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**Professor Nadia Badawi**

Macquarie Group Foundation Chair of Cerebral Palsy  
PO Box 560, Darlinghurst, New South Wales 2010 Australia

## Interventions and Management

### 1. Phys Occup Ther Pediatr. 2013 Jul 2. [Epub ahead of print]

#### **The Dimensions of Mastery Questionnaire in School-Aged Children with Congenital Hemiplegia: Test-Retest Reproducibility and Parent-Child Concordance.**

Miller L, Marnane K, Ziviani J, Boyd RN.

Queensland Cerebral Palsy and Rehabilitation Research Centre, School of Medicine, The University of Queensland, Royal Children's Hospital, Brisbane, Australia.

**Aim:** To examine internal consistency, test-retest reproducibility, and parent-child concordance of the Dimensions of Mastery Questionnaire 17.0 (DMQ) in school-aged children with congenital hemiplegia. **Method:** Forty-two children ( $8.24 \pm 2.38$  years, Manual Ability Classification System (MACS) I = 23, MACS II = 19) and their parents completed the DMQ, and a subset on two occasions 2-30 days apart ( $n = 27$ ). Cronbach's alpha ( $\alpha$ ), intraclass correlation coefficients (ICCs), standard error of measurement (SEM), and 95% limits of agreement were calculated. **Results:** Internal consistency for child self-report was variable ( $\alpha = 0.57-0.90$ ). Cronbach's alphas for parent proxy report were good ( $\alpha = 0.69-0.86$ ). Test-retest reproducibility for instrumental aspect (ICC = 0.86) and total motivation (ICC = 0.84) were excellent with subscales ranging from 0.70 to 0.91. The SEM for total motivation was 0.23 points. Parent-child concordance was poor across all scores (ICC = -0.04 to 0.42) with a large SEM (0.50-0.91). **Interpretation:** The DMQ parent report has good test-retest reproducibility for subscales, instrumental, and total motivation scores in school-aged children with congenital hemiplegia. Parent-child concordance was low highlighting differences in individual and contextual perspectives.

[PMID: 23815262](#) [PubMed - as supplied by publisher]

### 2. Res Dev Disabil. 2013 Jun 26;34(9):2884-2889. doi: 10.1016/j.ridd.2013.05.008. [Epub ahead of print]

#### **Effects of self-controlled feedback on learning of a throwing task in children with spastic hemiplegic cerebral palsy.**

Hemayattalab R, Arabameri E, Pourazar M, Ardakani MD, Kashefi M.

Department of Physical Education and Sport Sciences, University of Tehran, Kargar Street, Tehran, Iran.

The purpose of this study was to examine the effect of self-controlled feedback on learning a throwing task in

children with spastic hemiplegic cerebral palsy (SHCP). In order to achieve the research objectives, using a semi-experimental method, 20 children with SHCP (7-12 years old) were selected from special schools in Tehran, Iran. After showing the participants how to do the throwing task, a pre-test with 10 trials was conducted to homogenize the participants. Then, they were randomly assigned to two groups (self-control group and yoked group) to be examined in acquisition, retention, and transfer phases. Children in self-control group requested feedback when necessary during the acquisition phase. In contrast, participants in yoked-group replicated the feedback schedules of their counterparts in self-control group without any choice. A multivariate analysis of variance (MANOVA) was performed to analyze the data. Based on the results, a significant difference was not found between the self-control and yoked-group in acquisition phase ( $F=.538$ ,  $p<.473$ ). However, there was a significant difference between the two groups in retention ( $F=11.72$ ,  $p<.003$ ) and transfer ( $F=6.74$ ,  $p<.018$ ) phases. Thus, based on the better results obtained in the self-control condition, this type of feedback can be used in physiotherapy programs related to children with CP to improve their motor skills and independence movements.

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[PMID: 23810928](#) [PubMed - as supplied by publisher]

**3 . Res Dev Disabil. 2013 Jun 28;34(9):3014-3028. doi: 10.1016/j.ridd.2013.05.047. [Epub ahead of print]**

**Precision grip control, sensory impairments and their interactions in children with hemiplegic cerebral palsy: A systematic review.**

Bleyenheuft Y, Gordon AM.

Institute of Neuroscience, Université catholique de Louvain, Belgium. Electronic address: [yannick.bleyenheuft@uclouvain.be](mailto:yannick.bleyenheuft@uclouvain.be).

Children with hemiplegic cerebral palsy (HCP) exhibit long-term functional deficits. One of the most debilitating is the loss of prehension since this may impair functional independence. This loss of prehension could be partly due to sensory deficits. Identifying the underlying causes of prehension deficits and their potential link with sensory disorders is important to better adapt neurorehabilitation. Here we provide an overview of precision grip and sensory impairments in individuals with HCP, and the relation between them, in order to determine whether the sensory impairments influence the type and magnitude of deficits as measured by studies of prehensile force control. Pubmed and Scopus databases were used to search studies from 1990 to 2012, using combinations of the following keywords: fingertip force; grip force; precision grip; sensory deficit; sensory impairment; tactile discrimination; with cerebral palsy. Of the 190 studies detected through the systematic search; 38 were finally included in the systematic part of this review. This review shows that sensory deficits are common and are likely underestimated using standard clinical assessments in HCP. Some studies suggest these deficits are the basis of predictive motor control impairments in these individuals. However, children with HCP retain some ability to use predictive control, even if it is impaired in the more affected hand. Intensive practice and initial use of the less affected hand, which has only subtle sensory deficits, has been shown to remediate impairments in anticipatory motor control during subsequent use of the more affected hand. Implications for motor and sensory rehabilitation of individuals with HCP are discussed.

