions. It is also sensitive to the structural state of the brain, being related to basal ganglia, thalamus and white matter areas such as superior longitudinal fasciculus. So, the RCPM may be considered a standardized easy-to-administer tool with great potential in both clinical and research fields of bilateral cerebral palsy.

Copyright © 2016 Elsevier Ltd. All rights reserved.

PMID: 27262445 [PubMed - as supplied by publisher]

Brain State Before Error Making in Young Patients With Mild Spastic Cerebral Palsy.

Hakkarainen E, Pirilä S, Kaartinen J, van der Meere JJ.

J Child Neurol. 2015 Oct;30(11):1489-95. doi: 10.1177/0883073815571453. Epub 2015 Mar 11.

In the present experiment, children with mild spastic cerebral palsy and a control group carried out a memory recognition task. The key question was if errors of the patient group are foreshadowed by attention lapses, by weak motor preparation, or by both. Reaction times together with event-related potentials associated with motor preparation (frontal late contingent negative variation), attention (parietal P300), and response evaluation (parietal error-preceding positivity) were investigated in instances where 3 subsequent correct trials preceded an error. The findings indicated that error responses of the patient group are foreshadowed by weak motor preparation in correct trials directly preceding an error.

© The Author(s) 2015.

PMID: 25762584 [PubMed - indexed for MEDLINE]

Traitement - Rééducation motrice et cognitive

Protocol for a prospective observational study of conventional treatment and traditional Korean medicine combination treatment for children with cerebral palsy.

Yoo JE, Yun YJ, Shin YB, Kim NK, Kim SY, Shin MJ, Yu SA.

BMC Complement Altern Med. 2016 Jun 8;16(1):172. doi: 10.1186/s12906-016-1161-6.

BACKGROUND: Cerebral palsy leads to many complications as well as delayed motor development, and early intensive rehabilitation in infancy, which is based on the theory of brain plasticity, is emphasized. In addition to conventional treatment, including physical, occupational, or speech-language therapies, children also have a demand for traditional Korean medicine interventions such as acupuncture or herbal medicine; however, a lack of evidence has made traditional Korean medicine difficult to implement in practice. We planned a multicentre, prospective, observational study to assess the effectiveness, safety and cost-effectiveness of conventional treatment and traditional Korean medicine combination treatment for children with cerebral palsy.

METHODS/DESIGN: Three hundred children with cerebral palsy aged 6 to 78 months will be recruited from six institutions. Data from each child are collected every month for a one-year period, during which time treatment might be changed or discontinued. A qualified investigator visits the sites to measure effectiveness variables, including Gross Motor Function Measure and Paediatric Evaluation of Disability Inventory. Adverse events and cost-effectiveness variables are collected using surveys conducted at baseline, mid-study, and end of study, as well as monthly tracking surveys. In the analyses, participants will be classified into two groups: group A children will be the conventional treatment group with physical, occupational, speech-language or other conventional rehabilitation therapies, whereas group B children will be the combination treatment group with traditional Korean medicine interventions, that is, herbal medicine, chuna, moxibustion and acupuncture, in addition to conventional treatment.

DISCUSSION: Only a few clinical case reports have evaluated the effectiveness and safety of traditional Korean medicine; therefore, more data are required to provide optimal information to children with cerebral palsy and their guardians. We hypothesized that traditional Korean medicine combination treatment for children with cerebral palsy would have benefits compared with conventional therapy alone. The findings of this study might provide informative data for conducting economic evaluations and developing clinical research on combination treatment for cerebral palsy in South Korea.

TRIAL REGISTRATION: NCT02223741.

[Free PMC Article](#)

PMCID: PMC4897905

PMID: 27267182 [PubMed - in process]

Pharmacologie Efficacite Tolérance

Clinical Trial of Erythropoietin in Young Children With Cerebral Palsy.

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org 34

Cho KH, Min K, Lee SH, Lee S, An SA, Kim M.

J Child Neurol. 2016 May 27. pii: 0883073816650038. [Epub ahead of print]

This study was conducted to assess the safety and efficacy of recombinant human erythropoietin in young children with cerebral palsy aged between 6 months and 3 years. All participants received subcutaneous recombinant human erythropoietin and 8 weeks of rehabilitation therapy. Adverse events, changes of vital signs, and hematologic tests were monitored up to 8 weeks postinjection. Functional measures of development at 4 and 8 weeks postinjection were compared with baseline values, and improvements were compared with those of an age-matched historical control group. Nine participants completed the trial from June 2012 to February 2015. No adverse events were related to recombinant human erythropoietin. Erythropoiesis was noted, although within normal range. Functional improvements were observed in all participants ($P < .05$) and increases in motor function were higher in recombinant human erythropoietin group than the control group. Accordingly, recombinant human erythropoietin administration was safe without any significant adverse events and improved the functional outcomes in young children with cerebral palsy.

© The Author(s) 2016.

PMID: 27233796 [PubMed - as supplied by publisher]

Comparison between an Ascenda and a silicone catheter in intrathecal baclofen therapy in pediatric patients: analysis of complications.

Motta F, Antonello CE

J Neurosurg Pediatr. 2016 Jun 24:1-6. [Epub ahead of print]

OBJECTIVE In this single-center study the authors investigated the complications occurring before and after the introduction of the new Ascenda intrathecal catheter (Medtronic Inc.) in pediatric patients treated with intrathecal baclofen therapy (ITB) for spasticity and/or dystonia.

METHODS This was a retrospective review of 508 children who had received ITB, 416 with silicone catheters in the 13 years between September 1998 and September 2011 and 92 with Ascenda catheters in the 3 years between September 2011 and August 2014. The authors evaluated major complications such as infections, CSF leaks treated, and problems related to the catheter or pump, and they compared the 2 groups of patients who had received either a silicone catheter or an Ascenda catheter implant.

RESULTS One hundred twenty patients in the silicone group (29%) and 1 patient in the Ascenda group (1.1%; $p < 0.001$) had a major complication. In the silicone group 23 patients (5.5%) were affected by CSF leakage and 75 patients (18%) experienced 82 catheter-related events, such as occlusion, dislodgment, disconnection, or breakage, which required catheter replacement. In the Ascenda group, only 1 patient (1.1%) was affected by CSF leakage.

CONCLUSIONS To the authors' knowledge, this study is the first in the literature to compare the performance of the new Ascenda catheter, introduced in 2011, with the traditional silicone catheter for intrathecal drug infusion. In their analysis, the authors found that the Ascenda catheter can reduce major complications related to the catheter after ITB pump implantation. Further investigation is necessary to expand on and confirm their results.

PMID: 27341610 [PubMed - as supplied by publisher]

Evaluating Functional Outcomes of Botulinum Toxin Type A Injection Combined with Occupational Therapy in the Upper Limbs of Children with Cerebral Palsy: A 9-Month Follow-Up from the Perspectives of Both Child and Caregiver.

Lin YC, Huang CY, Lin IL, Shieh JY, Chung YT, Chen KL.

PLoS One. 2015 Nov 24;10(11):e0142769. doi: 10.1371/journal.pone.0142769. eCollection 2015.

OBJECTIVE: To assess the effectiveness of combining botulinum toxin type A (BoNT-A) with functional occupational therapy (OT) at 9-month follow-up in children with cerebral palsy (CP) with bilateral upper limb impairments from the perspectives of both child and caregiver.

METHODS: Twelve children with CP and their caregivers were assessed across 5 time points over 9 months based on the ICF after BoNT-A injection and functional OT in this open-label study.

RESULTS: Significant differences were found across the 5 time points ($p < .05$) for both grasp and visual-motor integration with small effects (effect sizes = 0.12-0.24) and the self-care capability and performance of social function ($p < .05$). However, based on the effect sizes (0.02-0.14), no significant effects were found at the 4 post-test

time points. Small effects were found on the psychological domain (effect sizes = 0.25-0.37) and environmental domains (effect size = 0.27) at follow-ups.

CONCLUSION: Combining a BoNT-A injection with OT not only reduced the muscle tone and increased ROM but also improved the upper limb function and self-care capability in children with CP. More importantly, these effects persisted for up to 9 months. Functional OT extends the effectiveness of a BoNT-A injection.

[Free PMC Article](#)

PMCID: PMC4657995

PMID: 26599003 [PubMed - indexed for MEDLINE]

Muscle histopathology in children with spastic cerebral palsy receiving botulinum toxin type A.

Valentine J, Stannage K, Fabian V, Ellis K, Reid S, Pitcher C, Elliott C.

Muscle Nerve. 2016 Mar;53(3):407-14. doi: 10.1002/mus.24763. Epub 2016 Jan 5.

INTRODUCTION: Botulinum toxin A (BoNTA) is routine treatment for hypertonicity in children with cerebral palsy (CP).

METHODS: This single-blind, prospective, cross-sectional study of 10 participants (mean age 11 years 7 months) was done to determine the relationship between muscle histopathology and BoNTA in treated medial gastrocnemius muscle of children with CP. Open muscle biopsies were taken from medial gastrocnemius muscle and vastus lateralis (control) during orthopedic surgery.

RESULTS: Neurogenic atrophy in the medial gastrocnemius was seen in 6 participants between 4 months and 3 years post-BoNTA. Type 1 fiber loss with type 2 fiber predominance was significantly related to the number of BoNTA injections ($r = 0.89$, $P < 0.001$).

CONCLUSIONS: The impact of these changes in muscle morphology on muscle function in CP is not clear. It is important to consider rotating muscle selection or injection sites within the muscle or allowing longer time between injections.

© 2015 Wiley Periodicals, Inc.

PMID: 26154631 [PubMed - indexed for MEDLINE]

Chirurgie

Blood Transfusion Incidence, Risk Factors, and Associated Complications in Surgical Treatment of Hip Dysplasia.

Sherrod BA, Baker DK, Gilbert SR.

J Pediatr Orthop. 2016 Jun 8. [Epub ahead of print]

BACKGROUND: Perioperative bleeding requiring blood transfusion is a known complication of hip dysplasia (HD) surgery. Here we examine rates of, risk factors for, and postoperative complications associated with transfusion during HD surgery.

METHODS: The National Surgical Quality Improvement Program (NSQIP) Pediatric database was queried for patients treated by an orthopaedist from 2012 to 2013. HD cases were categorized by Current Procedural Terminology codes into femoral osteotomies, acetabular osteotomies, combined femoral/acetabular osteotomies, and open reductions. Patients were grouped by comorbidities: neuromuscular (NM) disease (eg, cerebral palsy) group, non-NM with other comorbidity (Other) group, and no known comorbidity (NL) group. Patients were stratified by weight-normalized transfusion volume. Multivariate regression analysis of transfusion association with procedures, demographics, comorbidities, preoperative laboratory values, and 30-day complications was performed.

RESULTS: A total of 1184 HD cases were included. Transfusion rates for the NL, Other, and NM groups, respectively, were 44/451 (9.8%), 61/216 (28.2%), and 161/517 (31.1%). Transfusion volumes (mean±SD) for the NL, Other, and NM groups, respectively, were 8.4±5.4, 13.9±8.8, and 15.5±10.0 mL/kg ($P < 0.001$). Combined osteotomies had the highest transfusion rates in the NM and Other groups (35.7% and 45.8%, respectively), whereas acetabular osteotomies had the highest rate in the NL group (15.8%). Open reductions had the lowest transfusion rate (all groups). Longer operations were independently associated with transfusion (all groups, per hour increase, $OR > 1.5$, $P < 0.001$). Independent patient risk factors included preoperative hematocrit $< 31\%$ (NM group, $OR = 18.42$, $P = 0.013$), female sex (NL group, $OR = 3.55$, $P = 0.008$), developmental delay (NM group, $OR = 2.37$, $P = 0.004$), pulmonary comorbidity (NM group, $OR = 1.73$, $P = 0.032$), and older age (NL group, per year increase: $OR = 1.29$, $P < 0.001$). In all groups, transfusion was associated with longer hospitalization ($P < 0.001$). We observed a volume-dependent

increase in overall complication rate within the Other group for transfusion volumes >15 mL/kg (25.0% vs. 5.4% for <15 mL/kg, P=0.048).

CONCLUSIONS: We identified several risk factors for transfusion in HD surgery. The incidence of transfusion in HD surgery and its association with adverse outcomes warrants development of appropriate patient management guidelines.

LEVEL OF EVIDENCE: Level III-prognostic.

PMID: 27280901 [PubMed - as supplied by publisher]

Changes in gait which occur before and during the adolescent growth spurt in children treated by selective dorsal rhizotomy.

McFall J, Stewart C, Kidgell V, Postans N, Jarvis S, Freeman R, Roberts A.

Gait Posture. 2015 Sep;42(3):317-22. doi: 10.1016/j.gaitpost.2015.06.187. Epub 2015 Jun 29.

This paper presents long term follow up results from 17 children (6 girls, 11 boys, GMFCS levels II-IV), treated by means of selective dorsal rhizotomy (SDR). The particular focus is on the effect of the adolescent growth spurt on patients who had previously undergone SDR. The children were all assessed using 3D gait analysis, in combination with clinical examination at three time points-before SDR surgery (PRE), after SDR surgery when pre-adolescent (POST1) and post-adolescence (POST2). The total follow up period to POST2 was 8 years 6 months for girls and 9 years 5 months for boys. All children maintained or improved their GMFCS level. Positive changes in ranges of motion and gait were observed at POST1 and these were generally maintained over adolescence to POST2. The mean Gait Profile Score (GPS) had improved by 3.2 points (14.7-11.5) at POST1, with a non-significant deterioration of 0.3 over the adolescent growth spurt. These positive results reflect the total package of care for the children, involving careful pre-operative selection by a multidisciplinary team and post-operative management including intensive physiotherapy and maintenance in tuned ankle foot orthoses. Fifty-nine per cent of children had some additional orthopaedic surgery, mostly bony procedures. The overall benefits arising from their management need to be considered in the light of the likely deterioration experienced by this patient group. The results of this study support the use of SDR as part of a management strategy for carefully selected children with cerebral palsy with the aim of optimizing gait at skeletal maturity.

Copyright © 2015 Elsevier B.V. All rights reserved.

PMID: 26164354 [PubMed - indexed for MEDLINE]

Combined Anterior and Posterior Lumbar Rhizotomy for Treatment of Mixed Dystonia and Spasticity in Children With Cerebral Palsy.

Abdel Ghany WA, Nada M, Mahran MA, Aboud A, Mahran MG, Aziz Nasef MA, Gaber M, Sabry T, Ibrahim MH, Taha MH.

Neurosurgery. 2016 May 27. [Epub ahead of print]

BACKGROUND: Children with cerebral palsy (CP) can present with severe secondary dystonia with or without associated spasticity of their extremities.

OBJECTIVE: To assess the outcomes of combined anterior and posterior lumbar rhizotomy for the treatment of mixed hypertonia in the lower extremities of children with CP.

METHODS: Fifty children with CP were subjected to combined anterior and posterior lumbar rhizotomies in a prospective study. Clinical outcome measurements were recorded preoperatively and were evaluated at 2, 6, and 12 months postoperatively. The operative techniques were performed by laminotomy from L1-S1, and intraoperative monitoring was used in all cases. All patients underwent intensive postoperative physiotherapy programs.

RESULTS: Changes in muscle tone, joint range of motion, and dystonia were significant (P = .000) at postoperative assessment visits.

CONCLUSION: This study demonstrated the potential of combined anterior and posterior lumbar rhizotomies to improve activities of daily living in children with CP and with mixed spasticity and dystonia.

ABBREVIATIONS: BAD, Barry-Albright Dystonia ScaleCAPR, combined anterior and posterior lumbar rhizotomyCP, cerebral palsyITB, intrathecal baclofenMAS, modified Ashworth ScaleROM, range of motionSDR, selective dorsal rhizotomyThis is an open-access article distributed under the terms of the Creative Commons Attribution-Noncommercial-No Derivatives License 4.0 (CC-BY-NC-ND), where it is permissible to download and share the work, provided it is properly cited. The work cannot be changed in any way or used commercially.

PMID: 27244465 [PubMed - as supplied by publisher]

Correction of gait after derotation osteotomies in cerebral palsy: Are the effects predictable?

Böhm H, Hösl M, Dussa CU, Döderlein L.

Gait Posture. 2015 Oct;42(4):569-74. doi: 10.1016/j.gaitpost.2015.09.003. Epub 2015 Sep 10.

Derotation osteotomies of the femur and tibia are established procedures to improve transverse plane deformities during walking with inwardly pointing knees and in- and out toeing gait. However, effects of femoral derotation osteotomies on gait were reported to be small, and those for the tibia are not known. Therefore, the aim of the study was to show the relation between the amount of intraoperative rotation and the changes during gait for osteotomies at femur and tibia levels, and predict those for the femur from preoperative clinical and gait data. Forty-four patients with spastic cerebral palsy between 6 and 19 years were included, 33 limbs received rotation only at the femur, 8 only at the tibia and 12 limbs at both levels. Gait analysis and clinical testing was performed pre- and 21.4 (SD=1.8) months postoperatively. The amount of intraoperative derotation of the femur showed no significant correlation with the change in hip rotation during walking ($R=-0.17$, $p=0.25$), whereas the rotation of the tibia showed an excellent relationship ($R=0.84$, $p<0.001$) with the change in knee rotation. Preoperative hip rotation during walking explained only 18% of the variability of the postoperative change in hip rotation during gait. Strength and passive range of motion in hip extension and abduction as well as hip extension or abduction or foot progression during walking did not show any predictive significance. In conclusion changes of knee rotation during gait is directly predictable from the amount of tibial corrections, contrary the change in hip rotation was not related to the amount of femoral derotation, and prediction was only fair.

