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Interventions and Management

1. Nucl Med Mol Imaging. 2013 Jun;47(2):119-24. doi: 10.1007/s13139-013-0200-1. Epub 2013 Apr 10.

Brain SPECT Analysis After Constraint-Induced Movement Therapy in Young Children with Hemiplegic Cerebral Palsy: Case Report.

Kong EJ, Chun KA, Jeong JH, Cho IH.

Constraint-induced movement therapy (CIMT) was shown recently to be promising for improving upper-limb function in children with cerebral palsy (CP). This study investigated the changes in cerebral perfusion with single-photon emission computerized tomography (SPECT) after modified CIMT (child-friendly CIMT) in young hemiplegic girls. Two young children with left hemiplegic CP were studied with SPECT at rest before and after the CIMT period, and they also performed standardized upper motor function tests [Jebsen hand function test, quality of upper extremity skills test (QUEST), and dynamic electromyography (EMG)]. The cerebral perfusion SPECT revealed regional perfusion increase in the motor cortex area in the affected hemisphere, and the changes associated with functional gain. Our cases showed that intensive movement therapy appears to change local cerebral perfusion and SPECT could show these changes in children with hemiplegic CP.

[PMID: 24900092](https://pubmed.ncbi.nlm.nih.gov/24900092/) [PubMed] [PMCID: PMC4041966](https://pubmed.ncbi.nlm.nih.gov/PMC4041966/) Free PMC Article

2. BMC Pediatr. 2014 Jun 5;14(1):141. [Epub ahead of print]

Efficacy of baby-CIMT: study protocol for a randomised controlled trial on infants below age 12 months, with clinical signs of unilateral CP.

Eliasson AC, Sjöstrand L, Ek L, Krumlinde-Sundholm L, Tedroff K.

BACKGROUND: Infants with unilateral brain lesions are at high risk of developing unilateral cerebral palsy (CP). Given the great plasticity of the young brain, possible interventions for infants at risk of unilateral CP deserve exploration. Constraint-induced movement therapy (CIMT) is known to be effective for older children with unilateral CP but is not systematically used for infants. The development of CIMT for infants (baby-CIMT) is described here, as is the methodology of an RCT comparing the effects on manual ability development of baby-CIMT versus baby-massage. The main hypothesis is that infants receiving baby-CIMT will develop manual ability in the involved hand faster than will infants receiving baby-massage in the first year of life. **Method and design:** The study will be a randomised, controlled, prospective parallel-group trial. Invited infants will be to be randomised to either the baby-

CIMT or the baby-massage group if they: 1) are at risk of developing unilateral CP due to a known neonatal event affecting the brain or 2) have been referred to Astrid Lindgren Children's Hospital due to asymmetric hand function. The inclusion criteria are age 3-8 months and established asymmetric hand use. Infants in both groups will receive two 6-weeks training periods separated by a 6-week pause, for 12 weeks in total of treatment. The primary outcome measure will be the new Hand Assessment for Infants (HAI) for evaluating manual ability. In addition, the Parenting Sense of Competence scale and Alberta Infant Motor Scale will be used. Clinical neuroimaging will be utilized to characterise the brain lesion type. To compare outcomes between treatment groups generalised linear models will be used. **DISCUSSION:** The model of early intensive intervention for hand function, baby-CIMT evaluated by the Hand Assessment for Infants (HAI) will have the potential to significantly increase our understanding of how early intervention of upper limb function in infants at risk of developing unilateral CP can be performed and measured.

Trial registration: SFO-V4072/2012, 05/22/2013.

[PMID: 24903062](#) [PubMed - as supplied by publisher] Free full text

3. Bone Joint J. 2014 Jun;96-B(6):800-6. doi: 10.1302/0301-620X.96B6.33020.

The surgical treatment of lordoscoliosis and hyperlordosis in patients with quadriplegic cerebral palsy.

Karampalis C, Tsirikos AI.