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**4. Clin Rehabil. 2013 Jul 1. [Epub ahead of print]**

**Modified constraint-induced movement therapy versus intensive bimanual training for children with hemiplegia - a randomized controlled trial.**

Deppe W, Thuemmler K, Fleischer J, Berger C, Meyer S, Wiedemann B.

Neurological Rehabilitation Centre for Children and Adolescents, Klinik Bavaria Kreischa, Kreischa/Dresden, Germany.

**Objective:** To clarify whether modified constraint-induced movement therapy provides greater improvement than intensive bimanual training both for motor functions and spontaneous use of the paretic arm and hand in everyday life activities. **Design:** Randomized controlled, single-blind trial. **Setting:** Inpatient paediatric rehabilitation clinic. **Subjects:** Forty-seven children with unilateral cerebral palsy or other non-progressive hemiplegia (aged 3.3-11.4 years) were randomly assigned to either a modified constraint-induced movement programme (kid-CIMT) or intensive bimanual training. **Interventions:** Patients in the kid-CIMT group received 60 hours of unilateral constraint-induced and 20 hours of bimanual training over four weeks. Patients in the bimanual treatment group received 80 hours of bimanual training over four weeks. **Main outcome measures:** Melbourne Assessment of Unilateral Upper Limb Function and Assisting Hand Assessment. **Results:** Modified constraint-induced therapy provided a significantly better outcome for isolated motor functions of the paretic arm than bimanual training (gain in Melbourne Assessment, percent score: 6.6 vs. 2.3,  $P=0.033$ ). Regarding spontaneous use both methods led to similar improvement (gain in Assisting Hand Assessment, percent score: 6.2 vs. 4.6,  $P=0.579$ ). More-disabled children showed greater improvement than less-disabled ones (correlation with Assisting Hand Assessment pretreatment score  $r = -0.40$ ). Age did not affect treatment outcome. **Conclusions:** Modified constraint-induced movement therapy can improve isolated functions of the hemiplegic arm better than intensive bimanual training, but regarding spontaneous hand use in everyday life both methods lead to similar improvement. Improvements are generally greater in more impaired children. Age does not affect outcome.

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**5. BMJ Case Rep. 2013 Jun 27;2013. pii: bcr2013010337. doi: 10.1136/bcr-2013-010337.**

**Bilateral knee extensor disruption in severe crouch gait.**

Elhassan Y, Kiernan D, Lynch T, O'Brien T.

Gait Laboratory, Central Remedial Clinic, Dublin, Ireland.

Crouch gait is one of the most troublesome abnormal gait patterns in ambulant patients with spastic diplegic cerebral palsy (CP). Although CP is a non-progressive condition, crouch gait can result in knee extensor disruption (KED) causing deterioration or cessation of ambulation. Diagnosis of KED in crouch gait is often overlooked. We report a seminal case of a 28-year-old active woman with diplegic CP with severe crouch gait who was referred for gait analysis due to subjective decreased walking speed and endurance. Gait analysis showed kinematic features typical of KED and radiology confirmed the diagnosis.

[PMID: 23814213](#) [PubMed - in process]

**6. Gait Posture. 2013 Jun 27. pii: S0966-6362(13)00267-1. doi: 10.1016/j.gaitpost.2013.05.031. [Epub ahead of print]**

**The relationship between clinical measurements and gait analysis data in children with cerebral palsy.**

Domagalska M, Szopa A, Syczewska M, Pietraszek S, Kidoń Z, Onik G.

Faculty of Health Sciences, Medical University of Silesia, Katowice, Poland. Electronic address: mdomagalska@sum.edu.pl.

Spasticity is a common impairment that interferes with motor function (particularly gait pattern) in children with cerebral palsy (CP). Gait analysis and clinical measurements are equally important in evaluating and treating gait disorders in children with CP. This study aimed to explore the relationship between the spasticity of lower extremity muscles and deviations from the normal gait pattern in children with CP. Thirty-six children with spastic CP (18 with spastic hemiplegia [HS] and 18 with spastic diplegia [DS]), ranging in age from 7 to 12 years, participated in the study. The children were classified as level I ( $n=24$ ) or level II ( $n=12$ ) according to the Gross Motor Function Classification System. Spasticity levels were evaluated with the Dynamic Evaluation of Range of Motion (DAROM) using the accelerometer-based system, and gait patterns were evaluated with a three dimensional gait analysis using the Zebris system (Isny, Germany). The Gillette Gait Index (GGI) was calculated from the gait data. The results show that gait pathology in children with CP does not depend on the static and dynamic contractures of hip and knee flexors. Although significant correlations were observed for a few clinical measures with the gait data

(GGI), the correlation coefficients were low. Only the spasticity of rectus femoris showed a fair to moderate correlation with GGI. In conclusion, the results indicate the independence of the clinical evaluation and gait pattern and support the view that both factors provide important information about the functional problems of children with CP.