Copyright © 2015 Elsevier B.V. All rights reserved.

PMID: 26387820 [PubMed - indexed for MEDLINE]

Effects of Soft Tissue Surgery on Pelvic and Hip Rotation in Patients with Spastic Diplegia: A Meta-Analysis.

Jung HJ, Yoon JY, Oh MK, Kim YC, Kim JH, Eom TW, Park KB.

Clin Orthop Surg. 2016 Jun;8(2):187-93. doi: 10.4055/cios.2016.8.2.187. Epub 2016 May 10.

BACKGROUND: There are several different opinions regarding the improvements seen on the transverse plane after soft tissue surgery alone in independently ambulant patients with cerebral palsy. We performed a meta-analysis using data from previous studies to identify the effects of soft tissue surgery alone on pelvic and hip rotation in children with spastic diplegia.

METHODS: We conducted a pilot study to evaluate the improvement in pelvic and hip rotation after muscle-tendon lengthening surgery in children with spastic diplegia. We also searched EMBASE and PubMed and selected 2 previous studies using the same test conditions with kinematic data on the pelvis and hip joints. A meta-analysis of the results of these 3 studies, including this pilot study, was then performed.

RESULTS: The meta-analysis results showed an external rotation decrease ($p = 0.005$) in the mean difference of pelvic rotation of -3.61 (95% confidence interval [CI], -6.13 to -1.09) and a mean difference in hip rotation of 6.60 (95% CI, 3.34 to 9.86), indicating a significant increase in the hip external rotation after surgery ($p < 0.001$).

CONCLUSIONS: In independently community-ambulant pediatric patients with spastic diplegia, pelvic retraction and hip internal rotation could be improved after soft tissue surgery.

Electromagnetic bone segment tracking to control femoral derotation osteotomy – A saw bone study.

Geisbüsch A, Auer C, Dickhaus H, Niklasch M, Dreher T.

J Orthop Res. 2016 Jun 21. doi: 10.1002/jor.23348. [Epub ahead of print]

Correction of rotational gait abnormalities is common practice in pediatric orthopaedics such as in children with cerebral palsy. Femoral derotation osteotomy is established as a standard treatment, however different authors reported substantial variability in outcomes following surgery with patients showing over- or under-correction. Only 60% of the applied correction is observed postoperatively, which strongly suggests intraoperative measurement error or loss of correction during surgery. This study was conducted to verify the impact of error sources in the derotation procedure and assess the utility of a newly developed, instrumented measurement system based on electromagnetic tracking aiming to improve the accuracy of rotational correction. A supracondylar derotation osteotomy was performed in 21 artificial femur sawbones and the amount of derotation was quantified during the procedure by the tracking system and by 9 raters using a conventional goniometer. Accuracy of both measurement

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 38 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

devices was determined by repeated computer tomography scans. Average derotation measured by the tracking system differed by $0.1^\circ \pm 1.6^\circ$ from the defined reference measurement. In contrast, a high inter-rater variability was found in goniometric measurements (range: $10.8^\circ \pm 6.9^\circ$, mean interquartile distance: 6.6°). During fixation of the osteosynthesis, the tracking system reliably detected unintentional manipulation of the correction angle with a mean absolute change of $4.0^\circ \pm 3.2^\circ$. Our findings show that conventional control of femoral derotation is subject to relevant observer bias whereas instrumental tracking yields accuracy better than $\pm 2^\circ$. The tracking system is a step towards more reliable and safe implementation of femoral correction, promising substantial improvements of patient safety in the future.

This article is protected by copyright. All rights reserved.

PMID: 27325569 [PubMed - as supplied by publisher]

Factors associated with recurrence after femoral derotation osteotomy in cerebral palsy.

Niklasch M, Wolf SI, Klotz MC, Geisbüsch A, Brunner R, Döderlein L, Dreher T.

Gait Posture. 2015 Oct;42(4):460-5. doi: 10.1016/j.gaitpost.2015.07.059. Epub 2015 Aug 1.

Femoral derotation osteotomy (FDO) as gold standard treatment for internal rotation gait in cerebral palsy (CP) leads to satisfying short-term results, whereas rates of recurrence up to 33% are reported in long-term outcome studies. The purpose of this study was therefore to identify factors contributing to recurrence of internal rotation gait in patients with CP who were treated with FDO in childhood. 70 patients (age: 10 (± 3.3) years at surgery) with bilateral CP and internal rotation gait were examined pre-, one year and at least five years (mean 8 ± 2 years) postoperatively after distal or proximal FDO, using standardized clinical examination and 3D gait-analysis. 27 patients had a good hip rotation one year postoperatively (between 5° external and 15° internal for both limbs) and were considered for the analysis of factors contributing to recurrence of internal rotation gait. Regarding all included patients both mean hip rotation and foot progression angle improved significantly ($p < 0.001$) from pre- to postoperative. A significant deterioration in hip rotation (more involved side) ($p < 0.001$) from one year postoperatively to the long-term follow-up can be observed. Younger age, reduced hip joint impulse, increased plantar flexion and internal foot progression angle postoperatively could be identified as factors for recurrence. FDO on average leads to a satisfactory correction of internal rotation gait. In order to improve the long-term outcome after FDO the time of multilevel surgery should be indicated as late as possible and the different factors leading to potential recurrence should be considered.

Copyright © 2015 Elsevier B.V. All rights reserved.

PMID: 26276696 [PubMed - indexed for MEDLINE]

Hip dislocation in cerebral palsy: evolution of the contralateral side after reconstructive surgery.

Abdo JC, Forlin E.

Rev Bras Ortop. 2016 May 3;51(3):329-32. doi: 10.1016/j.rboe.2015.07.012.

OBJECTIVE: To evaluate the progression of the contralateral hip after unilateral reconstruction of hip dislocation in patients classified as GMFCS IV-V; and to identify potential prognostic factors for their evolution.

METHODS: This was a retrospective study on 17 patients with spastic cerebral palsy, who were classified on the GMFCS scale (Gross Motor Functional Classification System) as degrees IV and V, and who underwent unilateral reconstruction surgery to treat hip dislocation (adductor release, femoral varus osteotomy and acetabuloplasty). The minimum postoperative follow-up was 30 months. The clinical parameters evaluated were sex, age at time of surgery, length of follow-up after surgery and range of abduction. The treatment parameters were use/nonuse of femoral shortening, application of botulinum toxin and any previous muscle releases. The radiographic parameters were Reimer's extrusion index (REI), acetabular angle (AA) and the continuity of Shenton's line.

RESULTS: Among the 17 patients evaluated, eight presented dislocation (group I) and nine did not (group II). Group I comprised three males and five females; group II comprised one male and eight females. The mean age at the time of surgery among the group I patients was 62 months and the mean follow-up was 62 months. In group II, these were 98 and 83 months, respectively. There was a trend in which patients of greater age did not evolve with contralateral dislocation. Among the nine patients with the combination of $REI < 30\%$ and $AA < 25^\circ$, only one presented dislocation during the follow-up. Contralateral subluxation occurred within the first two years after the surgery.

CONCLUSION: Hips presenting $REI < 30^\circ$ and $AA < 25^\circ$ do not tend to evolve to subluxation and can be kept under observation. Preoperative clinical and radiographic measurements alone are not useful for indicating the natural evolution of non-operated hips. The critical period for subluxation is the first two years after surgery.

Science Infos Paralyse Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 39 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

Free PMC Article

Publisher: Abstract available from the publisher.

PMCID: PMC4887446

PMID: 27274487 [PubMed]

Incidence of and Risk Factors for Loss of 1 Blood Volume During Spinal Fusion Surgery in Patients With Cerebral Palsy.

Jain A, Sponseller PD, Shah SA, Yaszay B, Njoku DB, Miyanji F, Newton PO, Bastrom TP, Marks MC; Harms Study Group.

J Pediatr Orthop. 2016 Jun 2. [Epub ahead of print]

BACKGROUND: Spinal fusion surgery is associated with greater blood loss in patients with cerebral palsy (CP) than in patients with adolescent idiopathic scoliosis. Risk factors for loss of 1 blood volume (LOBV) in patients with CP have not been well studied. We investigated the incidence of and risk factors for LOBV during spinal fusion surgery in young patients with CP.

METHODS: We queried a multicenter registry of CP patients for all patients 21 years or younger who had undergone spinal fusion from 2008 through 2013; 272 patients met these criteria. We analyzed data on patient characteristics, preoperative laboratory values, radiographic measures, and surgical characteristics. For univariate analysis, we used χ tests and logistic regression models. Factors that were significant in the univariate analysis were used to construct a multivariate logistic regression model. Significance was set at $P < 0.01$.

RESULTS: Incidence of LOBV was 39.7%. On multivariate analysis, unit rod construct and coronal curve magnitude were significantly associated with LOBV ($P < 0.01$). The multivariate model accounted for 32.2% of variance in LOBV. Compared with patients with pedicle screw-rod constructs, patients with unit rod constructs had 12.6-fold higher odds of LOBV ($P < 0.01$). For each 1-degree increase in coronal curve magnitude, odds of LOBV increased 1.03-fold ($P < 0.01$).

CONCLUSIONS: In patients with CP, there is a substantial risk of LOBV during spinal fusion surgery. Use of unit rod constructs and greater preoperative coronal curves were significant risk factors for LOBV during surgery.

LEVEL OF EVIDENCE: Level II.

PMID: 27261969 [PubMed - as supplied by publisher]

Multilevel surgery in adults with cerebral palsy.

Putz C, Döderlein L, Mertens EM, Wolf SI, Braatz F, Dreher T.

Bone Joint J. 2016 Feb;98-B(2):282-8. doi: 10.1302/0301-620X.98B2.36122.

AIMS: Single-event multilevel surgery (SEMLS) has been used as an effective intervention in children with bilateral spastic cerebral palsy (BSCP) for 30 years. To date there is no evidence for SEMLS in adults with BSCP and the intervention remains focus of debate.

METHODS: This study analysed the short-term outcome (mean 1.7 years, standard deviation 0.9) of 97 ambulatory adults with BSCP who performed three-dimensional gait analysis before and after SEMLS at one institution.

RESULTS: Two objective gait variables were calculated pre- and post-operatively; the Gillette Gait Index (GGI) and the Gait Profile Score (GPS). The results were analysed in three groups according to their childhood surgical history (group 1 = no surgery, group 2 = surgery other than SEMLS, group 3 = SEMLS). Improvements in gait were shown by a significant decrease of GPS ($p = 0.001$). Similar results were obtained for both legs (GGI right side and left side $p = 0.01$). Furthermore, significant improvements were found in all subgroups although this was less marked in group 3, where patients had undergone previous SEMLS.

DISCUSSION: SEMLS is an effective and safe procedure to improve gait in adults with cerebral palsy. However, a longer rehabilitation period is to be expected than found in children. SEMLS is still effective in adult patients who have undergone previous SEMLS in childhood.

TAKE HOME MESSAGE: Single-event multilevel surgery is a safe and effective procedure to improve gait disorders in adults with bilateral spastic cerebral palsy.

©2016 The British Editorial Society of Bone & Joint Surgery.

PMID: 26850437 [PubMed - indexed for MEDLINE]

Predictors of outcome after single-event multilevel surgery in children with cerebral palsy: a retrospective ten-year follow-up study.

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 40 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

Švehlík M, Steinwender G, Lehmann T, Kraus T
Bone Joint J. 2016 Feb;98-B(2):278-81. doi: 10.1302/0301-620X.98B2.35959.

AIMS: Single event multilevel surgery (SEMLS) has been shown to improve gait in children with cerebral palsy (CP). However, there is limited evidence regarding long-term outcomes and factors influencing them.

METHODS: In total 39 children (17 females and 22 males; mean age at SEMLS ten years four months, standard deviation 37 months) with bilateral CP (20 Gross Motor Function Classification System (GMFCS) level II and 19 GMFCS level III) treated with SEMLS were included. Children were evaluated using gait analysis and the Gait Deviation Index (GDI) before SEMLS and one, two to three, five and at least ten years after SEMLS. A linear mixed model was used to estimate the effect of age at the surgery, GMFCS and follow-up period on GDI.

RESULTS: There was a mean improvement of 12.1 (-15.3 to 45.1) GDI points one year after SEMLS ($p < 0.001$) and 10.3 (-23.1 to 44.2) GDI points ten years after SEMLS compared with before SEMLS ($p < 0.001$). GMFCS level III children aged ten to 12 years had the most improvement. The GMFCS III group had more surgical procedures at the index SEMLS ($p < 0.001$) and during the follow-up period ($p = 0.039$). After correcting for other factors, age at surgery was the only factor predictive of long-term results. Our model was able to explain 45% of the variance of the change in GDI at the different time points.

TAKE HOME MESSAGE: Children with GMFCS III level aged ten to 12 are the benchmark responders to SEMLS in the long-term.

©2016 The British Editorial Society of Bone & Joint Surgery.

PMID: 26850436 [PubMed - indexed for MEDLINE]

Outcomes of Isolated Varus Derotational Osteotomy in Children With Cerebral Palsy Hip Dysplasia and Predictors of Resubluxation.

Chang FM, May A, Faulk LW, Flynn K, Miller NH, Rhodes JT, Zhaoxing P, Novais EN.

J Pediatr Orthop. 2016 Jun 8. [Epub ahead of print]

BACKGROUND: The appropriate intervention for hip subluxation or dislocation in children affected by cerebral palsy (CP) remains controversial. The purpose of this retrospective study was to report radiographic and clinical outcomes following isolated femoral varus derotational osteotomy (VDRO) in children with CP hip dysplasia. Risk factors for resubluxation and avascular necrosis (AVN) were also examined.

METHODS: A cohort of 100 patients (199 hips) with CP treated with isolated VDRO between 2003 and 2009 was reviewed. All but 1 patient received bilateral surgery. Patients were followed for an average of 5.4 years (range, 1.03 to 10.20 y). Anteroposterior pelvic radiographs were used to assess migration percentage (MP), Shenton's line, and presence of AVN. Resubluxation was defined as a postoperative break in Shenton's line. Radiographic outcomes and risk analysis was performed in the 91 subjects (179 hips) with radiographic follow-up >1 year.

RESULTS: Significant improvement was observed in MP, and all hips had a reconstituted Shenton's line following surgery. Over the course of follow-up, 16% of hips were noted to have a repeat break in Shenton's line. Univariate risk analysis showed preoperative MP, Gross Motor Function Classification System (GMFCS) level, and age at surgery were risk factors for a recurrent line break. Preoperative MP and GMFCS level were found to be predictors of resubluxation in multivariate analysis. AVN was detected in 10 hips (5.7%). GMFCS level V patients were more at risk for resubluxation, but less at risk for AVN when compared with ambulatory (GMFCS I/II/III) patients and GMFCS level IV patients.

CONCLUSIONS: Performing a VDRO without additional procedures provided a stable and concentrically reduced hip joint in this population of children with CP. Attention should be paid to initial ambulatory status during the postoperative period. Concomitant procedures such as pelvic osteotomy should be considered for patients of GMFCS level IV and V, as these patients were more at risk for recurrent subluxation.

LEVEL OF EVIDENCE: Level III-retrospective comparative study.

PMID: 27280898 [PubMed - as supplied by publisher]

Performing a Definitive Fusion in Juvenile CP Patients is a Good Surgical Option.

Yaszay B(1), Sponseller PD, Shah SA, Asghar J, Miyanji F, Samdani AF, Bartley C, Newton PO.

J Pediatr Orthop. 2016 Jun 2. [Epub ahead of print]

BACKGROUND: In juveniles with progressive curves, there is debate regarding the use of growth friendly implants versus definitive fusion. This study presents outcomes of juvenile cerebral palsy (CP) scoliosis patients who underwent definitive fusion before age 11.

METHODS: A review of a prospective, multicenter registry identified patients 10 years and younger who had a definitive posterior fusion for their CP scoliosis. Preoperative and postoperative demographic and radiographic changes were evaluated with descriptive statistics. Repeated measures analysis of variance were utilized to compare outcome scores.

RESULTS: Fourteen children with a mean age of 9.7 years (8.3 to 10.8 y) and a minimum of 2 years follow-up (range 2 to 3 y) were identified. The mean preoperative curve magnitude and pelvic obliquity was 84 ± 25 degrees (range 63 to 144 degrees) and 25 ± 14 degrees, respectively. All patients were skeletally immature with open triradiate cartilage. Three patients had unit rods with wires while the rest incorporated pedicle screws. Immediately postoperation, the average major curve was 25 ± 17 degrees ($P\leq 0.001$, 71% correction rate). At most recent follow-up, the average major curve increased to 30 ± 18 degrees ($P\leq 0.001$) for a 65% correction rate. Pelvic obliquity improved to 4 ± 4 degrees (84% correction, $P\leq 0.001$) immediately postoperation and to 6 ± 5 degrees ($P=0.002$) at latest follow-up for a 76% correction rate. None of the patients required revision surgery for progression. From pre to most recent follow-up, the CPchild Health outcome scores improved from 47 to 58 ($P=0.019$). One patient had a deep infection, and 1 patient had a broken rod that did not require any further treatment.