We describe 13 patients with cerebral palsy and lordoscoliosis/hyperlordosis of the lumbar spine who underwent a posterior spinal fusion at a mean age of 14.5 years (10.8 to 17.4) to improve sitting posture and relieve pain. The mean follow-up was 3.3 years (2.2 to 6.2). The mean pre-operative lumbar lordosis was 108° (80 to 150°) and was corrected to 62° (43° to 85°); the mean thoracic kyphosis from 17° (-23° to 35°) to 47° (25° to 65°); the mean scoliosis from 82° (0° to 125°) to 22° (0° to 40°); the mean pelvic obliquity from 21° (0° to 38°) to 3° (0° to 15°); the mean sacral slope from 79° (54° to 90°) to 50° (31° to 66°). The mean pre-operative coronal imbalance was 5 cm (0 cm to 8.9 cm) and was corrected to 0.6 cm (0 to 3.2). The mean sagittal imbalance of -8 cm (-16 cm to 7.8 cm) was corrected to -1.6 cm (-4 cm to 2.5 cm). The mean operating time was 250 minutes (180 to 360 minutes) and intra-operative blood loss 0.8 of estimated blood volume (0.3 to 2 estimated blood volume). The mean intensive care and hospital stay were 3.5 days (2 to 8) and 14.5 days (10 to 27), respectively. Three patients lost a significant amount of blood intra-operatively and subsequently developed chest or urinary infections and superior mesenteric artery syndrome. An increased pre-operative lumbar lordosis and sacral slope were associated with increased peri-operative morbidity: scoliosis and pelvic obliquity were not. A reduced lumbar lordosis and increased thoracic kyphosis correlated with better global sagittal balance at follow-up. All patients and their parents reported excellent surgical outcomes. Lordoscoliosis and hyperlordosis are associated with significant morbidity in quadriplegic patients. They are rare deformities and their treatment is challenging. Sagittal imbalance is the major component: it can be corrected by posterior fusion of the spine with excellent functional results. Cite this article: Bone Joint J 2014;96-B:800-6.

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[PMID: 24891582](#) [PubMed - in process]

4. Indian J Dermatol. 2014 May;59(3):310-1. doi: 10.4103/0019-5154.131432.

Cutaneous myiasis in an infant with cerebral palsy.

Verma P.

[PMID: 24891676](#) [PubMed] PMCID: PMC4037966 Free PMC Article

5. J Pediatr Orthop. 2014 May 30. [Epub ahead of print]**Reliability of Radiologic Measures of Hip Displacement in a Cohort of Preschool-aged Children With Cerebral Palsy.**

Craven A1, Pym A, Boyd RN.

BACKGROUND: Radiologic hip surveillance is recommended for children with cerebral palsy (CP) at risk of hip displacement. Young children with abnormal proximal femoral geometry (Hilgenreiner epiphyseal angle, HEA) may be more likely to develop hip displacement, less likely to respond to nonsurgical intervention, and may benefit from earlier surgical referral. The reliability of radiographic measures of migration percentage (MP) in the immature pelvis of young children has been reported in smaller retrospective studies; HEA has not been examined in this population. This prospective study describes the reliability of MP and HEA in very young children with CP. **METHODS:** Participants were entered from tertiary referral center CP clinics into a prospectively recruited population-based cohort for hip surveillance with pelvic radiography using standardized patient position, at 18, 24, 30, 36, and 48 months. All Gross Motor Function Classification System (GMFCS) levels were included. Two independent raters assessed radiographs for HEA and MP. The intraclass correlation coefficient (ICC) was computed as a measure of interrater and intrarater reliability. The correlation coefficient between HEA and femoral position was computed. **RESULTS:** Ninety-eight children less than 25 months (spasticity=83, 85%; GMFCS IV-V=38, 39%), and 114 children 25 to 48 months (spasticity=96, 85%; GMFCS IV-V=37, 32%) were included from 133 unique participants (spasticity=111, 84%; GMFCS IV-V=42, 32%). Of these 79 children were studied in both age groups. Overall interrater and intrarater reliability of MP was high [ICC=0.93; 95% confidence interval (CI), 0.91-0.95]; SEM was 3.9% (single) and 5.5% (sequential). Perfect concordance for classification of marked hip displacement (MP>30%) occurred in 217 cases (95.2%); nonweighted=0.80; 95% CI, 0.68-0.91. For HEA, overall reliability was high (ICC=0.89; 95% CI, 0.85-0.93); SEM=4.8% (single) and 6.7% (sequential). Correlation between changes in HEA and femoral abduction was poor (coefficient=-0.27, P=0.244). **CONCLUSIONS:** MP and HEA can be reliably applied to very young children with CP, with high reliability for both measures. Measured HEA values appear to be independent of patient position, and may reflect genuine changes in proximal femoral geometry. A longitudinal study should be performed to determine the relationship between HEA and later hip outcomes.