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#### 7. Clin Orthop Relat Res. 2013 Jun 28. [Epub ahead of print]

##### **CORR Insights®: Does Proximal Rectus Femoris Release Influence Kinematics In Patients With Cerebral Palsy and Stiff Knee Gait?**

Chambers HG.

Department of Orthopaedics, Rady Children's Hospital, San Diego, 3030 Children's Way, San Diego, CA, 92123-4228, USA, [hchambers@chsd.org](mailto:hchambers@chsd.org).

[PMID: 23813181](#) [PubMed - as supplied by publisher]

#### 8. Gait Posture. 2013 Jun 26. pii: S0966-6362(13)00234-8. doi: 10.1016/j.gaitpost.2013.05.004. [Epub ahead of print]

##### **Muscle fatigue during repetitive voluntary contractions: A comparison between children with cerebral palsy, typically developing children and young healthy adults.**

Eken MM, Dallmeijer AJ, Houdijk H, Doorenbosch CA.

Department of Rehabilitation Medicine, MOVE Research Institute, VU University Medical Centre, Amsterdam, The Netherlands; Department of Research and Development, Rehabilitation Centre Heliomare, Wijk aan Zee, The Netherlands. Electronic address: [m.eken@vumc.nl](mailto:m.eken@vumc.nl).

**AIM:** To combine peak torque and EMG analyses to investigate the hypothesis that 1) children with cerebral palsy (CP) have lower muscle fatigability than typically developing children (TD) and whether 2) muscle fatigue correlates with muscle strength. **METHODS:** Seven CP children, eight TD children and ten young healthy adults (YHA) performed an all-out fatigue test of 35 maximal concentric knee extension and flexion contractions on an isokinetic dynamometer. Angular velocity was set at 60°/s. Peak torque (PT) was determined per repetition and either normalized to bodyweight or maximum voluntary torque. Surface-EMG of quadriceps and hamstring muscles was measured to obtain changes in median frequency (EMG-mf) and smooth rectified EMG amplitude per contraction. **RESULTS:** Decline in PT differed between all groups for extensors and flexors, where YHA showed the largest decline and CP children the smallest decline over the course of the test. YHA showed a larger decline in EMG-mf of all quadriceps and hamstrings than TD and CP children, while TD children showed a larger decline in EMG-mf of m.rectus femoris and m.vastus lateralis than CP children. **INTERPRETATION:** Results confirm that children with CP show lower fatigability than TD children and that the lower fatigability coincides with lower maximal muscle strength.

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**9. J Child Orthop. 2012 Jul;6(3):229-35. doi: 10.1007/s11832-012-0405-3. Epub 2012 Jun 8.**

**Comparison of hamstring lengthening with hamstring lengthening plus transfer for the treatment of flexed knee gait in ambulatory patients with cerebral palsy.**

Feng L, Patrick Do K, Aiona M, Feng J, Pierce R, Sussman M.

Shriners Hospitals for Children, Rm 2108, Building 11, Wanghai Road, Xiamen, 361008 Fujian People's Republic of China.

**PURPOSE:** Children with spastic diplegic and hemiplegic cerebral palsy frequently ambulate with flexed knee gait. There has been concern that hamstring lengthening used to treat this problem may weaken hip extension. This study evaluates the primary outcome of hamstring transfer plus lengthening in comparison with traditional hamstring lengthening in treating flexed knee gait in ambulatory patients with cerebral palsy. **METHODS:** A total of 47 children (67 lower limbs) ranging in age from 5 to 17 years old were included in this study. All subjects underwent a variety of additional surgeries at the time of the hamstring surgery as part of a multilevel treatment plan. All patients who met the inclusion criteria were divided into two groups, the hamstring lengthening alone group (HSL) and the hamstring transfer plus lengthening group (HST). Full gait analysis studies were done for all subjects pre-operatively and 1 year post-operatively. **RESULTS:** There were 25 patients (35 limbs) in the HSL group and 22 patients (32 limbs) in the HST group. There was no significant difference in age, gender, or the time from surgery to post-operative gait analysis between groups. On physical examination, both HSL and HST groups showed improvement in passive knee extension, popliteal angle, and straight leg raise. Maximum knee extension in stance phase was improved in both groups. The maximum hip extension in late stance phase was significantly improved only in the HST group. The peak hip extension power in stance phase showed significant improvement only in the HST group and a significant decrease for the HSL group. **CONCLUSIONS:** The findings of this study demonstrated that both the HSL and HST procedures resulted in similar amounts of improvement in passive range of motion of the knee, as well in knee extension in stance during gait at 1 year post-operatively. However, with the HST procedure, there was better preservation of hip extension power and improved hip extension in stance. The HST procedure should be considered when hamstring surgery is performed.