CONCLUSIONS: Progressive scoliosis in juvenile CP patients requires the surgeon to balance the need for further growth with the risks of progression or repeated surgical procedures. Our study demonstrates that definitive fusion once the curves approach 90 degrees results in significant radiographic and quality of life improvements, but further follow-up is needed to determine whether those results remain after skeletal maturity.

LEVEL OF EVIDENCE: Level IV-therapeutic.

PMID: 27261965 [PubMed - as supplied by publisher]

Short-term and Long-term Clinical Results of the Surgical Correction of Thumb-in-Palm Deformity in Patients With Cerebral Palsy.

Alewijnse JV, Smeulders MJ, Kreulen M.

J Pediatr Orthop. 2015 Dec;35(8):825-30. doi: 10.1097/BPO.0000000000000380.

BACKGROUND: Thumb-in-palm deformity disturbs a functional grip of the hand in patients with cerebral palsy. Reported recurrence rates after surgical correction are contradicting and earlier studies are limited to short-term follow-up. Therefore, the aim of this retrospective clinical outcome study is to evaluate the success rate of surgical correction of thumb-in-palm deformity around 1 year and at a minimum of 5 years follow-up. In addition, long-term patient satisfaction of the treatment is evaluated.

METHODS: Patients with cerebral palsy who underwent a surgical correction for their thumb-in-palm deformity between April 2003 and April 2008 at the Academic Medical Center in Amsterdam were included. All patients were classified into 4 categories according to the assessment system of the Committee on Spastic Hand Evaluation. The result of surgery was considered "short-term successful" and "long-term successful" when, respectively, short-term and long-term classification was better compared with preoperative. The association between the patient satisfaction outcomes and the long-term clinical outcomes were statistically analyzed.

RESULTS: Data were collected from 39 patients and their charts. The success rate was 87% at short-term follow-up, which in the long term decreased to 80%. Interestingly, thumb position deteriorated in 29% of the patients between short-term and long-term follow-up. In the long term, 74% of the patients were satisfied with the position of their thumb and 87% would undergo the surgery again. Both these outcomes were statistically significant associated with the long-term success rate ($P<0.05$).

CONCLUSIONS: The surgical correction of thumb-in-palm deformity has a high clinical success rate and patient satisfaction in the long term. However, it should be taken into account that the clinical result around 1 year postoperative cannot be considered final.

PMID: 25575357 [PubMed - indexed for MEDLINE]

Screw augmentation for spinopelvic fixation in neuromuscular spine deformities: technical note.

Dubory A, Bachy M, Bouloussa H, Courvoisier A, Morel B, Vialle R.

Eur Spine J. 2015 Nov;24(11):2580-7. doi: 10.1007/s00586-015-4155-z. Epub 2015 Aug 11

PURPOSE: The primary goal of curve correction in neuromuscular patients is to restore coronal and sagittal trunk balance, including the pelvis, to maximize sitting balance. For several years, it has been a common practice to inject polymeric cement into osteoporotic bone through specially designed, perforated pedicle screws in an effort to enhance screw stability. Therefore, we started using the association of a spinopelvic fixation with S1 pedicle screw augmentation, using bisphenol-a-glycidyl dimethacrylate composite resin in neuromuscular patients with pelvic obliquity, technique in neuromuscular patients to improve pedicle screw stability of our pelvic construct.

METHODS: Ten patients undergoing spinopelvic fixation for a neuromuscular spinal deformity were enrolled in the study. Clinical and radiographic data were analyzed and presented. Minimal follow-up took place at 6 months to assess early complications.

RESULTS: Five patients were diagnosed with spastic quadriplegia secondary to cerebral palsy, four had Duchenne's muscular dystrophy, and one had a T5-level traumatic flaccid paraplegia. Preoperative PO ranged from 8° to 34° (mean 19.16°). Postoperative PO ranged from 0° to 6.3° (mean 1.6°). After surgery, all patients returned to a full-time sitting position between days 5 and 12 without the need for additional bracing. No mechanical failure of the construct was noted during follow-up.

CONCLUSIONS: We used sacral pedicle screw augmentation as a reliable tool to strengthen spinopelvic fixation in neuromuscular scoliosis without increasing the intraoperative morbidity. In our practice, sacral screw augmentation can definitely enhance PO correction obtained by a posterior procedure.

PMID: 26261012 [PubMed - indexed for MEDLINE]

Surgical Treatment Guidelines for Digital Deformity Associated With Intrinsic Muscle Spasticity (Intrinsic Plus Foot) in Adults With Cerebral Palsy.

Boffeli TJ, Collier RC

J Foot Ankle Surg. 2015 Sep-Oct;54(5):985-93. doi: 10.1053/j.jfas.2014.06.023. Epub 2014 Aug 22.

Intrinsic plus foot deformity has primarily been associated with cerebral palsy and involves spastic contracture of the intrinsic musculature with resultant toe deformities. Digital deformity is caused by a dynamic imbalance between the intrinsic muscles in the foot and extrinsic muscles in the lower leg. Spastic contracture of the toes frequently involves curling under of the lesser digits or contracture of the hallux into valgus or plantarflexion deformity. Patients often present with associated pressure ulcers, deformed toenails, shoe or brace fitting challenges, and pain with ambulation or transfers. Four different patterns of intrinsic plus foot deformity have been observed by the authors that likely relate to the different patterns of muscle involvement. Case examples are provided of the 4 patterns of intrinsic plus foot deformity observed, including global intrinsic plus lesser toe deformity, isolated intrinsic plus lesser toe deformity, intrinsic plus hallux valgus deformity, and intrinsic plus hallux flexus deformity. These case examples are presented to demonstrate each type of deformity and our approach for surgical management according to the contracture pattern. The surgical approach has typically involved tenotomy, capsulotomy, or isolated joint fusion. The main goals of surgical treatment are to relieve pain and reduce pressure points through digital realignment in an effort to decrease the risk of pressure sores and allow more effective bracing to ultimately improve the patient's mobility.

Copyright © 2015 American College of Foot and Ankle Surgeons. Published by Elsevier Inc. All rights reserved.

PMID: 25154656 [PubMed - indexed for MEDLINE]

The Long-term Outcome of Early Spine Fusion for Scoliosis in Children with Cerebral Palsy.

Sitoula P, Holmes L Jr, Sees J, Rogers K, Dabney K, Miller F.

Clin Spine Surg. 2016 Jun 20. [Epub ahead of print]

STUDY DESIGN: Retrospective review of radiographs and charts (case-only).

OBJECTIVE: The aim of this study was to describe the long-term outcomes of spine fusion for neuromuscular scoliosis in children <10 years of age with cerebral palsy (CP).

SUMMARY OF BACKGROUND DATA: Severely involved children with CP may develop early onset scoliosis. The outcome of spine fusion is not clear and there are no studies focused on spine fusion in this young patient population.

METHODS: This is a retrospective review of 33 children who underwent spine fusion with unit rod instrumentation between 1989 and 2006 for CP neuromuscular scoliosis, aged <10 years at spine fusion, and with follow-up > 5 years.

Demographic, medical, and radiographic data were retrospectively assessed. RANOVA and Kaplan-Meier survival estimates were used for data assessment.

RESULTS: 33 of 42 patients who underwent spine fusion in this period, 19 boys and 14 girls, met the inclusion criteria. Out of 9 patients who were excluded, 3 were lost to follow up and remaining 6 died within 5 years of surgery. Mean age at surgery was 8.3 years (range, 4.4-9.9). Mean follow-up was 9.8 years (range, 5.5-15.8). Gross motor function classification system level was V in 31 patients and IV in 2 patients. Thirty-one patients (94%) had seizure disorder, 29 patients (88%) had gastric feeding tubes, and 9 patients (27%) had tracheostomy tubes. 85% of the patients had posterior only surgery. Mean Cobb angles preoperative, immediately postoperative, and at final follow-up were 85°, 21°, and 24°, respectively. Mean postoperative pelvic obliquity correction was 15°±9°, P<0.001. At final follow-up, there was no significant change from the postoperative measurements. Complications included one deep wound infection and 10 other problems. Eleven patients (28.2%) died after a mean follow-up of 5.6±3.8 years

CONCLUSION: In our cohort with early onset neuromuscular scoliosis, spine fusion was associated with minimal short and long-term morbidity, but there 28% mortality at ten years follow-up and 50% predicted mortality at 15 years.

PMID: 27326971

Réadaptation fonctionnelle

Bilateral muscle strength symmetry and performance are improved following walk training with restricted blood flow in an elite paralympic sprint runner: Case study.

Salvador AF, Schubert KR, Cruz RS, Corvino RB, Pereira KL, Caputo F, de Oliveira MF.

Phys Ther Sport. 2016 Jul;20:1-6. doi: 10.1016/j.ptsp.2015.10.004. Epub 2015 Oct 21

OBJECTIVES: Investigate the influence of 4 weeks of walk training with blood flow restriction (BFR) on muscle strength, metabolic responses, 100-m and 400-m performances in an athlete with cerebral palsy.

METHODS: An elite Paralympic sprinter (20 years, 176 cm, 64.8 kg) who presented with moderate hemiplegic cerebral palsy (right side impaired) completed four visits before and after 4 weeks of the BFR training: 1) anthropometric measurements, familiarization of maximal voluntary contraction (MVC), and an incremental test; 2) MVC measurements; 3) 400-m performance, and 4) 100-m performance. The walk training with BFR consisted of four bouts of 5 min at 40% of maximal aerobic speed with 1 min of passive rest with complete reperfusion.

RESULTS: All performance times were lower with training (100-m: 1%; 400-m: 10%), accompanied by adaptations in aerobic variables (V'O₂max: 6%; OBLA: 24%) and running economy (9-10%). Lactic acid energy metabolism was reduced (25-27%), even in the presence of a higher lactate efflux from the previously active muscles after training. MVC (right leg: 19%; left leg: 9%) increased in both legs unevenly, decreasing the muscle strength asymmetry between limbs.

CONCLUSIONS: These results indicate that cardiovascular and neuromuscular adaptations can be simultaneously induced following BFR training in a paralympic sprinter.

Copyright © 2015 Elsevier Ltd. All rights reserved.

PMID: 27325532 [PubMed - in process]

Capturing neuroplastic changes after bimanual intensive rehabilitation in children with unilateral spastic cerebral palsy: A combined DTI, TMS and fMRI pilot study.

Bleyenheuft Y, Dricot L, Gilis N, Kuo HC, Grandin C, Bleyenheuft C, Gordon AM, Friel KM.

Res Dev Disabil. 2015 Aug-Sep;43-44:136-49. doi: 10.1016/j.ridd.2015.06.014. Epub 2015 Jul 13.

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. Here we documented the implementation of three different neurological assessments (diffusion tensor imaging-DTI, transcranial magnetic stimulation-TMS and functional magnetic resonance imaging-fMRI) before and after a bimanual intensive treatment (HABIT-ILE) in two children with USCP presenting differential corticospinal

developmental reorganization (ipsilateral and contralateral). The aim of the study was to capture neurophysiological changes and to document the complementary relationship between these measures, the potential measurable changes and the feasibility of applying these techniques in children with USCP. Independent of cortical reorganization, both children showed increases in activation and size of the motor areas controlling the affected hand, quantified with different techniques. In addition, fMRI provided additional unexpected changes in the reward circuit while using the affected hand.

Copyright © 2015 The Authors. Published by Elsevier Ltd.. All rights reserved.

[Free PMC Article](#)

PMCID: PMC4871716

PMID: 26183338 [PubMed - indexed for MEDLINE]

Constraint-induced movement therapy improves upper limb activity and participation in hemiplegic cerebral palsy: a systematic review.

Chiu HC, Ada L

J Physiother. 2016 Jun 17. pii: S1836-9553(16)30016-9. doi: 10.1016/j.jphys.2016.05.013. [Epub ahead of print]

QUESTIONS: Does constraint-induced movement therapy improve activity and participation in children with hemiplegic cerebral palsy? Does it improve activity and participation more than the same dose of upper limb therapy without restraint? Is the effect of constraint-induced movement therapy related to the duration of intervention or the age of the children?

DESIGN: Systematic review of randomised trials with meta-analysis.

PARTICIPANTS: Children with hemiplegic cerebral palsy with any level of motor disability.

INTERVENTION: The experimental group received constraint-induced movement therapy (defined as restraint of the less affected upper limb during supervised activity practice of the more affected upper limb). The control group received no intervention, sham intervention, or the same dose of upper limb therapy.

OUTCOME MEASURES: Measures of upper limb activity and participation were used in the analysis.

RESULTS: Constraint-induced movement therapy was more effective than no/sham intervention in terms of upper limb activity (SMD 0.63, 95% CI 0.20 to 1.06) and participation (SMD 1.21, 95% CI 0.41 to 2.02). However, constraint-induced movement therapy was no better than the same dose of upper limb therapy without restraint either in terms of upper limb activity (SMD 0.05, 95% CI -0.21 to 0.32) or participation (SMD -0.02, 95% CI -0.34 to 0.31). The effect of constraint-induced movement therapy was not related to the duration of intervention or the age of the children.

CONCLUSIONS: This review suggests that constraint-induced movement therapy is more effective than no intervention, but no more effective than the same dose of upper limb practice without restraint.

REGISTRATION: PROSPERO CRD42015024665. [Chiu H-C, Ada L (2016) Constraint-induced movement therapy improves upper limb activity and participation in hemiplegic cerebral palsy: a systematic review. *Journal of Physiotherapy* XX: XX-XX].

Copyright © 2016 Australian Physiotherapy Association. Published by Elsevier B.V. All rights reserved.

[Free Article](#)

PMID: 27323932 [PubMed - as supplied by publisher]

Does therapeutic electrical stimulation improve function in children with disabilities? A comprehensive literature review.

Bosques G, Martin R, McGee L, Sadowsky C

J Pediatr Rehabil Med. 2016 May 31;9(2):83-99. doi: 10.3233/PRM-160375.

The use of therapeutic electrical stimulation for medical purposes is not new; it has been described in medical textbooks since the 18th century, but its use has been limited due to concerns for tolerance and lack of research showing efficacy. The purpose of this review is to discuss the potential clinical applicability, while clarifying the differences in electrical stimulation (ES) treatments and the theory behind potential benefits to remediate functional impairments in youth. The literature review was performed as follows: A total of 37 articles were reviewed and the evidence for use in pediatric diagnoses is reported. The synthesis of the literature suggests that improvements in various impairments may be possible with the integration of ES. Most studies were completed on children with cerebral palsy (CP). Electrical stimulation may improve muscle mass and strength, spasticity, passive range of motion (PROM), upper extremity function, walking speed, and positioning of the foot and ankle kinematics during walking. [Science Infos Paralysie Cérébrale](#), juin 2016, [FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 45 1 45 54 03 03 contact: Christine Doumergue \[cdoumergue@lafondationmotrice.org\]\(mailto:cdoumergue@lafondationmotrice.org\)](#)

Sitting posture and static/dynamic sitting balance may be improved with ES to trunk musculature. Bone mineral density may be positively affected with the use of Functional Electrical Stimulation (FES) ergometry. ES may also be useful in the management of urinary tract dysfunction and chronic constipation. Among all reviewed studies, reports of direct adverse reactions to electrical stimulation were rare. In conclusion, NMES and FES appear to be safe and well tolerated in children with various disabilities. It is suggested that physiatrists and other healthcare providers better understand the indications and parameters in order to utilize these tools effectively in the pediatric population.

PMID: 27285801 [PubMed - in process]

Effectiveness of Rehabilitation Interventions to Improve Gait Speed in Children With Cerebral Palsy: Systematic Review and Meta-analysis.

Phys Ther. 2016 Jun 16. [Epub ahead of print]

Moreau NG, Bodkin AW, Bjornson K, Hobbs A, Soileau M, Lahasky K

BACKGROUND: Children with cerebral palsy (CP) have decreased gait speeds, which can negatively impact participation and quality of life. However, evidence for effective rehabilitation interventions to improve gait speed remains unclear.

PURPOSE: To determine the effectiveness of interventions for improving gait speed in ambulatory children with CP.

DATA SOURCES: MEDLINE, CINAHL, ERIC, and PEDro were searched from inception through April 2014.

STUDY SELECTION: Randomized controlled trials (RCTs) or experimental designs with a comparison group; included a physical therapy or rehabilitation intervention for children with CP; and reported gait speed as an outcome measure.

DATA EXTRACTION: Methodological quality was assessed by PEDro scores. Means, standard deviations, and change scores for gait speed were extracted. General study information and dosing parameters of the intervention were recorded (frequency, duration, intensity, and volume).

DATA SYNTHESIS: 24 studies were included. Three categories of interventions were identified: gait training (n=8), resistance training (n=9), and miscellaneous (n=7). Meta-analysis showed that gait training was effective in increasing gait speed with a standardized effect size of 0.92 (95% CI: 0.19 to 1.66; p = 0.01) while resistance training was shown to have a negligible effect (effect size = 0.06; 95% CI: -0.12 to 0.25; p = 0.51). Effect sizes from negative to large were reported for studies in the miscellaneous category.

LIMITATIONS: Gait speed was the only outcome measure analyzed.