LEVEL OF EVIDENCE: Level I/II-testing and development of diagnostic tests.

[PMID: 24887078](#) [PubMed - as supplied by publisher]

6. Bone Joint J. 2014 Jun;96-B(6):778-82. doi: 10.1302/0301-620X.96B6.33700.**Gastrocsoleus recession techniques: an anatomical and biomechanical study in human cadavers.**

Tinney A1, Khot A2, Eizenberg N3, Wolfe R4, Graham HK5.

Lengthening of the conjoined tendon of the gastrocnemius aponeurosis and soleus fascia is frequently used in the treatment of equinus deformities in children and adults. The Vulpius procedure as described in most orthopaedic texts is a division of the conjoined tendon in the shape of an inverted V. However, transverse division was also described by Vulpius and Stoffel, and has been reported in some clinical studies. We studied the anatomy and biomechanics of transverse division of the conjoined tendon in 12 human cadavers (24 legs). Transverse division of the conjoined tendon resulted in predictable, controlled lengthening of the gastrocsoleus muscle-tendon unit. The lengthening achieved was dependent both on the level of the cut in the conjoined tendon and division of the midline raphé. Division at a proximal level resulted in a mean lengthening of 15.2 mm (sd 2.0, (12 to 19)), which increased to 17.1 mm (sd 1.8, (14 to 20)) after division of the midline raphé. Division at a distal level resulted in a mean lengthening of 21.0 mm (sd 2.0, (18 to 25)), which increased to 26.4 mm (sd 1.4, (24 to 29)) after division of the raphé. These differences were significant ($p < 0.001$). Cite this article: Bone Joint J 2014; 96-B:778-82.

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[PMID: 24891578](#) [PubMed - in process]

7. Clin Orthop Surg. 2014 Jun;6(2):208-15. doi: 10.4055/cios.2014.6.2.208. Epub 2014 May 16.**Z-lengthening of the Achilles Tendon with Transverse Skin Incision.**

Kim HT, Oh JS, Lee JS, Lee TH.

BACKGROUND: The risk of various complications after Achilles tendon lengthening is mainly related to the length of surgical exposure and the lengthening method. A comprehensive technique to minimize the complications is required. **METHODS:** The treatment of Achilles tendon tightness in 57 patients (95 ankles) were performed by using a short transverse incision on a skin crease of the heel and by Z-lengthening of the tendon. In the severe cases, two or three transverse incisions were required for greater lengthening of the tendon, and a serial cast or Ilizarov apparatus was applied for the gradual correction. The results of these 95 ankles were compared to those of 18 ankles, which underwent percutaneous sliding lengthening, and to the 19 ankles, which received Z-lengthening with a medial longitudinal incision. **RESULTS:** The functional and cosmetic satisfaction was achieved among those who underwent the tendon lengthening with the new technique. The mean American Orthopaedic Foot & Ankle Society (AOFAS) score improved from 56.1 to 81.8. The second operations to correct recurrence were performed in the two cerebral palsy patients. **CONCLUSIONS:** The new technique has a low rate of complications such as scarring, adhesion, total transection, excessive lengthening, and recurrence of shortening. The excellent cosmesis and the short operation time are the additional advantages.

[PMID: 24900904](#) [PubMed - in process] [PMCID: PMC4040383](#) Free PMC Article

8. Am J Phys Med Rehabil. 2014 May 29. [Epub ahead of print]**Effect of Extracorporeal Shock Wave Therapy on Gait Pattern in Hemiplegic Cerebral Palsy: A Randomized Controlled Trial.**

El-Shamy SM1, Eid MA, El-Banna MF.