[PMID: 23814623](#) [PubMed] [PMCID: PMC3400004](#)

**10. J Child Orthop. 2012 Jul;6(3):217-27. doi: 10.1007/s11832-012-0413-3. Epub 2012 Jun 20.**

**Pes planovalgus deformity surgical correction in ambulatory children with cerebral palsy.**

Kadhim M, Holmes L Jr, Church C, Henley J, Miller F.

Department of Orthopaedic Surgery, Alfred I. duPont Hospital for Children, Wilmington, DE 19803 USA.

**PURPOSE:** Planovalgus foot deformity is common in diplegic and quadriplegic patients. Surgery is the definitive treatment to restore the alignment of the talus, calcaneus, and navicular bones. We aimed, in the current study, to compare the effectiveness of subtalar fusion and calcaneal lengthening, and to assess the recurrence in ambulatory children with cerebral palsy. **METHODS:** This is a retrospective study of 78 patients (138 feet diagnosed with planovalgus deformity) who underwent surgical correction using subtalar fusion or calcaneal lengthening. Range of motion, radiographic indices, kinematic, and pedobarographic data were used to examine the deformity and the outcome of surgery. A repeated measures analysis of variance (ANOVA) was used to test the study hypothesis. **RESULTS:** Most of the patients were diplegic (87.2 %) and the mean age at surgery was  $11.9 \pm 2.9$  years (range from 4.7 to 18.3 years), with a mean follow-up of  $5 \pm 4.4$  years (range from 1 to 15.4 years). Sixty-three feet were treated with calcaneal lengthening, while 75 were treated with subtalar fusion. The feet treated with subtalar fusion were more severe preoperatively. However, both surgery groups showed improvement postoperatively. Among 12 cases of recurrence, medial column fusion was the main surgery performed to correct the deformity. **CONCLUSIONS:** Surgery is effective in the treatment of planovalgus deformity in ambulatory children with cerebral palsy. Severe and rigid planovalgus feet can be treated effectively with subtalar fusion. Feet with milder deformity show good results, with calcaneal lengthening. Surgery provides good correction in young patients, but there is a higher recurrence rate.

[PMID: 23814622](#) [PubMed] [PMCID: PMC3400002](#)

**11. J Korean Neurosurg Soc. 2013 Apr;53(4):223-7. doi: 10.3340/jkns.2013.53.4.223. Epub 2013 Apr 30.**

**Surgical outcomes and complications after occipito-cervical fusion using the screw-rod system in craniocervical instability.**

Choi SH, Lee SG, Park CW, Kim WK, Yoo CJ, Son S.

Department of Neurosurgery, Gachon University, Gil Hospital, Incheon, Korea.

**OBJECTIVE:** Although there is no consensus on the ideal treatment of the craniocervical instability, biomechanical stabilization and bone fusion can be induced through occipito-cervical fusion (OCF). The authors conducted this study to evaluate efficacy of OCF, as well as to explore methods in reducing complications. **METHODS:** A total of 16 cases with craniocervical instability underwent OCF since the year 2002. The mean age of the patients was 51.5 years with a mean follow-up period of 34.9 months. The subjects were compared using lateral X-ray taken before the operation, after the operation, and during last follow-up. The Nurick score was used to assess neurological function pre and postoperatively. **RESULTS:** All patients showed improvements in myelopathic symptoms after the operation. The mean preoperative Nurick score was 3.1. At the end of follow-up after surgery, the mean Nurick score was 2.0. After surgery, most patients' posterior occipito-cervical angle entered the normal range as the pre operation angle decreased from 121 to 114 degree. There were three cases with complications, such as, vertebral artery injury, occipital screw failure and wound infection. In two cases with cerebral palsy, occipital screw failures occurred. But, reoperation was performed in one case. **CONCLUSION:** OCF is an effective method in treating craniocervical instability. However, the complication rate can be quite high when performing OCF in patients with cerebral palsy, rheumatoid arthritis. Much precaution should be taken when performing this procedure on high risk patients.

[PMID: 23826478](#) [PubMed] [PMCID: PMC3698232](#)

**12. Int J Sports Med. 2013 Jul;34(7):667. doi: 10.1055/s-0033-1349099. Epub 2013 Jul 3.**

**Aerobic training in children with cerebral palsy.**

Nsenga AL, Shephard RJ, Ahmaidi S.

UFR-STAPS, Université de Picardie, AMIENS, France.

[PMID: 23824988](#) [PubMed - in process]

**13. Cien Saude Colet. 2013 Jul;18(7):2075-84.**

**Evaluation of a program of application of the botulinum toxin type A in children with cerebral palsy in Vale do Jequitinhonha [Article in Portuguese]**

Silva GF, Teles MC, Santos SA, Ferreira FO, Almeida KM, Camargos AC.