CONCLUSIONS: Gait training was the most effective intervention in improving gait speed for ambulatory children with CP. Strength training, even if properly dosed, was not shown to be effective in improving gait speed. Velocity training, EMG biofeedback training, and whole-body vibration were effective in improving gait speed in individual studies and warrant further investigation.

© 2016 American Physical Therapy Association.

PMID: 27313240 [PubMed - as supplied by publisher]

Effects of strength training on mobility in adults with cerebral palsy: A systematic review.

Ross SM, MacDonald M, Bigouette JP

Disabil Health J. 2016 Jul;9(3):375-84. doi: 10.1016/j.dhjo.2016.04.005. Epub 2016 Apr 26.

BACKGROUND: Many adults with cerebral palsy report experiencing early-onset decline in mobility and independence. The role of strength training to combat this is not well understood.

OBJECTIVE/HYPOTHESIS: To examine the effects of strength-training interventions on muscle strength and functional outcomes for adults with CP using the ICF framework.

METHODS: A systematic review was conducted following standardized guidelines and using key words including: adults, cerebral palsy in combination with resistance or strength training, and ambulation and function related key words. Selection criteria included: (a) adults (mean age 18+ years) with CP, (b) strength training intervention, and (c) at least one activity or participation outcome measure. 26 retrieved articles were retained for full review. Data on strength training protocols were extracted and compared to national guidelines. Outcome measures were classified within ICF domains.

RESULTS: Six articles met the inclusion criteria. These articles were of high research quality and consistent with recommended training protocols for adults with CP. Positive gains in muscle strength were reported across studies.

Changes within the activity ICF dimension were inconsistent, with 2 of the 6 studies observing increases in self-selected walking speed.

CONCLUSIONS: Findings indicate training benefits for adults with CP. However, a small sample (n = 111 across all included studies) and the absence of extended training regimens and follow-up hindered conclusive results. High consistency in training protocols and outcome measures allowed for critical discussion on key research questions regarding the impact of strength training and subsequent gains in function within ICF domains.

Copyright © 2016 Elsevier Inc. All rights reserved.

PMID: 27286912 [PubMed - in process]

Evaluation of the effectiveness of robotic gait training and gait-focused physical therapy programs for children and youth with cerebral palsy: a mixed methods RCT.

Wiat L, Rosychuk RJ, Wright FV

BMC Neurol. 2016 Jun 2;16(1):86. doi: 10.1186/s12883-016-0582-7.

BACKGROUND: Robot assisted gait training (RAGT) is considered to be a promising approach for improving gait-related gross motor function of children and youth with cerebral palsy. However, RAGT has yet to be empirically demonstrated to be effective. This knowledge gap is particularly salient given the strong interest in this intensive therapy, the high cost of the technology, and the requirement for specialized rehabilitation centre resources.

METHODS: This is a research protocol describing a prospective, multi-centre, concurrent mixed methods study comprised of a randomized controlled trial (RCT) and an interpretive descriptive qualitative design. It is a mixed methods study designed to determine the relative effectiveness of three physical therapy treatment conditions (i.e., RAGT, a functional physical therapy program conducted over-ground (fPT), and RAGT + fPT) on gait related motor skills of ambulatory children with cerebral palsy. Children with cerebral palsy aged 5-18 years who are ambulatory (Gross Motor Function Classification System Levels II and III) will be randomly allocated to one of four treatment conditions: 1) RAGT, 2) fPT, 3) RAGT and fPT combined, or 4) a maintenance therapy only control group. The qualitative component will explicate child and parent experiences with the interventions, provide insight into the values that underlie their therapy goals, and assist with interpretation of the results of the RCT.

DISCUSSION: n/a.

TRIAL REGISTRATION: NCT02391324 Registered March 12, 2015.

PMCID: PMC4890515

PMID: 27255908 [PubMed - in process]

Intensive upper limb intervention with self-management training is feasible and promising for older children and adolescents with unilateral cerebral palsy.

Geerdink Y, Aarts P, van der Burg J, Steenbergen B, Geurts A

Res Dev Disabil. 2015 Aug-Sep;43-44:97-105. doi: 10.1016/j.ridd.2015.06.013. Epub 2015 Jul 9.

This study explored the feasibility and preliminary effectiveness of a short (one week) intensive intervention combining Constraint Induced Movement Therapy (CIMT) and bimanual training (BiT) to improve upper limb capacity and bimanual performance guided by individual goal setting in children and adolescents with unilateral cerebral palsy aged 8-18 years. Self-management training was added to the intervention to maximize the effect of training and to empower the participants in self-monitoring the effective use of their affected hand. Functional goals (Canadian Occupational Performance Measure), unimanual capacity (Box and Block Test), bimanual performance (ABILHAND-Kids, Children's Hand-use Experience Questionnaire (CHEQ)) and amount of use (Video Observation Aarts and Aarts - determine developmental disregard (VOAA-DDD-R)) were measured at baseline, one week and four months post intervention. Twenty children (mean age 9.5 years) participated. Repeated measures ANOVA was used to measure effects over time. Compared to baseline, there were significant improvements on all outcome measures. The largest effect sizes were found for the COPM-performance and COPM-satisfaction (Cohen's d=2.09 and d=2.42, respectively). The effect size was large for the ABILHAND-Kids (d=0.86), moderate for the CHEQ (d=0.70) and Box and Block Test (d=0.56), and small for the VOAA-DDD-R (d=0.33). All effects were retained at the four months post intervention assessment. The results of this study indicate that one-week (36h) intensive CIMT-BiT combined with self-management training is a feasible and promising intervention for improving the capacity of the upper limb and its use in bimanual activities in older children and adolescents with unilateral CP.

Copyright © 2015 Elsevier Ltd. All rights reserved.

PMID: 26164301 [PubMed - indexed for MEDLINE]

Science Infos Paralyse Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 47 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

Muscle Recruitment and Coordination following Constraint-Induced Movement Therapy with Electrical Stimulation on Children with Hemiplegic Cerebral Palsy: A Randomized Controlled Trial.

Xu K, He L, Mai J, Yan X, Chen Y.

PLoS One. 2015 Oct 9;10(10):e0138608. doi: 10.1371/journal.pone.0138608. eCollection 2015.

OBJECTIVE: To investigate changes of muscle recruitment and coordination following constraint-induced movement therapy, constraint-induced movement therapy plus electrical stimulation, and traditional occupational therapy in treating hand dysfunction.

METHODS: In a randomized, single-blind, controlled trial, children with hemiplegic cerebral palsy were randomly assigned to receive constraint-induced movement therapy (n = 22), constraint-induced movement therapy plus electrical stimulation (n = 23), or traditional occupational therapy (n = 23). Three groups received a 2-week hospital-based intervention and a 6-month home-based exercise program following hospital-based intervention. Constraint-induced movement therapy involved intensive functional training of the involved hand during which the uninvolved hand was constrained. Electrical stimulation was applied on wrist extensors of the involved hand. Traditional occupational therapy involved functional unimanual and bimanual training. All children underwent clinical assessments and surface electromyography (EMG) at baseline, 2 weeks, 3 and 6 months after treatment. Surface myoelectric signals were integrated EMG, root mean square and cocontraction ratio. Clinical measures were grip strength and upper extremity functional test.

RESULTS: Constraint-induced movement therapy plus electrical stimulation group showed both a greater rate of improvement in integrated EMG of the involved wrist extensors and cocontraction ratio compared to the other two groups at 3 and 6 months, as well as improving in root mean square of the involved wrist extensors than traditional occupational therapy group ($p < 0.05$). Positive correlations were found between both upper extremity functional test scores and integrated EMG of the involved wrist as well as grip strength and integrated EMG of the involved wrist extensors ($p < 0.05$).

CONCLUSIONS: Constraint-induced movement therapy plus electrical stimulation is likely to produce the best outcome in improving muscle recruitment and coordination in children with hemiplegic cerebral palsy compared to constraint-induced movement therapy alone or traditional occupational therapy.

TRIAL REGISTRATION: chictr.org ChiCTR-TRC-13004041.

[Free PMC Article](#)

PMCID: PMC4599892

PMID: 26452230 [PubMed - indexed for MEDLINE]

Resting State and Diffusion Neuroimaging Predictors of Clinical Improvements Following Constraint-Induced Movement Therapy in Children With Hemiplegic Cerebral Palsy.

Manning KY, Fehlings D, Mesterman R, Gorter JW, Switzer L, Campbell C, Menon RS

J Child Neurol. 2015 Oct;30(11):1507-14. doi: 10.1177/0883073815572686. Epub 2015 Mar 11.

The aim was to identify neuroimaging predictors of clinical improvements following constraint-induced movement therapy. Resting state functional magnetic resonance and diffusion tensor imaging data was acquired in 7 children with hemiplegic cerebral palsy. Clinical and magnetic resonance imaging (MRI) data were acquired at baseline and 1 month later following a 3-week constraint therapy regimen. A more negative baseline laterality index characterizing an atypical unilateral sensorimotor resting state network significantly correlated with an improvement in the Canadian Occupational Performance Measure score ($r = -0.81$, $P = .03$). A more unilateral network with decreased activity in the affected hemisphere was associated with greater improvements in clinical scores. Higher mean diffusivity in the posterior limb of the internal capsule of the affect tract correlated significantly with improvements in the Jebsen-Taylor score ($r = -0.83$, $P = .02$). Children with more compromised networks and tracts improved the most following constraint therapy.

© The Author(s) 2015.

PMID: 25762587 [PubMed - indexed for MEDLINE]

Site-Specific Transmission of a Floor-Based, High-Frequency, Low-Magnitude Vibration Stimulus in Children With Spastic Cerebral Palsy.

Singh H, Whitney DG, Knight CA, Miller F, Manal K, Kolm P, Modlesky CM
Arch Phys Med Rehabil. 2016 Feb;97(2):218-23. doi: 10.1016/j.apmr.2015.08.434. Epub 2015 Sep 21.

OBJECTIVE: To determine the degree to which a high-frequency, low-magnitude vibration signal emitted by a floor-based platform transmits to the distal tibia and distal femur of children with spastic cerebral palsy (CP) during standing.

DESIGN: Cross-sectional study.

SETTING: University research laboratory.

PARTICIPANTS: Children with spastic CP who could stand independently (n=18) and typically developing children (n=10) (age range, 4-12y) participated in the study (N=28).

INTERVENTIONS: Not applicable.

MAIN OUTCOME MEASURES: The vibration signal at the high-frequency, low-magnitude vibration platform (approximately 33Hz and 0.3g), distal tibia, and distal femur was measured using accelerometers. The degree of plantar flexor spasticity was assessed using the Modified Ashworth Scale.

RESULTS: The high-frequency, low-magnitude vibration signal was greater ($P<.001$) at the distal tibia than at the platform in children with CP ($.36\pm.06g$ vs $.29\pm.05g$) and controls ($.40\pm.09g$ vs $.24\pm.07g$). Although the vibration signal was also higher at the distal femur ($.35\pm.09g$, $P<.001$) than at the platform in controls, it was lower in children with CP ($.20\pm.07g$, $P<.001$). The degree of spasticity was negatively related to the vibration signal transmitted to the distal tibia (Spearman $\rho=-.547$) and distal femur (Spearman $\rho=-.566$) in children with CP (both $P<.05$).

CONCLUSIONS: A high-frequency, low-magnitude vibration signal from a floor-based platform was amplified at the distal tibia, attenuated at the distal femur, and inversely related to the degree of muscle spasticity in children with spastic CP. Whether this transmission pattern affects the adaptation of the bones of children with CP to high-frequency, low-magnitude vibration requires further investigation.

Copyright © 2016 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

PMID: 26392035 [PubMed - indexed for MEDLINE]

The effects of forward and backward walking according to treadmill inclination in children with cerebral palsy.

Kim WH, Kim WB, Yun CK.

J Phys Ther Sci. 2016 May;28(5):1569-73. doi: 10.1589/jpts.28.1569. Epub 2016 May 31.

[Purpose] This study investigated the effects of forward and backward walking using different treadmill incline positions on lower muscle activity in children with cerebral palsy, to provide baseline data for gait training intensity.

[Subjects and Methods] Nineteen subjects with cerebral palsy walked forward and backward at a self-selected pace on a treadmill with inclines of 0%, 5%, 10%, and 15%. Activation of the rectus femoris, biceps femoris, tibialis anterior, and lateral gastrocnemius was measured using surface electromyography during the stance phase.

[Results] As treadmill incline increased during forward walking, muscle activation of the paralyzed lower limbs did not significantly change. However, as treadmill incline increased during backward walking, rectus femoris activation significantly increased and a significant difference was found between treadmill inclines of 0% and 10%. A comparison of backward and forward walking showed a significant difference in rectus femoris activation at treadmill inclines of 0%, 5%, and 10%. Activation of the tibialis anterior was only significantly higher for backward walking at the 10% gradient.

[Conclusion] Backward walking may strengthen the rectus femoris and tibialis anterior in walking training for cerebral palsy. Gradient adjustment of the treadmill can be used to select the intensity of walking training.

[Free PMC Article](#)

PMID: 27313373 [PubMed]

The impact of strength training on skeletal muscle morphology and architecture in children and adolescents with spastic cerebral palsy: A systematic review.

Gillett JG, Boyd RN, Carty CP, Barber LA

Res Dev Disabil. 2016 Jun 20;56:183-196. doi: 10.1016/j.ridd.2016.06.003. [Epub ahead of print]

AIM: The aim of this study was to systematically review the current literature to determine the impact of strength training on skeletal muscle morphology and architecture in individuals aged 4-20 years with spastic type cerebral palsy.

METHODS: A comprehensive search for randomised and non-randomised controlled trials, cohort studies and cross-comparison trials was performed on five electronic databases. Included studies were graded according to level of evidence and assessed for methodological quality using the Downs and Black scale. Quantitative data was analysed using effect sizes.

RESULTS: Six of 304 articles met the inclusion criteria. Methodological quality of the included papers ranged from 14 to 19 (out of 32). A large effect was found on muscle cross-sectional area following strength training, with small to moderate effects on muscle volume and thickness.

CONCLUSION AND IMPLICATIONS: There is preliminary evidence that strength training leads to hypertrophy in children and adolescents with CP. A paucity of studies exist measuring morphological and architectural parameters following strength training in these individuals. Overall low study methodological quality along with heterogeneous study design, dissimilar outcome measures, and lack of adequate control groups, indicated that care is needed when interpreting the results of these studies in isolation.

Copyright © 2016 Elsevier Ltd. All rights reserved.

PMID: 27337690 [PubMed - as supplied by publisher]

Treadmill training with an incline reduces ankle joint stiffness and improves active range of movement during gait in adults with cerebral palsy.

Lorentzen J, Kirk H, Fernandez-Lago H, Frisk R, Scharff Nielsen N, Jorsal M, Nielsen JB

Disabil Rehabil. 2016 May 30;1-7. [Epub ahead of print]

PURPOSE: We investigated if 30 min of daily treadmill training with an incline for 6 weeks would reduce ankle joint stiffness and improve active range of movement in adults with cerebral palsy (CP).

METHODS: The study was designed as a randomized controlled clinical trial including 32 adults with CP (GMFCS 1-3) aged 38.1 SD 12 years. The training group (n = 16) performed uphill treadmill training at home daily for 30 min for 6 weeks in addition to their usual activities. Passive and reflex mediated stiffness and range of motion (ROM) of the ankle joint, kinematic and functional measures of gait were obtained before and after the intervention/control period. Intervention subjects trained 31.4 SD 10.1 days for 29.0 SD 2.3 min (total) 15.2 h.

RESULTS: Passive ankle joint stiffness was reduced (F = 5.1; p = 0.031), maximal gait speed increased (F = 42.8, p < 0.001), amplitude of toe lift prior to heel strike increased (F = 5.3, p < 0.03) and ankle angle at heel strike was decreased (F = 12.5; p < 0.001) significant in the training group as compared to controls.

CONCLUSION: Daily treadmill training with an incline for 6 weeks reduces ankle joint stiffness and increases active ROM during gait in adults with CP. Intensive gait training may thus be beneficial in preventing and reducing contractures and help to maintain functional gait ability in adults with CP. Implications for rehabilitation Uphill gait training is an effective way to reduce ankle joint stiffness in adult with contractures. 6 weeks of daily uphill gait training improves functional gait parameters such as gait speed and dorsal flexion during gait in adults with cerebral palsy.

PMID: 27237772 [PubMed - as supplied by publisher]

Wide-pulse-high-frequency neuromuscular electrical stimulation in cerebral palsy.

Neyroud D, Armand S, De Coulon G, Da Silva SR, Wegrzyk J, Gondin J, Kayser B, Place N.

Clin Neurophysiol. 2016 Feb;127(2):1530-9. doi: 10.1016/j.clinph.2015.07.009. Epub 2015 Jul 17.

OBJECTIVE: The present study assesses whether wide-pulse-high-frequency (WPHF) neuromuscular electrical stimulation (NMES) could result in extra-force production in cerebral palsy (CP) patients as previously observed in healthy individuals.