OBJECTIVE: The aim of this study was to investigate the effects of shock wave therapy on gait pattern in children with hemiplegic cerebral palsy. **DESIGN:** Fifteen children were assigned to the study group, whose members received shock wave therapy (1500 shots/muscle, frequency of 5Hz, energy of 0.030 mJ/mm, one session/wk). Another 15 were assigned to the control group, whose members participated in a conventional physical therapy exercise program for 3 successive months. Baseline and post treatment assessments were performed using the Modified Ashworth Scale to evaluate spasticity degrees and using a three-dimensional gait analysis to evaluate gait parameters. **RESULTS:** Children in the study group showed a significant improvement when compared with those in the control group ($P < 0.005$). The Modified Ashworth scores after treatment were 1.86 (0.22) and 1.63 (0.23) for the control and study groups, respectively. The gait parameters (stride length, cadence, speed, cycle time, and stance phase percentage) after treatment were 0.5 m, 125 steps/min, 0.6 m/sec, 0.48 sec, and 50.4% and 0.74 m, 119 steps/min, 0.75 m/sec, 0.65 sec, and 55.9% for the control group and the study group, respectively. **CONCLUSIONS:** Shock wave therapy may be a useful tool for improving spasticity and gait pattern in children with hemiplegic cerebral palsy.

[PMID: 24879552](#) [PubMed - as supplied by publisher]

9. Am J Phys Med Rehabil. 2014 Jun 4. [Epub ahead of print]**Effect of Postural Balance Training on Gait Parameters in Children with Cerebral Palsy.**

Abd El-Kafy EM1, El-Basatiny HM.

OBJECTIVE: The aim of this study was to evaluate the effect of dynamic bilateral postural stability on balance control and gait parameters in children with cerebral palsy. **DESIGN:** Thirty children with spastic diplegia (8-10 yrs) were included in this study. The children were randomly assigned into two groups: control group A and study group B. The children in both groups received traditional physical therapy program, 2 hrs per day for group A and 1.5 hrs followed by 30 mins of dynamic postural stability training program using the Biodex Stability System for group B. The treatment frequency was three sessions per week for 8 consecutive weeks on two stability levels (7 and 8). The participating children received pretreatment and posttreatment assessments using the Biodex Stability System

to evaluate the stability indices (anteroposterior, mediolateral, and overall) at the two stability levels (7 and 8) and three-dimensional motion analysis system (pro-reflex system) to evaluate the spatiotemporal parameters including step length, velocity, cycle time, stance, and swing phase percentage. RESULTS: The children in both groups showed significant improvements in the mean values of all measured variables after treatment indexed by a significant reduction in stability indices and improvement in gait parameters. The results also showed significant differences in all measured parameters in favor of group B, when compared with those in group A ($P < 0.01$). CONCLUSIONS: Balance training on the Biodex Stability System could be a useful tool in conjunction with traditional physical therapy program for improving balance control and gait functions in children with spastic diplegic cerebral palsy.

[PMID: 24901761](#) [PubMed - as supplied by publisher]

10. Eur J Phys Rehabil Med. 2014 Jun 5. [Epub ahead of print]

Aerobic fitness and physical activity in adults with chronic physical challenges and nonprogressive brain disease.

Satonaka A1, Suzuki N, Kawamura M.