The scope of this study was to evaluate the effects of a public program of application of botulinum toxin type A (BoNT-A) in terms of muscle spasticity, range of motion, quality of gait, functional independence and quality of life of children and adolescents with cerebral palsy (CP). A quasi-experimental study was conducted with 14 children with CP to evaluate the effects of three applications of BoNT-A, at intervals of three months. Children were assessed using the Modified Ashworth Rating Scale, the Manual Goniometer, the Physician Rating Scale, the Pediatric Evaluation of Disability Inventory (PEDI) and the Caregiver Questionnaire (CQ). There was a reduction of spasticity, an increase in the range of motion, an improvement of the functional abilities of self-care and mobility of PEDI and the areas of personal care, comfort and interaction/communication with the CQ. The BoNT-A application program for children and adolescents with CP, conducted in a public rehabilitation service in the Jequitinhonha Valley, was effective for the targeted population.

[PMID: 23827912](#) [PubMed - in process]

**14. Anesteziol Reanimatol. 2013 Jan-Feb;(1):45-8.****Peripheral regional block role in orthopedics in pediatric patients with cerebral palsy [Article in Russian]**

[No authors listed]

Haemodynamics of 58 Pediatric patients with cerebral palsy was studied during combined anaesthesia based on sevoflurane and peripheral nerve block. Sevoflurane and peripheral nerve block with infusion support 14-15 ml/kg/hr provide stable cardiac output during orthopedic surgeries in Pediatric patients with cerebral palsy. Excessive arterial hypotension and total peripheral vascular resistance decrease were registered in older patients as results of more pronounced vascular effect of anaesthetics in patients with decreased adaptive-compensatory possibilities and insufficient infusion support. The proposed anaesthesia method provides adequate intraoperative analgesia, fast recovery and comfortable postoperative period.

[PMID: 23808254](#) [PubMed - in process]

**15. Vopr Kurortol Fizioter Lech Fiz Kult. 2013 May-Jun;(3):36-40.****Estimation of the efficacy of inertialess exercise machines used for the rehabilitation of adolescents presenting with pediatric cerebral palsy [Article in Russian]**

[No authors listed]

The objective of the present study was to estimate the role of the heyvus training machine as a tool for enhancing the effectiveness of combined rehabilitation of the adolescent patients suffering from spastic diplegia cerebral paralysis. The mechanisms of action of this treatment on the clinical manifestations of compromised statics and voluntary movements have been elucidated.

[PMID: 23819415](#) [PubMed - in process]

**16. Chin J Integr Med. 2013 Jul;19(7):505-9. doi: 10.1007/s11655-013-1504-9. Epub 2013 Jul 2.****Clinical observation on treatment of clearing the governor vessel and refreshing the mind needling in neural development and remediation of children with cerebral palsy.**

Liu ZH, Qi YC, Pan PG, Ma MM, Qian XG, Fu WJ.

Cerebral Palsy Rehabilitation Center of Nanhai Maternity and Children Hospital Affiliated to Guangzhou University of Chinese Medicine, Foshan, Guangdong Province, 528200, China, Lzh1958424@163.com.

**OBJECTIVE:** To investigate the effects of clearing the Governor Vessel and refreshing the mind needling in neural development and remediation of children with cerebral palsy. **METHODS:** A total of 200 cases of children with cerebral palsy were randomly assigned to the treatment group (100 patients) and the control group (100 patients). The treatment group was given the combined therapy of acupuncture and rehabilitation training, and the chosen acupoints were 13 points of the Governor Vessel, Shenshu (BL 23), Taixi (KI 3), Yanglingquan (GB 34), Zusanli (ST 36) and Sanyinjiao (SP 6), and points of refreshing the mind were also selected, which included puncturing Shenting (GV 24) toward Qianding (GV 21), puncturing Qianding (GV 21) toward Baihui (GV 20), puncturing Baihui (GV 20) toward Naohu (GV 17) and Sishencong (Ex-HN 1). The control group was only treated with rehabilitation training. A contrastive analysis of the therapeutic effect between acupuncture combined with rehabilitation training and rehabilitation training alone was made after a treatment course of 3 months. The Gross Motor Function Measure (GMFM) and Beijing Gesell Developmental Scale were adopted to assess the neural development and rehabilitation outcomes of the two groups. In addition, skull CT/MRI was adopted to evaluate the plerosis of injured cerebral nerve after treatment. **RESULTS:** The total effective rate in treatment group was 87% (87/100), significantly higher than the 55% (55/100) in the control group. The children's development quotient (DQ) tested by Gesell Developmental Scale and scores tested by GMFM in the treatment group were obviously higher than those in the control group ( $P < 0.01$ ). The improving and curing rates presented by skull CT/MRI in the treatment group were higher than those in the control group ( $P < 0.01$ ). **CONCLUSIONS:** Clearing the Governor Vessel and refreshing the mind needling could accelerate the recovery of injured brain nerve and the reconstruction of brain

function. The acupuncture therapy could ameliorate both the motor development and cognitive development. On the other hand, the forward curative effect of acupuncture combined with rehabilitation training was significantly better than the rehabilitation training alone.

[PMID: 23818202](#) [PubMed - in process]

**17. J Rehabil Med. 2013 Jul 4. doi: 10.2340/16501977-1185. [Epub ahead of print]**

**Cardiovascular disease risk in adults with spastic bilateral cerebral palsy.**

Slot WM, Roebroek ME, Nieuwenhuijsen C, Bergen MP, Stam HJ, Burdorf A, Berg-Emons RJ.