METHODS: Ten CP and 10 age- and sex-matched control participants underwent plantar flexors NMES. Two to three 10-s WPHF (frequency: 100 Hz, pulse duration: 1 ms) and conventional (CONV, frequency 25 Hz, pulse duration: 50 μ s) trains as well as two to three burst-like stimulation trains (2s at 25 Hz, 2s at 100 Hz, 2s at 25 Hz; pulse duration: 1 ms) were evoked. Resting soleus and gastrocnemii maximal H-reflex amplitude (Hmax) was normalized by maximal M-wave amplitude (Mmax) to quantify α -motoneuron modulation.

RESULTS: Similar Hmax/Mmax ratio was found in CP and control participants. Extra-force generation was observed both in CP (+18 \pm 74%) and control individuals (+94 \pm 124%) during WPHF (p < 0.05). Similar extra-forces were found during burst-like stimulations in both groups (+108 \pm 110% in CP and +65 \pm 85% in controls, p > 0.05).

CONCLUSION: Although the mechanisms underlying extra-force production may differ between WPHF and burst-like NMES, similar increases were observed in patients with CP and healthy controls.

Science Infos Paralyisie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 50 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

SIGNIFICANCE: Development of extra-forces in response to WPHF NMES evoked at low stimulation intensity might open new possibilities in neuromuscular rehabilitation.

Copyright © 2015 International Federation of Clinical Neurophysiology. Published by Elsevier Ireland Ltd. All rights reserved.

PMID: 26232132 [PubMed - indexed for MEDLINE]

Orthèse

Effect of supporting 3D-garment on gait postural stability in children with bilateral spastic cerebral palsy.

Degelaen M, De Borre L, Buyl R, Kerckhofs E, De Meirleir L, Dan B
NeuroRehabilitation. 2016 Jun 23. [Epub ahead of print]

BACKGROUND: Children with cerebral palsy show dysfunctional postural control which interferes with their functional performance and daily-life activities.

OBJECTIVE: The aim of the study was to identify the effect of a 3D supporting garment on trunk postural control and interjoint coordination during gait in children with bilateral cerebral palsy.

METHODS: We analyzed tridimensional trunk motion, trunk-thigh and interjoint coordination in 15 4-10 year-old children with bilateral spastic cerebral palsy (GMFCS I or II) and 16 4-10 year-old typically developing children while walking with or without a supporting garment.

RESULTS: We found significant changes in the coordination between trunk and lower limbs in children with cerebral palsy. Step velocity and cadence both increased significantly in children with cerebral palsy but in controls, the cadence remained unaltered. Interojoint coordination between hip-knee and knee-ankle was altered during the stance phase only in the subgroup of children with cerebral palsy without any limitations in ankle joint passive range of motion.

CONCLUSION: 3D supporting garments improve trunk-thigh and lower limb interjoint coordination in walking in children with bilateral cerebral palsy.

PMID: 27341370 [PubMed - as supplied by publisher]

Minimising impairment: Protocol for a multicentre randomised controlled trial of upper limb orthoses for children with cerebral palsy.

Imms C, Wallen M, Elliott C, Hoare B, Randall M, Greaves S, Adair B, Bradshaw E, Carter R, Orsini F, Shih ST, Reddihough D.

BMC Pediatr. 2016 May 27;16(1):70. doi: 10.1186/s12887-016-0608-8.

BACKGROUND: Upper limb orthoses are frequently prescribed for children with cerebral palsy (CP) who have muscle overactivity predominantly due to spasticity, with little evidence of long-term effectiveness. Clinical consensus is that orthoses help to preserve range of movement: nevertheless, they can be complex to construct, expensive, uncomfortable and require commitment from parents and children to wear. This protocol paper describes a randomised controlled trial to evaluate whether long-term use of rigid wrist/hand orthoses (WHO) in children with CP, combined with usual multidisciplinary care, can prevent or reduce musculoskeletal impairments, including muscle stiffness/tone and loss of movement range, compared to usual multidisciplinary care alone.

METHODS/DESIGN: This pragmatic, multicentre, assessor-blinded randomised controlled trial with economic analysis will recruit 194 children with CP, aged 5-15 years, who present with flexor muscle stiffness of the wrist and/or fingers/thumb (Modified Ashworth Scale score ≥ 1). Children, recruited from treatment centres in Victoria, New South Wales and Western Australia, will be randomised to groups (1:1 allocation) using concealed procedures. All children will receive care typically provided by their treating organisation. The treatment group will receive a custom-made serially adjustable rigid WHO, prescribed for 6 h nightly (or daily) to wear for 3 years. An application developed for mobile devices will monitor WHO wearing time and adverse events. The control group will not receive a WHO, and will cease wearing one if previously prescribed. Outcomes will be measured 6 monthly over a period of 3 years. The primary outcome is passive range of wrist extension, measured with fingers extended using a goniometer at 3 years. Secondary outcomes include muscle stiffness, spasticity, pain, grip strength and hand deformity. Activity, participation, quality of life, cost and cost-effectiveness will also be assessed.

DISCUSSION: This study will provide evidence to inform clinicians, services, funding agencies and parents/carers of children with CP whether the provision of a rigid WHO to reduce upper limb impairment, in combination with usual multidisciplinary care, is worth the effort and costs.

TRIAL REGISTRATION: ANZ Clinical Trials Registry: U1111-1164-0572 .

[Free PMC Article](#)

PMCID: PMC4882829

PMID: 27230616 [PubMed - in process]

The Effects of Varying Ankle Foot Orthosis Stiffness on Gait in Children with Spastic Cerebral Palsy Who Walk with Excessive Knee Flexion.

Kerkum YL, Buizer AI, van den Noort JC, Becher JG, Harlaar J, Brehm MA

PLoS One. 2015 Nov 23;10(11):e0142878. doi: 10.1371/journal.pone.0142878. eCollection 2015.

INTRODUCTION: Rigid Ankle-Foot Orthoses (AFOs) are commonly prescribed to counteract excessive knee flexion during the stance phase of gait in children with cerebral palsy (CP). While rigid AFOs may normalize knee kinematics and kinetics effectively, it has the disadvantage of impeding push-off power. A spring-like AFO may enhance push-off power, which may come at the cost of reducing the knee flexion less effectively. Optimizing this trade-off between enhancing push-off power and normalizing knee flexion in stance is expected to maximize gait efficiency. This study investigated the effects of varying AFO stiffness on gait biomechanics and efficiency in children with CP who walk with excessive knee flexion in stance. Fifteen children with spastic CP (11 boys, 10±2 years) were prescribed with a ventral shell spring-hinged AFO (vAFO). The hinge was set into a rigid, or spring-like setting, using both a stiff and flexible performance. At baseline (i.e. shoes-only) and for each vAFO, a 3D-gait analysis and 6-minute walk test with breath-gas analysis were performed at comfortable speed. Lower limb joint kinematics and kinetics were calculated. From the 6-minute walk test, walking speed and the net energy cost were determined. A generalized estimation equation ($p < 0.05$) was used to analyze the effects of different conditions. Compared to shoes-only, all vAFOs improved the knee angle and net moment similarly. Ankle power generation and work were preserved only by the spring-like vAFOs. All vAFOs decreased the net energy cost compared to shoes-only, but no differences were found between vAFOs, showing that the effects of spring-like vAFOs to promote push-off power did not lead to greater reductions in walking energy cost. These findings suggest that, in this specific group of children with spastic CP, the vAFO stiffness that maximizes gait efficiency is primarily determined by its effect on knee kinematics and kinetics rather than by its effect on push-off power.

TRIAL REGISTRATION: Dutch Trial Register NTR3418.

PMCID: PMC4658111

PMID: 26600039 [PubMed - indexed for MEDLINE]

Stimulation cérébrale - Stimulation neurosensorielle

Deep brain stimulation in cerebral palsy: Challenges and opportunities.

Koy A, Timmermann L

Eur J Paediatr Neurol. 2016 May 27. pii: S1090-3798(16)30069-1. doi: 10.1016/j.ejpn.2016.05.015. [Epub ahead of print]

Cerebral palsy (CP) is the most common cause for acquired dystonia in childhood. Pharmacological treatment is often unsatisfactory and side effects are frequently dose-limiting. Data on outcome of DBS in paediatric patients with dyskinetic CP is very limited and heterogeneous. Reasons for the variability in responses are not entirely known yet. Interestingly, some CP-patients seem to improve subjectively on pallidal stimulation but without measurable changes in impairment scales. Besides dystonia scales, the use of sensitive age-dependent assessments tools is therefore reasonable to capture the full effect. As the course of disease duration as well as the age at operation seem to correlate with DBS outcome in patients with dystonia, DBS at an early stage of development might be beneficial for some of these patients. For the future, well-conducted trials as well as data collection in the international registry is of major importance to increase knowledge about DBS in CP patients, especially those implanted at a young age. Furthermore, selection criteria and guidelines or treatment standards are needed to improve the service for children with dyskinetic CP - especially in light of unsatisfactory medical treatment options. Copyright © 2016 European Paediatric Neurology Society. Published by Elsevier

Ltd. All rights reserved.

Science Infos Paralysie Cérébrale , juin 2016, FONDATION MOTRICE 67 rue Vergniaud 75013 Paris - tel +33 52 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

PMID: 27289260 [PubMed - as supplied by publisher]

Multiday Transcranial Direct Current Stimulation Causes Clinically Insignificant Changes in Childhood Dystonia: A Pilot Study.

Bhanpuri NH, Bertuccio M, Young SJ, Lee AA, Sanger TD

J Child Neurol. 2015 Oct;30(12):1604-15. doi: 10.1177/0883073815575369. Epub 2015 Mar 19.

Abnormal motor cortex activity is common in dystonia. Cathodal transcranial direct current stimulation may alter cortical activity by decreasing excitability while anodal stimulation may increase motor learning. Previous results showed that a single session of cathodal transcranial direct current stimulation can improve symptoms in childhood dystonia. Here we performed a 5-day, sham-controlled, double-blind, crossover study, where we measured tracking and muscle overflow in a myocontrol-based task. We applied cathodal and anodal transcranial direct current stimulation (2 mA, 9 minutes per day). For cathodal transcranial direct current stimulation (7 participants), 3 subjects showed improvements whereas 2 showed worsening in overflow or tracking error. The effect size was small (about 1% of maximum voluntary contraction) and not clinically meaningful. For anodal transcranial direct current stimulation (6 participants), none showed improvement, whereas 5 showed worsening. Thus, multiday cathodal transcranial direct current stimulation reduced symptoms in some children but not to a clinically meaningful extent, whereas anodal transcranial direct current stimulation worsened symptoms. Our results do not support transcranial direct current stimulation as clinically viable for treating childhood dystonia.

© The Author(s) 2015.

PMI: 25792428 [PubMed - indexed for MEDLINE]

Réalité virtuelle - Jeux video

Development and Reliability Evaluation of the Movement Rating Instrument for Virtual Reality Video Game Play.

Levac D, Nawrotek J, Deschenes E, Giguere T, Serafin J, Bilodeau M, Sveistrup H.

JMIR Serious Games. 2016 Jun 1;4(1):e9. doi: 10.2196/games.5528.

BACKGROUND: Virtual reality active video games are increasingly popular physical therapy interventions for children with cerebral palsy. However, physical therapists require educational resources to support decision making about game selection to match individual patient goals. Quantifying the movements elicited during virtual reality active video game play can inform individualized game selection in pediatric rehabilitation.

OBJECTIVE: The objectives of this study were to develop and evaluate the feasibility and reliability of the Movement Rating Instrument for Virtual Reality Game Play (MRI-VRGP).

METHODS: Item generation occurred through an iterative process of literature review and sample videotape viewing. The MRI-VRGP includes 25 items quantifying upper extremity, lower extremity, and total body movements. A total of 176 videotaped 90-second game play sessions involving 7 typically developing children and 4 children with cerebral palsy were rated by 3 raters trained in MRI-VRGP use. Children played 8 games on 2 virtual reality and active video game systems. Intraclass correlation coefficients (ICCs) determined intra-rater and interrater reliability. **RESULTS:** Excellent intrarater reliability was evidenced by ICCs of >0.75 for 17 of the 25 items across the 3 raters. Interrater reliability estimates were less precise. Excellent interrater reliability was achieved for far reach upper extremity movements (ICC=0.92 [for right and ICC=0.90 for left) and for squat (ICC=0.80) and jump items (ICC=0.99), with 9 items achieving ICCs of >0.70, 12 items achieving ICCs of between 0.40 and 0.70, and 4 items achieving poor reliability (close-reach upper extremity-ICC=0.14 for right and ICC=0.07 for left) and single-leg stance (ICC=0.55 for right and ICC=0.27 for left).

CONCLUSIONS: Poor video quality, differing item interpretations between raters, and difficulty quantifying the high-speed movements involved in game play affected reliability. With item definition clarification and further psychometric property evaluation, the MRI-VRGP could inform the content of educational resources for therapists by ranking games according to frequency and type of elicited body movements.

[Free Article](#)

PMID: 27251029 [PubMed]

Using Free Internet Videogames in Upper Extremity Motor Training for Children with Cerebral Palsy.

Sevick M, Eklund E, Mensch A, Foreman M, Standeven J, Engsborg J

Movement therapy is one type of upper extremity intervention for children with cerebral palsy (CP) to improve function. It requires high-intensity, repetitive and task-specific training. Tedium and lack of motivation are substantial barriers to completing the training. An approach to overcome these barriers is to couple the movement therapy with videogames. This investigation: (1) tested the feasibility of delivering a free Internet videogame upper extremity motor intervention to four children with CP (aged 8-17 years) with mild to moderate limitations to upper limb function; and (2) determined the level of intrinsic motivation during the intervention. The intervention used free Internet videogames in conjunction with the Microsoft Kinect motion sensor and the Flexible Action and Articulated Skeleton Toolkit software (FAAST) software. Results indicated that the intervention could be successfully delivered in the laboratory and the home, and pre- and post- impairment, function and performance assessments were possible. Results also indicated a high level of motivation among the participants. It was concluded that the use of inexpensive hardware and software in conjunction with free Internet videogames has the potential to be very motivating in helping to improve the upper extremity abilities of children with CP. Future work should include results from additional participants and from a control group in a randomized controlled trial to establish efficacy.

[Free Article](#)

PMID: 27338485 [PubMed]

Thérapie cellulaire Médecine régénérative

A Dichotomy of Information-Seeking and Information-Trusting: Stem Cell Interventions and Children with Neurodevelopmental Disorders.

Sharpe K, Di Pietro N, Jacob KJ, Illes J

Stem Cell Rev. 2016 Jun 10. [Epub ahead of print]

Parents and primary caregivers of children with Cerebral Palsy (CP) and Autism Spectrum Disorder (ASD) are faced with difficult treatment choices and management options for their children. The potential of stem cell technologies as an interventional strategy for CP and ASD has gained attention in the last decade. Information about these interventions varies in quality, resulting in a complex landscape for parent decision making for a child's care. Further complicating this landscape are clinics that advertise these interventions as a legitimate treatment for a fee. In this study, we surveyed individuals who considered taking their child with ASD or CP abroad for stem cell interventions on their use of different sources of stem cell related health information and their level of trust in these sources. Participants reported that while the Internet was their most frequent source of information, it was not well-trusted. Rather, information sources trusted most were researchers and the science journals in which they publish, other parents of children with CP and ASD, and healthcare providers. These findings highlight a dichotomy between information-seeking preferences and information-trusted sources. We discuss the challenges of health science communication and present innovative opportunities to increase communication with trusted and reliable sources as part of an integrated multi-pronged approach.

PMID: 27286955 [PubMed - as supplied by publisher]

Concise Review: Stem Cell Interventions for People With Cerebral Palsy: Systematic Review With Meta-Analysis.

Novak I, Walker K, Hunt RW, Wallace EM, Fahey M, Badawi N

Stem Cells Transl Med. 2016 May 31. pii: sctm.2015-0372. [Epub ahead of print]

Evidence for stem cells as a potential intervention for cerebral palsy is emerging. Our objective was to determine the efficacy and safety of stem cells for improving motor and cognitive function of people with cerebral palsy. Searches were conducted in October 2015 in CENTRAL, DARE, MEDLINE, and Cochrane Libraries. Randomized controlled trials and controlled clinical trials of stem cells for cerebral palsy were included. Two authors independently decided upon included trials, extracted data, quality, and risk of bias. The primary outcome was gross motor function. Secondary outcomes were cognitive function and adverse events (AEs). Effects were expressed as standardized mean differences (SMD) with 95% confidence intervals (CI), using a random-effects model. Five trials comprising 328 participants met inclusion criteria. Four cell types were studied: olfactory ensheathing, neural, neural progenitors, and allogeneic umbilical cord blood (UCBs). Transplantation procedures differed from central nervous system neurosurgical transplantation to intravenous/arterial infusion. Participants were followed short-term for only 6 months. Evidence of variable quality indicated a small statistically significant intervention effect from stem cells on

gross motor skills (SMD 1.27; 95% CI 0.22, 2.33), with UBCs most effective. There were insufficient and heterogeneous data to compare cognitive effects. Serious AEs were rare (n = 4/135 [3%] stem cells; n = 3/139 [2%] controls). Stem cells appeared to induce short-term improvements in motor skills. Different types of stem cell interventions were compared, meaning the data were heterogeneous and are a study limitation. Further randomized controlled trials are warranted, using rigorous methodologies. SIGNIFICANCE: Stem cells are emerging as a scientifically plausible treatment and possible cure for cerebral palsy, but are not yet proven. The lack of valid animal models has significantly hampered the scope of clinical trials. Despite the state of current treatment evidence, parents remain optimistic about the potential improvements from stem cell intervention and feel compelled to exhaust all therapeutic options, including stem cell tourism. Receiving unproven therapies from unvalidated sources is potentially dangerous. Thus it is essential that researchers and clinicians stay up to date. A systematic review and meta-analysis summarizing and aggregating current research data may provide more conclusive evidence to inform treatment decision making and help direct future research.