BACKGROUND: There are no reports on the relationship between aerobic fitness and promising factors that may affect aerobic fitness in adults with chronic physical challenges and nonprogressive brain disease. However, our previous study suggested that aerobic fitness may be affected by the skewness of frequency distribution of continuous heart rate. AIM: To investigate the relationship between aerobic fitness and promising factors that may affect aerobic fitness, as well as skewness of frequency distribution of continuous heart rate, in adults with chronic physical challenges and nonprogressive brain disease. DESIGN: Cross-sectional and correlative study. SETTING: Research laboratory setting. POPULATION: Thirty-three adults with chronic physical challenges and nonprogressive brain disease (cerebral palsy or stroke) were recruited. METHOD: Maximal oxygen uptake (VO_{2max}) was estimated by the multistage submaximal cycle ergometer test. Continuous heart rate was recorded throughout a weekday. Pearson's product moment correlation coefficient was used to test the relationship between estimated VO_{2max} and skewness of frequency distribution of continuous heart rate and average heart rate. Multiple regression analysis was used to comprehensively assess factors that contributed to estimated VO_{2max} . RESULTS: VO_{2max} correlated significantly with skewness of frequency distribution of continuous heart rate ($r = 0.53$, $P = 0.002$), whereas VO_{2max} did not correlate with average heart rate. Skewness and gender were significant determinants of VO_{2max} (regression coefficients: skewness $\beta = 0.442$, $P = 0.006$; gender $\beta = 0.420$; $P = 0.018$) whereas the type of brain disease, age, body mass index, and ambulatory functions were not significant factors. CONCLUSION AND CLINICAL REHABILITATION IMPACT: Aerobic fitness may be improved by frequent physical activity, including nonexercise activity thermogenesis, in adults with cerebral palsy or stroke, even if they have no opportunity for intense physical activities such as exercise.

[PMID: 24898078](#) [PubMed - as supplied by publisher]

11. Pediatr Int. 2014 Jun;56(3):424-6. doi: 10.1111/ped.12297.

Bone marrow transplant for a girl with bone marrow failure and cerebral palsy.

Kodama Y1, Okamoto Y, Shinkoda Y, Tanabe T, Nishikawa T, Yamaki Y, Kurauchi K, Kawano Y.

Bone marrow transplantation (BMT) has been used with increasing frequency to treat congenital bone marrow failure syndrome (CBMFs) successfully. Decision to perform BMT, however, is difficult in the case of comorbidity because of regimen-related toxicities. We describe here a child with CBMFs, severe cerebral palsy (CP) at Gross Motor Function Classification System level V and mental retardation (MR) who was transfusion dependent despite various medications. She underwent BMT from an HLA-1 locus-mismatched unrelated donor. Although engraftment was successful, no neurological improvement was seen 5 years after BMT. While CBMFs patients who have CP and MR could undergo transplantation safely, they may not benefit neurologically from BMT.

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12. Front Neurosci. 2014 May 26;8:111. doi: 10.3389/fnins.2014.00111. eCollection 2014.**A confidence metric for using neurobiological feedback in actor-critic reinforcement learning based brain-machine interfaces.**

Prins NW1, Sanchez JC2, Prasad A1.

Brain-Machine Interfaces (BMIs) can be used to restore function in people living with paralysis. Current BMIs require extensive calibration that increase the set-up times and external inputs for decoder training that may be difficult to produce in paralyzed individuals. Both these factors have presented challenges in transitioning the technology from research environments to activities of daily living (ADL). For BMIs to be seamlessly used in ADL, these issues should be handled with minimal external input thus reducing the need for a technician/caregiver to calibrate the system. Reinforcement Learning (RL) based BMIs are a good tool to be used when there is no external training signal and can provide an adaptive modality to train BMI decoders. However, RL based BMIs are sensitive to the feedback provided to adapt the BMI. In actor-critic BMIs, this feedback is provided by the critic and the overall system performance is limited by the critic accuracy. In this work, we developed an adaptive BMI that could handle inaccuracies in the critic feedback in an effort to produce more accurate RL based BMIs. We developed a confidence measure, which indicated how appropriate the feedback is for updating the decoding parameters of the actor. The results show that with the new update formulation, the critic accuracy is no longer a limiting factor for the overall performance. We tested and validated the system on three different data sets: synthetic data generated by an Izhikevich neural spiking model, synthetic data with a Gaussian noise distribution, and data collected from a non-human primate engaged in a reaching task. All results indicated that the system with the critic confidence built in always outperformed the system without the critic confidence. Results of this study suggest the potential application of the technique in developing an autonomous BMI that does not need an external signal for training or extensive calibration.