Rijndam Rehabilitation Centre Westersingel 300, NL-3015 LJ Rotterdam, The Netherlands.  
w.vanderslot@erasmusmc.nl.

Objective: To explore: (i) cardiovascular disease risk factors and the 10-year clustered risk of a fatal cardiovascular event in adults with spastic bilateral cerebral palsy; and (ii) relationships between the 10-year risk and body fat, aerobic fitness and physical activity. Design: Cross-sectional study. Subjects: Forty-three adults with spastic bilateral cerebral palsy without severe cognitive impairment (mean age 36.6 years (standard deviation 6); 27 men). Methods: Biological and lifestyle-related risk factors and the 10-year risk according to the Systematic Coronary Risk Evaluation (SCORE) were assessed. Relationships were studied using multivariable linear regression analysis. Results: The following single risk factors were present: hypertension (n = 12), elevated total cholesterol (n = 3), low high-density lipoprotein cholesterol (n = 5; all men), high-risk waist circumference (n = 11), obesity (body mass index; n = 5; all men), reduced aerobic fitness (on average 80% of reference values), reduced level of everyday physical activity (on average 78% of reference values) and smoking (n=9). All participants had a 10-year risk <1%. Corrected for gender, participants with higher waist circumference ( $\beta = 0.28$ ;  $p = 0.06$ ) or body mass index ( $\beta=0.25$ ;  $p = 0.08$ ) tended to have a higher 10-year risk. Conclusion: In this relatively young adult sample of people with spastic bilateral cerebral palsy several single cardiovascular disease risk factors were present. The 10-year fatal cardiovascular disease risk was low, and higher body fat tended to be related to higher 10-year risk.

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**18. Dev Med Child Neurol. 2013 Jun 28. doi: 10.1111/dmcn.12195. [Epub ahead of print]**

**Executive function in children and adolescents with unilateral cerebral palsy.**

Bodimeade HL, Whittingham K, Lloyd O, Boyd RN.

Queensland Cerebral Palsy and Rehabilitation Research Centre, Discipline of Paediatrics and Child Health, School of Medicine, The University of Queensland, Brisbane, Qld, Australia; School of Psychology, Faculty of Social and Behavioural Sciences, The University of Queensland, Brisbane, Qld, Australia.

AIM: the aim of this study was to compare executive function in children with left- and right-sided unilateral cerebral palsy (CP) and typically developing children. METHOD: There was a cross-sectional cohort of 46 children with unilateral CP (24 right-side, 22 left-side; 25 males, 21 females; mean age 11y 1mo, SD 2y 5mo) and 20 typically developing children (nine males, 11 females; mean age 10y 10mo, SD 2y 4mo). Four cognitive domains of executive function were assessed: attentional control, cognitive flexibility, goal setting, and information processing. Subtests from the Delis-Kaplan Executive Function System, the Test of Everyday Attention for Children, the Rey-Osterrieth Complex figure, and the Wechsler Intelligence Scale for Children - Fourth Edition were utilized. Between-group differences (right unilateral CP, left unilateral CP, and typically developing children) were examined using analyses of covariance. RESULTS: Children with CP performed significantly more poorly than typically developing children on all executive function measures (aggregate executive function:  $F(1,63)=31.16$ ;  $p<0.001$ ;  $\eta^2 =0.33$ ). There were no significant differences between children with left and right unilateral CP, except in the case of inhibition/switching total errors, with children with left unilateral CP making fewer errors than children with right unilateral CP ( $F(1,39)=4.14$ ;  $p=0.049$ ;  $\eta^2 =0.1$ ). INTERPRETATION: Children and adolescents with unilateral CP experience difficulties across multiple executive function domains compared with typically developing children, irrespective of the side of hemiplegia. This finding supports an early vulnerability model of early brain injury and has implications for intervention for children with CP.

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## 19. Pediatrics. 2013 Jul 1. [Epub ahead of print]

### Inpatient Characteristics of the Child Admitted With Chronic Pain.

Coffelt TA, Bauer BD, Carroll AE.

Department of Pediatrics, Indiana University School of Medicine, Indianapolis, Indiana;

**OBJECTIVE:** To define the demographic, diagnostic, procedural, and episode of care characteristics for children admitted with chronic pain. **METHODS:** We used the Pediatric Health Information System database to obtain data on demographic characteristics, length of stay, readmission rates, diagnoses, and procedures for children admitted with chronic pain. Patients with sickle cell disease, cancer, burns, cerebral palsy, transplants, and ventilator-dependent children were excluded. **RESULTS:** A total of 3752 patients with chronic pain were identified from 2004 through 2010. Admissions increased by 831% over this time period. The mean age of these patients was 13.5 years, the most common race was white (79%), and female subjects outnumbered male subjects by 2.41 to 1. The most common admission and principal discharge diagnosis was abdominal pain; comorbid diagnoses were common, with a mean of 10 diagnoses per patient. In total, 65% of patients had a comorbid gastrointestinal diagnosis and 44% had a psychiatric diagnosis. The mean length of stay was 7.32 days, with an expected length of stay of 4.24 days; 12.5% were readmitted at least once within 1 year. They underwent a mean of 3.18 procedures per patient. **CONCLUSIONS:** The average child admitted with chronic pain is a teenaged female with a wide variety of comorbid conditions, many of which are gastrointestinal and psychiatric in nature. Admissions for chronic pain are rising and account for substantial resource utilization. Future studies should further characterize this population, with the overall objective of improving outcomes and optimizing cost-effective care.