©AlphaMed Press.

PMID: 27245364 [PubMed - as supplied by publisher]

First Autologous Cord Blood Therapy for Pediatric Ischemic Stroke and Cerebral Palsy Caused by Cephalic Molding during Birth: Individual Treatment with Mononuclear Cells.

Jensen A, Hamelmann E.

Case Rep Transplant. 2016;2016:1717426. doi: 10.1155/2016/1717426. Epub 2016 Apr 30.

Intracranial laceration due to traumatic birth injury is an extremely rare event affecting approximately one newborn per a population of 4.5 million. However, depending on the mode of injury, the resulting brain damage may lead to lifelong sequelae, for example, cerebral palsy for which there is no cure at present. Here we report a rare case of neonatal arterial ischemic stroke and cerebral palsy caused by fetal traumatic molding and parietal depression of the head during delivery caused by functional cephalopelvic disproportion due to a "long pelvis." This patient was treated by autologous cord blood mononuclear cells (45.8 mL, cryopreserved, TNC 2.53×10^8) with a remarkable recovery. Active rehabilitation was provided weekly. Follow-up examinations were at 3, 18, 34, and 57 months. Generous use of neonatal head MRI in case of molding, craniofacial deformity, and a sentinel event during parturition is advocated to enhance diagnosis of neonatal brain damage as a basis for fast and potentially causative treatment modalities including autologous cord blood transplantation in a timely manner.

[Free PMC Article](#)

PMCID: PMC4867064

PMID: 27239361 [PubMed]

Involvement of Immune Responses in the Efficacy of Cord Blood Cell Therapy for Cerebral Palsy.

Kang M, Min K, Jang J, Kim SC, Kang MS, Jang SJ, Lee JY, Kim SH, Kim MK, An SA, Kim M

Stem Cells Dev. 2015 Oct 1;24(19):2259-68. doi: 10.1089/scd.2015.0074. Epub 2015 Jul 2.

This study evaluated the efficacy of umbilical cord blood (UCB) cell for patients with cerebral palsy (CP) in a randomized, placebo-controlled, double-blind trial and also assessed factors and mechanisms related to the efficacy. Thirty-six children (ages 6 months to 20 years old) with CP were enrolled and treated with UCB or a placebo. Muscle strength and gross motor function were evaluated at baseline and 1, 3, and 6 months after treatment. Along with function measurements, each subject underwent (18)F-fluorodeoxyglucose positron emission tomography at baseline and 2 weeks after treatment. Cytokine and receptor levels were quantitated in serial blood samples. The UCB group showed greater improvements in muscle strength than the controls at 1 (0.94 vs. -0.35, respectively) and 3 months (2.71 vs. 0.65) after treatment ($P < 0.05$). The UCB group also showed greater improvements in gross motor performance than the control group at 6 months (8.54 vs. 2.60) after treatment ($P < 0.01$). Additionally, positron emission tomography scans revealed decreased periventricular inflammation in patients administered UCB, compared with those treated with a placebo. Correlating with enhanced gross motor function, elevations in plasma pentraxin 3 and interleukin-8 levels were observed for up to 12 days after treatment in the UCB group. Meanwhile, increases in blood cells expressing Toll-like receptor 4 were noted at 1 day after treatment in the UCB group, and they were correlated with increased muscle strength at 3 months post-treatment. In this trial, treatment with UCB alone improved motor outcomes and induced systemic immune reactions and anti-inflammatory changes in the brain. Generally, motor outcomes were positively correlated with the number of UCB cells administered: a higher

number of cells resulted in better outcomes. Nevertheless, future trials are needed to confirm the long-term efficacy of UCB therapy, as the follow-up duration of the present trial was short.

PMID: 25977995 [PubMed - indexed for MEDLINE]

Preterm white matter brain injury is prevented by early administration of umbilical cord blood cells.

Li J, Yawno T, Sutherland A, Loose J, Nitsos I, Bischof R, Castillo-Melendez M, McDonald CA, Wong FY, Jenkin G, Miller SL

Exp Neurol. 2016 Jun 15. pii: S0014-4886(16)30182-0. doi: 10.1016/j.expneurol.2016.06.017. [Epub ahead of print]

Infants born very preterm are at high risk for neurological deficits including cerebral palsy. In this study we assessed the neuroprotective effects of umbilical cord blood cells (UCBCs) and optimal administration timing in a fetal sheep model of preterm brain injury. 50 million allogeneic UCBCs were intravenously administered to fetal sheep (0.7 gestation) at 12h or 5d after acute hypoxia-ischemia (HI) induced by umbilical cord occlusion. The fetal brains were collected at 10d after HI. HI (n=7) was associated with reduced number of oligodendrocytes (Olig2+) and myelin density (CNPase+), and increased density of activated microglia (Iba-1+) in cerebral white matter compared to control fetuses (P<0.05). UCBCs administered at 12h, but not 5d after HI, significantly protected white matter structures and suppressed cerebral inflammation. Activated microglial density showed a correlation with decreasing oligodendrocyte number (P<0.001). HI caused cell death (TUNEL+) in the internal capsule and cell proliferation (Ki-67+) in the subventricular zone compared to control (P<0.05), while UCBCs at 12h or 5d ameliorated these effects. Additionally, UCBCs at 12h induced a significant systemic increase in interleukin-10 at 10d, and reduced oxidative stress (malondialdehyde) following HI (P<0.05). UCBC administration at 12h after HI reduces preterm white matter injury, via anti-inflammatory and antioxidant actions.

Copyright © 2016. Published by Elsevier Inc.

PMID: 27317990 [PubMed - as supplied by publisher]

Douleur

Associations between recurrent musculoskeletal pain and visits to the family doctor (GP) and specialist multi-professional team in 74 Norwegian youth with cerebral palsy.

Ramstad K, Jahnsen R, Diseth TH

Child Care Health Dev. 2016 Jun 9. doi: 10.1111/cch.12366. [Epub ahead of print]

BACKGROUND: Musculoskeletal pain in cerebral palsy (CP) is common, but probably undertreated. The aim of the study was to explore if recurrent musculoskeletal pain (RMP) related to the CP condition was associated with visits to the family doctor [general practitioner (GP)] and specialist habilitation centre in youth with CP.

METHODS: Seventy-four youth with CP (mean age 16.5 years, 40 boys) from the same geographical area were assessed by clinical examination, semi-structured interview on pain (adolescent and parent together), the two questions on pain from the Child Health Questionnaire (parents only) and a structured interview on health care services. Gross Motor Function Classification System was level I 39%, level II 23%, level III 8% and levels IV and V 30%.

RESULTS: Thirty-five participants (47%) had visited their GP last year, and 49 (66%) had visited the specialist habilitation centre. The presence of RMP (n = 58; 78%) was not significantly associated with having visited the GP or the specialist habilitation centre. Still, in participants with RMP, increasing pain severity was associated with having visited the GP. Rest, massage, change of position and oral drugs were the most common measures taken to relieve RMP. Three adolescents with RMP did not take any measures to relieve pain.

CONCLUSION: Youth with RMP do take measures to relieve pain, but usually not in the direction of consulting the health care services available unless the pain is severe. Both youth with CP and their caregivers should be encouraged to discuss RMP with their professional network of care.

© 2016 John Wiley & Sons Ltd.

PMID: 27283955 [PubMed - as supplied by publisher]

Defining mild, moderate, and severe pain in young people with physical disabilities.

Miró J, de la Vega R, Solé E, Racine M Jensen MP, Gálan S, Engel JM

Disabil Rehabil. 2016 Jun 13:1-8. [Epub ahead of print]

PURPOSE: The purpose of this study is to identify the cutoffs that are most suitable for classifying average and worst pain intensity as being mild, moderate, or severe in young people with physical disabilities.

METHOD: Survey study using a convenience sample of 113 young people (mean age = 14.19; SD = 2.9; age range: 8-20) with physical disabilities (namely, spinal cord injury, cerebral palsy, spina bifida, limb deficiency (acquired or congenital), or neuromuscular disease).

RESULTS: The findings support a non-linear association between pain intensity and pain interference. In addition, the optimal cutoffs for classifying average and worst pain as mild, moderate, or severe differed. For average pain, the best cutoffs were the following: 0-3 for mild, 4-6 for moderate, and 7-10 for severe pain, whereas the optimal classification for worst pain was 0-4 for mild, 5-6 for moderate, and 7-10 for severe pain.

CONCLUSIONS: The findings provide important information that may be used to help make decisions regarding pain treatment in young people with disabilities and also highlight the need to use different cutoffs for classifying pain intensity in young people with disabilities than those that have been suggested for adults with chronic pain. Implications for rehabilitation Most clinical guidelines make treatment recommendations based on classifications of pain intensity as being mild, moderate, and severe that do not have a clear cut association with pain intensity ratings. Cutoffs that are deemed to be the most appropriate for classifying pain intensity as mild, moderate, and severe appear to depend, at least in part, on the pain population that is being studied and pain domain that is being used. This work helps to advance our knowledge regarding the meaning of pain intensity ratings in young people with physical disabilities. Clinicians can use this information to make empirically guided decisions regarding when to intervene in young people with disabilities and chronic pain.

PMID: 27291566 [PubMed - as supplied by publisher]

Hip health at skeletal maturity: a population-based study of young adults with cerebral palsy.

Wawrzuta J, Willoughby KL, Molesworth C, Ang SG, Shore BJ, Thomason P, Graham HK
Dev Med Child Neurol. 2016 Jun 17. doi: 10.1111/dmcn.13171. [Epub ahead of print]

AIM: We studied 'hip health' in a population-based cohort of adolescents and young adults with cerebral palsy to investigate associations between hip morphology, pain, and gross motor function.

METHOD: Ninety-eight young adults (65 males, 33 females) from the birth cohort were identified as having developed hip displacement (migration percentage >30) and were reviewed at a mean age of 18 years 10 months (range 15-24y). Hip morphology was classified using the Melbourne Cerebral Palsy Hip Classification Scale (MCPHCS). Severity and frequency of pain were recorded using Likert scales. Gross motor function was classified by the Gross Motor Function Classification System (GMFCS).

RESULTS: Hip pain was reported in 72% of participants. Associations were found between pain scores and both hip morphology and GMFCS. Median pain severity score for MCPHCS grades 1 to 4 was 2 (interquartile range [IQR] 1.0-3.0) compared to 7 (IQR 6.0-8.0) for grades 5 and 6 (severe subluxation or dislocation). Hip surveillance and access to surgery were associated with improved hip morphology and less pain.

INTERPRETATION: Poor hip morphology at skeletal maturity was associated with high levels of pain. Limited hip surveillance and access to surgery, rather than GMFCS, was associated with poor hip morphology. The majority of young adults who had access to hip surveillance, and preventive and reconstructive surgery, had satisfactory hip morphology at skeletal maturity and less pain.

© 2016 Mac Keith Press.

PMID: 27312016 [PubMed - as supplied by publisher]

Pain and hospital admissions are important factors associated with quality of life in non-ambulatory children.

Elema A, Zalmstra TA, Boonstra AM, Narayanan UG, Reinders-Messelink HA, V D Putten AA
Acta Paediatr. 2016 Jun 2. doi: 10.1111/apa.13493. [Epub ahead of print]

AIM: This was the first study to investigate the factors associated with health-related quality of life (HRQoL) in non-ambulatory children with cerebral palsy (CP), based on a HRQoL measure specifically developed for this population.

METHODS: The Dutch version of the Caregiver Priorities and Child Health Index of Life with Disabilities (CPCHILD-DV) was used to measure HRQoL. It was completed by 66 parents of 47 boys and 19 girls with non-ambulatory CP aged between five and 18 years with gross motor function classification system (GMFCS) levels of IV and V. Factors measured were the child's motor and cognitive impairments, comorbidities, pain, parents' education and

occupations and family structure. Multiple linear regression analyses were used to determine the significant factors and the relative contribution of these factors to the CPCHILD-DV scores.

RESULTS: The most important factors associated with poorer HRQoL scores were pain and hospital admissions in the previous six months. Other factors were: increased GMFCS level, feeding by gastrostomy tube, inability to communicate verbally, cognitive impairment, poor seizure control and higher parents' educational qualifications.

CONCLUSION: Pain and hospital admissions were the most important factors that were negatively associated with HRQoL in non-ambulatory children with CP between five to 18 years.

This article is protected by copyright. All rights reserved.

PMID: 27250697 [PubMed - as supplied by publisher]

Fatigue

Construction and validation of the fatigue impact and severity self-assessment for youth and young adults with cerebral palsy.

Brunton LK, Bartlett DJ

Dev Neurorehabil. 2016 Jun 17:1-6. [Epub ahead of print]

PURPOSE: The Fatigue Impact and Severity Self-Assessment (FISSA) was created to assess the impact, severity, and self-management of fatigue for individuals with cerebral palsy (CP) aged 14-31 years.

METHODS: Items were generated from a review of measures and interviews with individuals with CP. Focus groups with health-care professionals were used for item reduction. A mailed survey was conducted (n=163/367) to assess the factor structure, known-groups validity, and test-retest reliability.

RESULTS: The final measure contained 31 items in two factors and discriminated between individuals expected to have different levels of fatigue. Individuals with more functional abilities reported less fatigue ($p < 0.002$) and those with higher pain reported higher fatigue ($p < 0.001$). The FISSA was shown to have adequate test-retest reliability, intraclass correlation coefficient (ICC)(3,1)=0.74 (95% confidence interval [CI] 0.53-0.87).

CONCLUSIONS: The FISSA valid and reliable for individuals with CP. It allows for identification of the activities that may be compromised by fatigue to enhance collaborative goal setting and intervention planning.

PMID: 27315589 [PubMed - as supplied]

Autres Troubles /troubles concomitants

Assessment of Abilities and Comorbidities in Children With Cerebral Palsy.

Gabis LV, Tsubary NM, Leon O, Ashkenasi A, Shefer S

J Child Neurol. 2015 Oct;30(12):1640-5. doi: 10.1177/0883073815576792. Epub 2015 Apr 8.

This study examines major comorbidities in children with severe cerebral palsy and the feasibility of psychological tests for measuring abilities in a more impaired population. Eighty psychological evaluations of children with cerebral palsy aged 1.8 to 15.4 years (mean = 5.6) were analyzed. Major comorbid disorders were correlated with severity of motor disability. More than half of the cohort were diagnosed with severe cerebral palsy according to the Gross Motor Function Classification System. Multiple subtests were combined in order to assess the intellectual level. Normal intelligence was found in 22.5%, and 41.3% had moderate or severe intellectual impairment. Epilepsy occurred in 32.5% and attention-deficit hyperactivity disorder (ADHD) in 22.5%. Intellectual disability correlated with motor ability and with epilepsy. In a logistic regression model, epilepsy and motor ability score predicted 29.9% of IQ score variance. Intellectual impairment and epilepsy are common comorbidities. Subtests from different scales should be applied and interpreted with caution.

© The Author(s) 2015.

PMID: 25855688 [PubMed - indexed for MEDLINE]

Nutrition – Troubles nutritionnels

A Cross-sectional Survey of Growth and Nutritional Status in Children With Cerebral Palsy in West China.

Wang F, Cai Q, Shi W, Jiang H, Li N, Ma D, Wang Q, Luo R, Mu D

BACKGROUND: We describe the growth and nutritional status of children with cerebral palsy (2 to 18 years old) in West China and to explore the correlation between the nutritional status and age, gender, and gross and fine motor function.

METHODS: We performed a cross-sectional survey of children registered as having cerebral palsy in the China Disabled Persons' Federation branch in Chengdu. Growth (height and weight) and nutritional (body mass index) status were recorded. Gross Motor Function Classification System (GMFCS) and Manual Ability Classification System (MACS) were used to determine gross and fine motor function, respectively. The association between nutritional status and age, GMFCS and MACS levels was evaluated.

RESULTS: We enrolled 377 children (53.6% male), among whom 160 (42.4%) were stunting, 48 (12.7%) underweight, 81 (21.5%) thin, and 70 (18.5%) overweight and obese. Thinness was the main nutritional problem in older patients (12 to 18 years), whereas overweight and obesity were the major issues in younger patients (2 to 12 years). Growth deviation and malnutrition were significantly more prevalent in patients with severe motor impairments. A significant negative correlation was found between nutritional status and age, GMFCS and MACS levels, and between growth and GMFCS and MACS levels.

CONCLUSIONS: Growth abnormality is common in children with cerebral palsy. Malnutrition and overnutrition both exist in children with cerebral palsy. Characteristics at different age stages and motor functional levels should be taken into consideration in the management of growth and nutrition in this population.

Copyright © 2016 Elsevier Inc. All rights reserved.

PMID: 27268760 [PubMed - in process]

Serum Leptin as a Nutritional Biomarker in Children with Cerebral Palsy.