[PMID: 24904257](#) [PubMed] [PMCID: PMC4033619](#) Free PMC Article

13. Nutr Metab (Lond). 2014 May 19;11:22. doi: 10.1186/1743-7075-11-22. eCollection 2014.**Abdominal obesity is an independent predictor of serum 25-hydroxyvitamin D deficiency in adults with cerebral palsy.**

Peterson MD, Haapala HJ, Chaddha A, Hurvitz EA.

BACKGROUND: Individuals with cerebral palsy (CP) are at risk for nutritional insufficiency. The purpose of the study was to examine the vitamin D status of adults with CP, and to evaluate the association between vitamin D and functional level, age, race, and anthropometric indicators of adiposity. **METHODS:** Serum vitamin D levels, BMI, waist circumference (WC), and functional level (measured by Gross Motor Function Classification System (GMFCS)) were examined in 112 adults with CP. Vitamin D status was assessed by serum 25-hydroxyvitamin D level (25(OH)D). The influence of motor impairment and adiposity on 25(OH)D were assessed using general linear modeling and logistic regression, with age, sex, race, and season as covariates. **RESULTS:** Mean vitamin D was 28.1±16.0 ng/ml. Only 45% of subjects had optimal levels of 25(OH)D, 21% were insufficient and 34% were deficient. Overweight or obesity was prevalent (52%), as was abdominal obesity in men (23.5% at 102 cm cutoff) and women (31.1% at 88 cm cutoff). There was a robust association between the indicator of visceral adiposity (WC) and 25(OH)D level ($p < 0.001$), even after controlling for age, sex, race, season, and GMFCS. According to sex-specific WC cutoffs, the odds of being deficient in vitamin D increase by a factor of 3.5 (95% CI 1.12-11.0) for abdominal obesity. GMFCS was not associated with 25(OH)D. **CONCLUSIONS:** Adults with CP are at risk for low vitamin D levels and overweight/obesity. Waist circumference is a strong independent predictor for low vitamin D levels.

[PMID: 24883075](#) [PubMed] [PMCID: PMC4039320](#) Free PMC Article

14. Dev Med Child Neurol. 2014 Jun 4. doi: 10.1111/dmcn.12502. [Epub ahead of print]**Development of communication by young people with cerebral palsy.**

Pennington L.

[PMID: 24894634](#) [PubMed - as supplied by publisher]**15. Child Psychiatry Hum Dev. 2014 May 31. [Epub ahead of print]****Psychiatric Diagnoses, Emotional-Behavioral Symptoms and Functional Outcomes in Adolescents Born Preterm with Very Low Birth Weights.**

Yang P1, Chen YH, Yen CF, Chen HL.

Children born preterm with very low birth weight (VLBW; birth weight =1,500 g) run risks of neurodevelopmental disorders. Studies of adolescent outcome are relatively few. In this follow-up survey, we examined the emotional-behavioral symptoms, psychiatric diagnoses and functional status in a geographically-based birth cohort of VLBW adolescents (average 13.4 years) as registered in a level III center of a recently developed Asian country. Psychiatric interviews were conducted. Parents were asked to fill out the Child Behavioral Checklist and the Current Status Survey. Results revealed that neonatal survival rate was 75.7 % (112/148). In the follow-up, 26.2 % of the adolescents required individualized educational plan; 52.5 % were with at least one neuropsychiatric diagnosis (e.g. cerebral palsy 24.6 %, intellectual disabilities 21.3 %, attention deficit/hyperactivity disorder 19.7 %), and 32.8 % of the participants were disabled. Logistic regression found that neonatal sepsis and grade III/IV intraventricular hemorrhage were most predictive of a disabled status in adolescence.

[PMID: 24879118](#) [PubMed - as supplied by publisher]**16. Eur J Phys Rehabil Med. 2014 Jun 4. [Epub ahead of print]****New definitions of 6 clinical signs of perceptual disorders in children with cerebral palsy: an observational study though reliability measures.**

Ferrari A1, Sghedoni A, Alboresi S, Pedroni E, Lombardi F.