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## 20. Res Dev Disabil. 2013 Jun 26;34(9):2864-2871. doi: 10.1016/j.ridd.2013.06.017. [Epub ahead of print]

### The influence of participation in leisure activities on quality of life in Spanish children and adolescents with Cerebral Palsy.

Badia M, Longo E, Orgaz MB, Gómez-Vela M.

Institute on Community Integration (INICO), Faculty of Psychology, University of Salamanca, Avda. de la Merced, 109-131, 37005 Salamanca, Spain. Electronic address: badia@usal.es.

Participation is an important modifiable quality of life (QOL) determinant and a key outcome measure. The aim of this study was to confirm if participation in leisure activities affects the QOL domains in children and adolescents with Cerebral Palsy (CP) in Spain. A total of 206 children and adolescents with CP (and their parents), 115 boys and 91 girls, mean age of 11.96 years (SD=3.00; range 8-18 years) participated in the study. Distribution according to the Gross Motor Function Classification System (GMFCS) was 24.3% Level I, 18% Level II, 18% Level III, 12.6% Level IV, and 27.2% Level V. Participation in leisure activities was assessed using the Spanish version of Children's Assessment of Participation and Enjoyment (CAPE) and QOL using the KIDSCREEN parents' version. Diversity, intensity and enjoyment of participation explained the levels of QOL in the Physical well-being, Psychological well-being, Autonomy, Parent relation & home life and Social support & peers domains, independently of gender, age and level of impairment (motor and intellectual). We also found that intensity and enjoyment of participation in informal activities had more influence on the different QOL domains. The most influenced domain by the enjoyment of participation in all domains and types of CAPE activities was Psychological well-being. The participation in leisure activities had a positive effect on the QOL of the Spanish children and adolescents with CP.

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## Prevention and Cure

### 21. *J Neurodev Disord.* 2013 Jul 3;5(1):17. [Epub ahead of print]

#### The effect of chronic prenatal hypoxia on the development of mature neurons in the cerebellum.

So K, Chung Y, Lee H, Kim E, Jeon Y.

**BACKGROUND:** Adverse intrauterine circumstances can result in abnormal brain development, and can contribute to many neurological disorders such as cerebral palsy, schizophrenia, and cognitive and behavioral deficits. These neurological problems are caused by conditions that cause chronic placental insufficiency (CPI), such as malnutrition, hypoxia, and acidemia. Hypoxia has been implicated in structural alterations of the cerebellum during development; however, the changes to the cerebellar external granular layer (EGL) induced by chronic prenatal hypoxia are not well understood. We therefore investigated the effect of chronic prenatal hypoxia on the development of mature neurons in the EGL using the guinea pig CPI model. **METHOD:** Unilateral uterine artery ligation was performed at 30 to 32 days of gestation (dg) - with term defined as approximately 67 dg. At 50 dg, 60 dg, and one week after birth, fetuses and newborns were sacrificed and assigned to either the growth-restricted (GR) or control (no ligation) group. After fixation, dissection, and sectioning of cerebellar tissue from these animals, immunohistochemistry was performed with antibodies raised to hypoxia-induced factor 1alpha (Hif1alpha), Pax6, NeuroD, and NeuN. **RESULTS:** The induction of hypoxia was confirmed by the presence of Hif1alpha immunoreactivity in the EGL of the GR (but not control) fetuses. The only other cellular immunoreactivity found in any of the tissues was to the NeuN antibody, which is a marker of mature neurons. The proportion of NeuN-immunoreactive (NeuN-IR) cells to the total number of cells in the EGL did not differ between the GR and control groups at 50 and 60 dg. The density of NeuN-IR cells was greater in GR fetuses than in controls at 60 dg ( $P < 0.05$ ) but not at 50 dg. At one week after birth, the EGL was just one cell thick, and only a few NeuN-IR cells could be observed in both groups. TUNEL assays performed to enable the evaluation of apoptosis in the cerebellar EGL revealed that cell death was not affected by hypoxia at 50 dg, 60 dg, and one week after birth. **CONCLUSION:** These findings indicate that chronic prenatal hypoxia affects the process of neuronal production late in fetal life, but that this effect does not persist postnatally.

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### 22. *Early Hum Dev.* 2013 Jun 27. pii: S0378-3782(13)00130-8. doi: 10.1016/j.earlhumdev.2013.05.009. [Epub ahead of print]

#### Motor skills at 23 years of age in young adults born preterm with very low birth weight.

Husby IM, Skranes J, Olsen A, Brubakk AM, Evensen KA.

Department of Laboratory Medicine, Children's and Women's Health, Norwegian University of Science and Technology, Trondheim, Norway. Electronic address: [ingrihu@stud.ntnu.no](mailto:ingrihu@stud.ntnu.no).