Amarase C, Weerasopone S, Osateerakun P, Honsawek S, Limpaphayom N.

Tohoku J Exp Med. 2016;239(2):139-46. doi: 10.1620/tjem.239.139.

Adequate nutrition is crucial for children with cerebral palsy (CCP). However, conventional nutritional assessments may be inadequate for defining undernourished CCP. Leptin, an adipocyte hormone controlling energy expenditure, could be a useful marker. Objectives of this cross-sectional analytic study were to explore correlations between serum leptin level and nutritional status, anthropometric measurements, and biochemical parameters in 86 CCP (aged 9 ± 2 years). Subscapular (SST) and triceps (TST) skinfold thicknesses, weight, and calculated height were obtained. Body mass index and weight-for-height (WH) Z-scores were calculated. Complete blood count and serum levels of leptin and albumin were collected. CCP were classified as undernourished if their WHZ was < -2 according to the World Health Organization criteria. Correlations between anthropometric measurements, biochemical data, and serum leptin levels were evaluated. From 86 CCP, 11 (12%) children were undernourished, and SST, hemoglobin, and hematocrit were significantly lower. Serum leptin levels of nourished and undernourished CCP were 5.4 ± 6.2 and 2.9 ± 1.6 ng/mL ($p < 0.001$), while the reported value from normal children was 4.9 ng/mL. Serum leptin levels demonstrated a significant correlation with SST and TST ($r = 0.83$ and 0.72 ; $p < 0.001$). Serum leptin was the only marker significantly correlated with WHZ ($r = 0.45$, $p < 0.001$) while adjusting for covariates. A serum leptin level of 2.2 ng/mL was the optimal cutoff point for defining adequate nutritional status ($WHZ \geq -2$). The measurement of serum leptin should be included in a care scheme of CCP especially during surgical evaluation.

PMID: 27265160 [PubMed - in process]

Sphère bucco-dentaire

Americans with Disabilities Act: Its Importance in Special Care Dentistry.

Surabian SR

Dent Clin North Am. 2016 Jul;60(3):627-47. doi: 10.1016/j.cden.2016.02.008.

This article focuses on understanding the Americans with Disabilities Act and developmental disabilities for health care providers in special care dentistry. Essential to this awareness is a comprehension of statutory and regulatory requirements and how state disability acts can be more rigorous in application. Developmental disabilities are re-examined in the context of the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition). Understanding of intellectual disability, epilepsy, autism spectrum disorder, and cerebral palsy is necessary because the

management of oral health considerations for special care patients has become ever more complex and indispensable.

Copyright © 2016 Elsevier Inc. All rights reserved.

PMID: 27264855 [PubMed - in process]

Bilateral transcervical submandibular gland excision for drooling: A study of the mature scar and long-term effects.

Delsing CP, Viergever T, Honings J van den Hoogen FJ.

Eur J Paediatr Neurol. 2016 May 11. pii: S1090-3798(16)30024-1. doi: 10.1016/j.ejpn.2016.05.001. [Epub ahead of print]

AIM: Several surgical techniques are available to treat drooling in neurologically disabled children and adolescents, with bilateral submandibular gland excision being the only transcervical procedure. External scars can be a reason to decline for this surgical approach. We investigated which factors influenced caregiver satisfaction by evaluating the long-term scar in relation to treatment outcome.

METHODS: We identified a historical cohort, in which all neurologically disabled patients who underwent bilateral submandibular gland excision for drooling between January 2009 and December 2013 were identified (n = 41). The Patient and Observer Scar Assessment Scale (POSAS) was used to evaluate observer and clinician satisfaction. All included patients were contacted by telephone and completed a digital questionnaire that included digital images of the scars.

RESULTS: Of the caregivers that responded the questionnaire 76% (19/25) were satisfied with the overall outcome. Twenty-four (96%) caregivers considered the scars acceptable. Caregiver satisfaction was not correlated to the appearance of scars, but was significantly correlated with the decrease in drooling severity on a visual analogue scale (p = 0.035) and decrease in lower respiratory tract infections (p = 0.042).

INTERPRETATION: The appearance of scars does not influence satisfaction after bilateral submandibular gland excision for drooling. As expected, satisfaction is correlated to the treatment outcome.

Copyright © 2016 European Paediatric Neurology Society. Published by Elsevier

Ltd. All rights reserved.

PMID: 27245880 [PubMed - as supplied by publisher]

Managing children with sialorrhoea (drooling): Experience from the first 301 children in our saliva control clinic.

Montgomery J, McCusker S, Lang K, Grosse S, Mace A, Lumley R, Kubba H.

Int J Pediatr Otorhinolaryngol. 2016 Jun;85:33-9. doi: 10.1016/j.ijporl.2016.03.010. Epub 2016 Mar 19.

OBJECTIVES: Sialorrhoea (drooling) is defined as the involuntary escape of saliva from the mouth. It is considered normal in young children but may cause social problems in older children. Sialorrhoea is frequently seen in children with cerebral palsy, with rates between 10% and 58% and in other neurodevelopmental diseases. Management of these children can be challenging and often requires an individual and stepwise approach. This is a large case series of children managed at the saliva control clinic in Glasgow, Scotland.

METHODS: A chart review of all children attending the saliva control clinic between 2006 and June 2012 was performed. This was to ensure that all children would have long term follow up (3 years minimum). Drooling severity was assessed on the child's first attendance at clinic, and at review following a treatment option, using the Teacher Drooling Scale (TDS).

RESULTS: The total number of children attending this clinic was 301, of which 274 had adequate records for inclusion in the study. 176 (64%) were male. The mean age was 7.3 (median 5) years. In terms of development 35 (13%) of children were developing normally and 50 (18%) had general developmental delay. There were 105 (38%) children with cerebral palsy. The final management of sialorrhoea in these children was simple reassurance and advice for 34 (12%), speech and language therapy for 62 (23%) anticholinergics in 90 patients (33%), botox for 30 (11%) and surgery for 71 (26%) children. The rate of non-tolerance of anticholinergics is 30%; 90 of the 298 children tried on anticholinergics had side effects leading to the treatment being stopped. The average teachers drooling score was 4.24 before clinic and 1.59 after clinic. Satisfactory results were achieved in 215 (78%) of children.

CONCLUSION: Our data illustrates that effective patient management requires all treatment options to be available, including speech therapy, medications, botulinum toxin and surgery. This is one of the larger case series of children attending a saliva control clinic.

Sialorrhea in children with cerebral palsy.

Dias BL, Fernandes AR, Filho HS.

J Pediatr (Rio J). 2016 Jun 6. pii: S0021-7557(16)30044-4. doi: 10.1016/j.jped.2016.03.006. [Epub ahead of print]

OBJECTIVE: To review the literature on sialorrhea in children with cerebral palsy.

SOURCE OF DATA: Non-systematic review using the keywords "sialorrhea" and "child" carried out in the PubMed(®), LILACS(®), and SciELO(®) databases during July 2015. A total of 458 articles were obtained, of which 158 were analyzed as they were associated with sialorrhea in children; 70 had content related to sialorrhea in cerebral palsy or the assessment and treatment of sialorrhea in other neurological disorders, which were also assessed.

DATA SYNTHESIS: The prevalence of sialorrhea is between 10% and 58% in cerebral palsy and has clinical and social consequences. It is caused by oral motor dysfunction, dysphagia, and intraoral sensitivity disorder. The severity and impact of sialorrhea are assessed through objective or subjective methods. Several types of therapeutic management are described: training of sensory awareness and oral motor skills, drug therapy, botulinum toxin injection, and surgical treatment.

CONCLUSIONS: The most effective treatment that addresses the cause of sialorrhea in children with cerebral palsy is training of sensory awareness and oral motor skills, performed by a speech therapist. Botulinum toxin injection and the use of anticholinergics have a transient effect and are adjuvant to speech therapy; they should be considered in cases of moderate to severe sialorrhea or respiratory complications. Atropine sulfate is inexpensive and appears to have good clinical response combined with good safety profile. The use of trihexyphenidyl for the treatment of sialorrhea can be considered in dyskinetic forms of cerebral palsy or in selected cases.

Copyright © 2016 Sociedade Brasileira de Pediatria. Published by Elsevier Editora Ltda. All rights reserved.

[Free Article](#)

PMID: 27281791 [PubMed - as supplied by publisher]

Troubles urinaires

[Preliminary study: Lower urinary tract dysfunction and anorectal disorders in children with cerebral palsy].

[Article in French]

Beaufils J, Damphousse M, Rauscent H, Heyman R, Bonan I

Prog Urol. 2015 Sep;25(10):565-75. doi: 10.1016/j.purol.2015.05.011. Epub 2015 Jun 23.

GOAL: Describe lower urinary tract dysfunction and anorectal disorders to children with cerebral palsy (CP), indicating their impact on quality of life.

MATERIALS: This was a prospective single-center study. A data collection was: type of PC, Gross Motor Function-Classification System (GMF-CS), mainstream education or not, Functional Independence Measure in children (MIF-kid), standardized vesicosphincteric symptoms and quality of life questionnaires (specific issue of impact sphincter dysfunction and generic scale Kidscreen-52).

RESULTS: Between January and March 2013, 19 children aged 5-17 years were included, including 16 into mainstream schooling. Of the 19, 16 had bladder and sphincter disorders: 14 urinary incontinence, 3 nycturies, 6 dysuria, 12 urgenturies, no urinary infection. Of the 14 urinary incontinence, 13 were in school. Of the 16 children enrolled, 5 were daytime fecal incontinence and 2 nocturnal fecal incontinence. Functional scores (GMF-CS and MIF-kid) children urinary incontinence were lower than those of children urinary continents ($P=0.04$ and 0.0007). Ten children had an impact of these disorders on quality of life. All were enrolled, eight (80%) in the mainstream.

CONCLUSION: The bladder and sphincter disorders were common in children with CP. They led to an impact on quality of life in more than half of the children studied, mostly educated in mainstream schools.

Copyright © 2015 Elsevier Masson SAS. All rights reserved.

PMID: 26116407 [PubMed - indexed for MEDLINE]

Risk of fall (RoF) intervention by affecting visual egocenter through gait analysis and yoked prisms.

Padula WV, Subramanian P, Spurling A, Jenness J

NeuroRehabilitation. 2015;37(2):305-14. doi: 10.3233/NRE-151263.

BACKGROUND: Following a neurologic event such as traumatic brain injury (TBI), cerebrovascular accident (CVA), and chronic neurological conditions including Parkinson's disease, multiple sclerosis, and cerebral palsy a shift in the visual midline (egocenter) can directly affect posture, balance and spatial orientation. As a consequence, this increases the risk of fall (RoF) and injury that imposes a major financial burden on the public health system.

OBJECTIVE: To determine if there is a statistically significant change in balance with the intervention of yoked prisms to reduce the risk of fall in subjects with neurological impairments.

METHODS: Ambulation of thirty-six subjects was evaluated on a pressure sensitive mat before and after intervention with yoked prisms. Changes in gait and balance were analyzed in the anterior-posterior (AP) and medial-lateral (ML) axes during ambulation.

RESULTS: T-tests for each measure comparing the difference-of-differences to a zero change at baseline returned statistically significant reductions in both AP ($p < 0.0001$; 95% CI: 1.368- 2.976) and ML ($p = 0.0002$; 95% CI: 1.472- 4.173) imbalances using specifically directed yoked prisms to correct the visual midline deviation.

CONCLUSION: These findings demonstrate that yoked prisms have the potential to provide a cost-effective means to restore the visual midline thereby improving balance, reduce RoF and subsequent injury.

PMID: 26484522 [PubMed - indexed for MEDLINE]

Use of prism adaptation in children with unilateral brain lesion: Is it feasible?

Riquelme I, Henne C, Flament B, Legrain V(4), Bleyenheuft Y(4), Hatem SM(5).

Res Dev Disabil. 2015 Aug-Sep;43-44:61-71. doi: 10.1016/j.ridd.2015.06.009. Epub 2015 Jul 8.

INTRODUCTION: Unilateral visuospatial deficits have been observed in children with brain damage. While the effectiveness of prism adaptation for treating unilateral neglect in adult stroke patients has been demonstrated previously, the usefulness of prism adaptation in a pediatric population is still unknown. The present study aims at evaluating the feasibility of prism adaptation in children with unilateral brain lesion and comparing the validity of a game procedure designed for child-friendly paediatric intervention, with the ecological task used for prism adaptation in adult patients.

METHODS: Twenty-one children with unilateral brain lesion randomly were assigned to a prism group wearing prismatic glasses, or a control group wearing neutral glasses during a bimanual task intervention. All children performed two different bimanual tasks on randomly assigned consecutive days: ecological tasks or game tasks. The efficacy of prism adaptation was measured by assessing its after-effects with visual open loop pointing (visuoproprioceptive test) and subjective straight-ahead pointing (proprioceptive test).

RESULTS: Game tasks and ecological tasks produced similar after-effects. Prismatic glasses elicited a significant shift of visuospatial coordinates which was not observed in the control group.

CONCLUSION: Prism adaptation performed with game tasks seems an effective procedure to obtain after-effects in children with unilateral brain lesion. The usefulness of repetitive prism adaptation sessions as a therapeutic intervention in children with visuospatial deficits and/or neglect, should be investigated in future studies.

Copyright © 2015 Elsevier Ltd. All rights reserved.

PMID: 26163480 [PubMed - indexed for MEDLINE]

Qualité de vie et rapport au monde

Environmental needs in childhood disability analysed by the WHO ICF, Child and Youth Version.

Illum NO, Bonderup M, Gradel KO.

Dan Med J. 2016 Jun;63(6). pii: A5238.

INTRODUCTION: The WHO has launched a common classification for disabilities in children, the International Classification of Functioning, Disability and Health, Child and Youth Version (ICF-CY). We wanted to determine

whether categories of the environmental (e) and the body functions (b) components of the classification could address environmental needs in children with different disorders and various disability severities.

METHODS: A set of 16 e categories and 47 b categories were selected and worded to best enable parents to describe children's everyday support needs and environmental influences through interviews in their own homes.

RESULTS: Of the 367 invited parents, 332 (90.5%) participated, providing data on children with spina bifida, spinal muscular atrophy, muscular disorders, cerebral palsy, visual impairments, hearing impairments, mental disability and disabilities following brain tumour treatment. The mean age of children across disabilities was 9.4 years (range: 1.0-15.9). The mean e code score was 35.7 (range: 4.0-64.0), and the mean b code score was 32.2 (range: 0.0-159.0). The most urgent needs as detected by qualifier 4 environmental categories scores were common among children with complex disorders and issues related to health professionals, legal services and health services.

CONCLUSIONS: Parents understand the environmental and body function components in a meaningful manner and the codes seem to be valid. Special emphasis should be given to environmental issues for children with more complex disabilities. There was no correlation between the severity of a disability and environmental issues, indicating that each child's needs were basically met, irrespective of disability severity.

FUNDING: partnership project § 16, 21, 31 administered by the Danish Health Authority.

TRIAL REGISTRATION: not relevant.

PMID: 27264942 [PubMed - in process]

Qualité de vie

Quality of life in young adults with cerebral palsy.

Jiang B, Walstab J, Reid SM, Davis E, Reddihough D

Disabil Health J. 2016 May 3. pii: S1936-6574(16)30045-0. doi: 10.1016/j.dhjo.2016.04.006. [Epub ahead of print]

BACKGROUND: Little is known about the quality of life (QOL) of young adults with cerebral palsy.

OBJECTIVE/HYPOTHESIS: This cross-sectional analysis compares the QOL of a cohort of young Australian adults with CP with a cohort of able-bodied peers to explore the relationship between QOL and impairments, functioning, and social participation.

METHODS: Young adults identified from the Victorian Cerebral Palsy Register were invited to complete a survey about QOL, gross motor function, independence in self-care, and social participation. QOL was assessed with the Quality of Life Instrument for Young Adults (YAQOL). A general population sample of young North American adults, who had completed the YAQOL was selected for comparison.

RESULTS: Surveys and consent forms were completed by 335 young adults or their proxies, an overall participation rate of 63% of those located. The mean age of the study participants was 24.7 [s.d = 2.8] years; 51% were male and 49% female. Two hundred and seven (62%) of the 335 participants self-reported their QOL. When compared with the general population sample, self-reporting participants had similar QOL scores for the social relationship and environmental context domains ($p > 0.05$), while QOL scores were lower for the physical health, psychological well-being, and role function domains ($p < 0.001$). There was no association between psychological well-being and variables related to body structure and gross motor function in young adults with CP.

CONCLUSIONS: Contrary to the assumption that young adults with severe CP have low psychosocial well-being, it is apparent that these individuals can have good psychosocial well-being regardless of their disability.

Copyright © 2016 Elsevier Inc. All rights reserved.

PMID: 27302534 [PubMed - as supplied by publisher]

Quality of Life of Children with Cystic Periventricular Leukomalacia – A Prospective Analysis with the Child Health Questionnaire-Parent Form 50.

Resch B, Mühlanger A, Maurer-Fellbaum U, Pichler-Stachl E, Resch E, Urlsberger B

Front Pediatr. 2016 May 17;4:50. doi: 10.3389/fped.2016.00050. eCollection 2016.

OBJECTIVE: Cystic periventricular leukomalacia (PVL) is associated with moderate to severe physical and mental handicaps in preterm infants. We hypothesized whether or not those handicaps were associated with a poorer quality of life (QOL) of affected children and their families compared to matched controls.