**BACKGROUND:** Motor skills have previously not been reported in young adults born with very low birth weight (VLBW), although they are commonly reported in children and adolescents. **AIM:** To compare fine and gross motor skills in VLBW young adults with matched term-born controls, and to study longitudinal changes in the VLBW group. **STUDY DESIGN:** A geographically based follow-up study of a VLBW group and a control group. **SUBJECTS:** Thirty-six VLBW (birth weight  $\leq 1500$ g) young adults, including four participants with cerebral palsy (CP), and 37 matched controls (birth weight  $\geq 10$ th centile) were examined at 14 and 23 years of age. **OUTCOME MEASURES:** Fine and gross motor skills were assessed using Grooved Pegboard test (GP), Trail Making Test-5 (TMT-5), Movement Assessment Battery for Children-2 (Movement ABC-2) and High-level Mobility Assessment Tool (HiMAT). **RESULTS:** VLBW young adults were slower than controls on GP ( $p=0.026$ ) and TMT-5 ( $p<0.001$ ). Mean total Movement ABC-2 score was  $69.7 \pm 20.2$  in the VLBW group compared with  $74.1 \pm 14.4$  in the control group ( $p=0.017$ ). Differences were also seen in manual dexterity and balance. Additionally, HiMAT showed reduced balance and speed in gross motor skills in the VLBW group. The proportion of participants with motor problems did not change between age 14 and 23. After exclusion of participants with CP, scores were essentially the same. **CONCLUSION:** VLBW young adults had overall poorer fine and gross motor skills compared with controls. Reduced speed seemed to be an underlying problem. Longitudinal findings indicate that VLBW children have not

outgrown their motor problems when entering adulthood.

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**23. Transl Stroke Res. 2013 Apr 1;4(2):137-148.**

**The potential for cell-based therapy in perinatal brain injuries.**

Phillips AW, Johnston MV, Fatemi A.

The Hugo W. Moser Research Institute at Kennedy Krieger Institute Johns Hopkins University, Baltimore, Maryland, USA ; Department of Neurology Johns Hopkins University, Baltimore, Maryland, USA.

Perinatal brain injuries are a leading cause of cerebral palsy worldwide. The potential of stem cell therapy to prevent or reduce these impairments has been widely discussed within the medical and scientific communities and an increasing amount of research is being conducted in this field. Animal studies support the idea that a number of stem cells types, including cord blood and mesenchymal stem cells have a neuroprotective effect in neonatal hypoxia-ischemia. Both these cell types are readily available in a clinical setting. The mechanisms of action appear to be diverse, including immunomodulation, activation of endogenous stem cells, release of growth factors, and anti-apoptotic effects. Here, we review the different types of stem cells and progenitor cells that are potential candidates for therapeutic strategies in perinatal brain injuries, and summarize recent preclinical and clinical studies.

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**24. Nurs Womens Health. 2013 Feb-Mar;17(1):42-51. doi: 10.1111/1751-486X.12005.**

**Magnesium sulfate during anticipated preterm birth for infant neuroprotection.**

Merrill L.

Health Sciences Center, Winnipeg, Manitoba, Canada. lisamerrill@live.ca

Advances in medical care of preterm infants, including the widespread use of surfactant and antenatal steroids, and improvements in ventilation management, have increased the survival rates of some of the most vulnerable infants. Yet, the risk of neurologic impairment and long-term medical complications remains a concern. Recently, the use of magnesium sulfate during anticipated preterm birth has been identified as a potential treatment to reduce adverse neurologic outcomes among preterm infants. This article discusses the use of magnesium sulfate for anticipated preterm birth to reduce neurologic impairment in preterm infants, including current clinical practice guidelines and implications for nurses.

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**25. Akush Ginekol (Sofia). 2013;52(2):40-7.**

**Intrauterine hypotrophy and programming the health status. Late problems in newborns with intrauterine hypotrophy [Article in Bulgarian]**

[No authors listed]

In recent years, accumulating more and more evidence demonstrating the programming effects of intrauterine development on the subsequent health of the individual. Intrauterine fetal hypotrophy is a consequence of the wide range of pathological processes in different periods of pregnancy. It is the second leading cause of perinatal death

after prematurity. Newborns from similar pathological pregnancies are often leaked premature baby and/or small for gestational age (SGA). Premature baby children have not only complicated and postnatal adaptation problems in the neonatal period, but many diseases occurring in later life: 1. Disorders in postnatal growth. 2. Neurological and intellectual consequences of IUH in term children (hyperactivity disorders attention, impaired fine motor skills, speech problems, risk of cerebral palsy). 3. Neurological and intellectual consequences of prematurity IUH (cognitive impairment in children with low birth weight, short stature at birth, and small head circumference for gestational age). 4. Metabolic syndrome (dyslipidemia, abdominal obesity, hypertension and high blood sugar). 5. Abnormal sexual development (hyperandrogenism, polycystic ovary syndrome in girls, reduced testicular size and lower testosterone levels in boys. 6. Other complications associated with intrauterine hypotrophy cardiovascular renal, pulmonary complications (BPD) disorders in vision, sensory neural hearing loss.

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