PATIENTS AND METHODS: All children with the diagnosis PVL collected from a local database of the Division of Neonatology of the Medical University of Graz, Austria, and born between 1997 and 2008 were included in the study

group. Preterm infants matched for gestational age, birth weight, year of birth, and gender without PVL served as controls. Selected perinatal data and neurological outcome were documented. The interview of the parents was conducted using the Child Health Questionnaire-Parent Form 50 (CHQ-PF50), German version. The CHQ-PF50 consists of 50 items divided over 11 multi-item scales and 2 single-item questions.

RESULTS: The CHQ-PF50 was answered by 21 parents of the study (26%) and 44 of the control (39%) group. Cases were diagnosed as having developmental delay, dystonia, strabismus, central visual impairment, seizures, and cerebral palsy (81 vs. 7%, $p < 0.001$) more common than controls. Analysis of the CHQ-PF 50 revealed significantly poorer results for cases regarding physical health (physical functioning: $p < 0.001$, physical social limitations: $p < 0.001$, and physical summary score: $p < 0.001$). Several psychosocial categories (behavior, mental health, and self-esteem) and the psychosocial summary score did not differ between groups. Only two categories (parental impact concerning time $p = 0.004$ and family activities: $p = 0.026$) revealed significantly poorer results in the cases as it was for the global category for health ($p = 0.009$).

CONCLUSION: Children with PVL had an overall poorer QOL regarding physical aspects. However, PVL was not generally associated with a poorer QOL regarding psychosocial aspects.

[Free PMC Article](#)

PMCID: PMC4869559

PMID: 27242979 [PubMed]

Vie quotidienne

Cognitive Orientation to daily Occupational Performance (CO-OP): A New Approach for Children with Cerebral Palsy.

Cameron D, Craig T, Edwards B, Missiuna C, Schwellnus H, Polatajko HJ

Phys Occup Ther Pediatr. 2016 Jun 9:1-16. [Epub ahead of print]

AIMS: The results of a small single-case study series suggested that Cognitive Orientation to daily Occupational Performance (CO-OP) may be a successful approach for children with cerebral palsy (CP). Therefore a pilot randomized controlled trial was conducted with the following research questions-is CO-OP a feasible approach to use with children with CP, what are the effects of CO-OP when compared to usual practice, and is a larger study warranted?

METHODS: 18 children between age 7 and 12 (nine in CO-OP group and nine in Current Usual Practice Approach (CUPA) group) received ten 1-hour sessions of intervention on average once per week at home. Primary outcome measures were the Canadian Occupational Performance Measure and the Performance Quality Rating Scale (PQRS). PQRS assessors were blind to group allocation and timing of assessment.

RESULTS: All children in the CO-OP group were able to learn the strategies and achieve their chosen goals, thus demonstrating the feasibility of the approach. Both approaches equally promoted skill acquisition and skill maintenance at follow-up. Effect sizes suggest that CO-OP may show some advantage for transfer and maintenance.

CONCLUSION: Based on these initial findings, further research is warranted. PMID: 27282077 [PubMed - as supplied by publisher]

Creating early opportunities to learn and move for infants with cerebral palsy.

Spittle A, Kwong A

J Physiother. 2016 Jun 9. pii: S1836-9553(16)30004-2. doi:10.1016/j.jphys.2016.05.002. [Epub ahead of print]

[Free Article](#)

PMID: 27292611 [PubMed - as supplied by publisher]

Parents' experience of undertaking an intensive cognitive orientation to daily occupational performance (CO-OP) group for children with cerebral palsy.

Jackman M, Novak I, Lannin N, Froude E

Disabil Rehabil. 2016 Jun 7:1-7. [Epub ahead of print]

PURPOSE: The purpose of this study was to explore the experience of parents of children with cerebral palsy (CP) who participated in an intensive cognitive orientation to daily occupational performance (CO-OP) group program addressing child chosen goals.

METHOD: Participants were six parents of children with CP who participated in a CO-OP upper limb task-specific training program. Parents participated in semi-structured interviews conducted via phone. A grounded theory approach was used. Interviews were transcribed verbatim and coded to identify categories and overarching themes of the parent experience of CO-OP.

RESULTS: The theory of CO-OP for children with CP was one of offering a unique and motivating learning experience for both the child and the parent, differing from other therapeutic approaches that families had previously been involved in. Five categories were identified: the unique benefits of CO-OP; the importance of intensity; the child's motivation; challenging the parent role; and the benefits and challenges of therapy within a group context.

CONCLUSION: Parents felt that CO-OP was a worthwhile intervention that leads to achievement of goals involving upper limb function and had the capacity to be transferred to future goals. Intensity of therapy and a child's motivation were identified as important factors in improvements. Further studies using quantitative research methods are warranted to investigate the benefits of CO-OP for children with neurological conditions. Implications for rehabilitation The cognitive orientation to daily occupational performance (CO-OP) is a promising upper limb cognitive motor training intervention for children with cerebral palsy. In a small sample, parents perceived that CO-OP leads to achievement of upper limb goals. Intensity of therapy, the child's motivation and the parents' ability to "step-back" were identified as important to the success of CO-OP.

PMID: 27269440 [PubMed - as supplied by publisher]

Teaching phonics to groups of middle school students with autism, intellectual disabilities and complex communication needs.

Ainsworth MK, Evmenova AS, Behrmann M, Jerome M.

Res Dev Disabil. 2016 Jun 16;56:165-176. doi: 10.1016/j.ridd.2016.06.001. [Epub ahead of print]

For students who have severe and multiple disabilities including intellectual disability, complex communication needs, physical and/or sensory disabilities, and autism, there are many barriers to literacy acquisition. The purpose of this study was to teach letter-sound correspondence to small groups of students with significant intellectual disabilities and comorbid communication disorders using the ALL (Accessible Literacy Learning) curriculum. The eight participants in this study, who ranged in age from 11 to 16 years of age and had primary diagnoses of cerebral palsy, autism, Rett syndrome, Down syndrome, and intellectual disability, were placed into four groups for instruction in phonics. The instruction followed the scripted lessons of ALL Curriculum. There was moderate evidence of the functional relation between the use of the ALL Curriculum and participants' progress towards letter-sound correspondence. Each group of participants demonstrated an increased performance in the treatment phase. The results of the visual analysis were supported by the statistically significant differences yielded by the randomization test analysis. Implications are discussed in terms of the importance of literacy instruction for students with all abilities and needs.

Copyright © 2016 Elsevier Ltd. All rights reserved.

PMID: 27318612 [PubMed - as supplied by publisher]

Activité physique - Sport

Exercise Intensity during Power Wheelchair Soccer.

Barfield JP, Newsome L, Malone LA

Arch Phys Med Rehabil. 2016 Jun 8. pii: S0003-9993(16)30239-8. doi: 10.1016/j.apmr.2016.05.012. [Epub ahead of print]

OBJECTIVE: The purpose of this study was to determine exercise intensity during power wheelchair soccer (PWS) among a sample of persons with mobility impairments.

DESIGN: Cross-sectional descriptive.

SETTING: On-site training facilities of multiple PWS teams.

PARTICIPANTS: Thirty participants with severe mobility impairments (MAge = 29.40 ± 15.51 yrs, MBMI = 24.11 ± 6.47, MPower Soccer Experience = 7.91 ± 3.93 yrs, MDisability Sport Experience = 12.44 ± 9.73 yrs) were recruited from multiple PWS teams.

INTERVENTIONS: Portable metabolic carts were used to collect oxygen consumption data during resting (REST) and gameplay (GAME) conditions.

MAIN OUTCOME MEASURE(S): Average VO₂ (expressed in METs) for REST and GAME and rate of perceived exertion (RPE) for GAME.

RESULTS: VO₂ increased from 1.35 ± 0.47 METs at REST to 1.81 ± 0.65 METs during GAME. This 34% increase in exercise intensity was significant (p < .01) and supported by a mean perceived exertion score of approximately 13 (Somewhat Hard).

CONCLUSIONS: Although not able to sustain an intensity associated with reduced secondary disease risk (i.e., 3 METs), the documented light-intensity exercise in the current study surpassed an intensity threshold associated with improved functional capacity and performance of daily living activities (i.e., 1.5 METs).

Copyright © 2016 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

PMID: 27288710 [PubMed - as supplied by publisher]

Leisure-Time Physical Activity in adults with Cerebral Palsy.

Usuba K, Oddson B, Gauthier A, Young NL.

Disabil Health J. 2015 Oct;8(4):611-8. doi: 10.1016/j.dhjo.2015.05.006. Epub 2015 May 30.

BACKGROUND: Cerebral Palsy (CP) is becoming more prevalent in the adult population, but there is limited information available regarding their Leisure-Time Physical Activity (LTPA).

OBJECTIVE: To investigate the self-reported frequency and LTPA participation patterns in adults with CP, compared to the Canadian general population (CGP).

METHODS: This was a cross-sectional, follow-up-survey of a cohort of 145 persons with CP. The primary outcome was the level of participation in LTPA. Questions were also posed about the motivations and self-reported barriers to LTPA participation. The survey results were compared to CGP estimates from the Canadian Community Health Survey (CCHS).

RESULTS: Fifty-four participants completed the survey, and 90% reported participation in at least one LTPA per week. On average, they reported participating in LTPA 7.3 ± 5.7 times/week. They also reported participating in an average of 4.1 ± 2.4 different types of LTPA. Walking, home-exercise, and swimming were the most frequently reported as a primary LTPA in the CP sample. These findings were comparable to those from the CGP. However, adults with CP were more likely to participate in home-exercise than the CGP (p < 0.05). More than 40% reported that the purpose of their LTPA was fitness or body maintenance and 56% indicated an interest in starting new activities. Various barriers were also reported.

CONCLUSIONS: Adults with CP frequently participated in LTPA. However, the majority of them are not achieving recommended daily physical activity levels. Also their LTPA habitually focuses on rehabilitative exercises and the diversity of LTPA is limited by several barriers.

Copyright © 2015 Elsevier Inc. All rights reserved.

PMID: 26141088 [PubMed - indexed for MEDLINE]

Paralympic athletes' perceptions of their experiences of sports-related injuries, risk factors and preventive possibilities.

Fagher K, Forsberg A, Jacobsson J, Timpka T, Dahlström Ö, Lexell J

Eur J Sport Sci. 2016 Jun 22:1-10. [Epub ahead of print]

Our knowledge of sports-related injuries in para-sport is limited and there are no data on how Paralympic athletes themselves perceive an injury. The aim of this qualitative study was to explore Paralympic athletes' perceptions of their experiences of sports-related injuries, risk factors and preventive possibilities. Eighteen Swedish Paralympic athletes with vision impairment, intellectual impairment, spinal cord injury, cerebral palsy, myelomeningocele, dysplasia and neuromuscular disorder, representing 10 different para-sports, were interviewed. The qualitative phenomenographic method was used to interpret the data. The analysis revealed nine categories of perceptions of experiences. The athletes perceived that their impairments were involved in the cause and consequential chains associated with a sports-related injury. Other categories that denoted and described these injuries were: sport overuse, risk behaviour, functional limitations, psychological stressors, the normalised pain, health hazards, individual possibilities to prevent sports-related injuries and unequal prerequisites. This qualitative study revealed

that Paralympic athletes' perceptions of their experiences of sports-related injuries are complex and multifactorial, and in several ways differ from able-bodied athletes. This needs to be considered in the sports health and safety work within the Paralympic Movement as well as in the design of future injury surveillance systems and preventive programmes.

PMID: 27329262 [PubMed - as supplied by publisher]

Sedentary and Active Time in Toddlers with and without Cerebral Palsy.

Oftedal S, Bell KL, Davies PS, Ware RS, Boyd RN.

Med Sci Sports Exerc. 2015 Oct;47(10):2076-83. doi: 10.1249/MSS.0000000000000653.

INTRODUCTION/PURPOSE: To evaluate differences in sedentary time and compare levels of physical activity and sedentary behavior to the Australian physical activity recommendations between toddlers with cerebral palsy (CP) according to functional capacity (Gross Motor Function Classification System [GMFCS]) and age-matched children with typical development (CTD).

METHODS: Children (2.4 ± 0.5 yr old) were split into CTD (n = 20), GMFCS I-II (n = 32), GMFCS III (n = 14), and GMFCS IV-V (n = 12) groups and wore a triaxial ActiGraph® for 3 d. Validated cut points were applied to identify sedentary and active time and the number and duration of sedentary bouts and breaks for each group. Analysis of variance (ANOVA) with post hoc testing, chi-square analysis, and the Fisher exact test were used to compare groups.

RESULTS: No difference between the CTD group (49%) and GMFCS I-II group (52%) was found for sedentary time as a percentage of wear time. The GMFCS III group was more sedentary than both these groups (62%, P < 0.05). The GMFCS IV-V group was more sedentary than all the other groups (74%, P < 0.05). The CTD group and GMFCS I-II group was more likely to spend 180 min or longer in active play on all 3 d than the GMFCS IV-V group (P < 0.05). The GMFCS IV-V group was more likely to have sedentary bouts ≥60 min or longer than all other groups (P < 0.05).

CONCLUSION: Differences in sedentary behavior between the CTD and mildly impaired children with CP (GMFCS I-II) are not evident in the toddler years. Children with moderate-to-severe functional impairment are progressively more sedentary and less likely to meet physical activity guidelines. Further research into the health implications of high levels of sedentary behavior in toddlers is required.

PMID: 26378944 [PubMed - indexed for MEDLINE]

Prise en charge et Accompagnement

Is a family-centred initiative a family-centred service? A case of a Conductive Education setting for children with cerebral palsy.

Schenker R, Parush S, Rosenbaum P, Rigbi A, Yochman A

Child Care Health Dev. 2016 Jun 9. doi: 10.1111/cch.12354. [Epub ahead of print]

BACKGROUND: From the moment a child is diagnosed as having cerebral palsy, families have to cope on a daily basis with the multifaceted challenges of life-long disability management. Family-centred service is embraced as a 'best practice' model because of accumulating evidence supporting its positive influence on parents and children's outcomes. Nevertheless, research comparing parent and provider perspectives on family-centred practices of educational service providers in education settings is scarce. The aims of this study were to compare the extent to which parents and conductors experience the service delivery in Tsad Kadima, the Association for Conductive Education in Israel, as being family-centred, as well as comparing parents' perception of different educational settings as being family-centred.

METHODS: Measurements of family-centeredness, the Israeli Measure of Processes of Care for families (MPOC-20) and for service providers (MPOC-SP), were administered to 38 teacher conductors and 83 families of children with cerebral palsy (aged 1-14), from different conductive educational settings.

RESULTS: Parents and conductors perceive Conductive Education service as being highly family centred in most domains, rating respectful and supportive care the highest and providing general information the lowest, thus indicating an area where improvements should be made. Parents perceived the service they receive to be more family-centred than conductor's perception about their own activities. In addition, educational setting (day care, pre-school and school) was found to be associated with parent's scores.

CONCLUSIONS: The current study, which is the first to examine family-centred service provision in a conductive special education setting, from the perspectives of both parents and conductors, provides significant evidence for

high-quality services in these settings.

© 2016 John Wiley & Sons Ltd.

PMID: 27283848 [PubMed - as supplied by publisher]



Empirical evaluation of circling interface with head-mounted mouse emulator users.

Ka HW, Simpson RC

Disabil Rehabil Assist Technol. 2016 Jun 13:1-11. [Epub ahead of print]

PURPOSE: To evaluate the performance of the circling interface, which is an alternative interaction method for selecting and manipulating on-screen objects based on circling the target, rather than pointing and clicking.

METHOD: We conducted empirical evaluations with actual head-mounted mouse emulator users from two different groups: individuals with spinal cord injury (SCI) and individuals with cerebral palsy (CP), comparing each group's performance and satisfaction level on pointing tasks with the circling interface to performance on the same tasks when using dwell-clicking software.

RESULTS: Across all operations, for both subjects with SCI and with CP, the circling interface showed faster performance than the dwell-clicking interface. For the single-click operation, the circling interface showed slower performance than dwell selection, but for both double-click and drag-and-drop operations, the circling interface produced faster performance. Subjects with CP required much longer time to complete the tasks compared to subjects with SCI. If errors caused by circling on an area with no target and unintentional circling caused by jerky movements and an abnormally tiny circle are automatically corrected by the circling interface, their performance accuracy with the circling interface outperformed existing solutions without a steep learning curve.

CONCLUSIONS: Circling interface can be used in conjunction with existing techniques and this kind of combined approach achieve more effective mouse use for some individuals with pointing problems. It is also expected to be useful for both computer access and augmentative communication software. Implications for Rehabilitation A circling interface will improve clinical practice by providing an alternative pointing method that does not require physically activating mouse buttons and is more efficient than dwell-clicking. Being used in conjunction with existing techniques, some individuals who are head mouse users can achieve more effective mouse use. The Circling interface can also work with AAC devices.

PMID: 27292928 [PubMed - as supplied by publisher]



LA FONDATION MOTRICE , Fondation de recherche sur la Paralyse cérébrale

67 rue Vergniaud 75013 Paris

Tel.: + 33 1 45 54 063 03

secretariat@lafondationmotrice.org

www.lafondationmotrice.org