BACKGROUND: Recently authors have begun to emphasize the non-motor aspects of Cerebral Palsy and their influence on motor control and recovery prognosis. Much has been written about single clinical signs (i.e. startle reaction) but so far no definitions of the six perceptual signs presented in this study have appeared in literature. **AIM:** This study defines 6 signs (startle reaction, upper limbs in startle position, frequent eye blinking, posture freezing, averted eye gaze, grimacing) suggestive of perceptual disorders in children with cerebral palsy and measures agreement on sign recognition among independent observers and consistency of opinions over time. **DESIGN:** Observational study with both cross-sectional and prospective components. **SETTING:** 56 videos presented to observers in random order. Videos were taken from 19 children with a bilateral form of cerebral palsy referred to the Children Rehabilitation Unit in Reggio Emilia. **PARTICIPANTS:** 35 rehabilitation professionals from all over Italy: 9 doctors and 26 physiotherapists. **METHODS:** Measure of agreement among 35 independent observers was compiled from a sample of 56 videos. Interobserver reliability was determined using the K index of Fleiss and reliability intraobserver was calculated by the Spearman correlation index between ranks (ρ). Percentage of agreement between observers and Gold Standard was used as criterion validity. **RESULTS:** Interobserver reliability was moderate for startle reaction, upper limb in startle position, averted eye gaze and eyeblinking and fair for posture freezing and grimacing. Intraobserver reliability remained consistent over time. Criterion validity revealed very high agreement between independent observer evaluation and gold standard. **CONCLUSIONS:** Semiotics of perceptual disorders can be used as a specific and sensitive instrument in order to identify a new class of patients within existing heterogeneous clinical types of bilateral cerebral palsy forms and could help clinicians in identifying functional prognosis. **CLINICAL REHABILITATION IMPACT:** To provide clinicians with a definition of 6 clinical signs found in children with cerebral palsy in routine rehabilitation settings. Future research should explore the link between these signs and motor prognosis (i.e. time to independent walking).

[PMID: 24896142](#) [PubMed - as supplied by publisher]

17. BMC Public Health. 2014 Jun 5;14(1):561. [Epub ahead of print]**The impact of chronic conditions of care recipients on the labour force participation of informal carers in Australia: which conditions are associated with higher rates of non-participation in the labour force?**

Schofield D, Cunich M, Shrestha R, Passey M, Kelly S, Tanton R, Veerman L.

BACKGROUND: Little is known about the effects of personal and other characteristics of care recipients on the behaviour of carers. The aim of this study is to examine the association between the main chronic (disabling) condition of care recipients and the likelihood of their (matched) primary carers aged 15-64 years being out of the labour force. **METHODS:** We conducted a retrospective analysis of cross-sectional data from the Australian Bureau of Statistics 2009 Survey of Disability, Ageing and Carers (SDAC) for people aged 15-64 years. We estimated the rates of exit from the labour force for primary carers and non-carers; rates of chronic disease occurrence for care recipients living with their main carers; odds ratios of primary carers being out of the labour force associated with the main chronic condition of their care recipient who lives with them. **RESULTS:** From the 2009 SDAC, we identified 1,268 out of 37,186 eligible participants who were primary carers of a care recipient who lived with them. Of these, 628 (49.5%) were out of the labour force. Most common diseases of care recipients were: back problems (12%); arthritis and related disorders (10%); diseases of the nervous system (such as multiple sclerosis, epilepsy, cerebral palsy) (7.4%); and conditions originating in the perinatal period or congenital malformations, deformations and chromosomal abnormalities (5.1%). When adjusted for age, sex, education and whether have a long term chronic condition of informal carers, the five conditions of care recipients associated with the highest odds of their carers being out of the labour force were: head injury/acquired brain damage; neoplasms, blood diseases, disorders of the immune system; leg/knee/foot/hip damage from injury/accident; dementia, Parkinson's disease, Alzheimer's disease; and diseases of the musculoskeletal system and connective tissue (osteoporosis). **CONCLUSIONS:** This study identifies the type of conditions that have the greatest impact on the labour force participation of informal carers - previously unavailable information for Australia. Australia, like most developed countries, is facing several skills shortages and an ageing population. These governments will need to adopt novel and more wholistic approaches to increase the labour force participation of diverse groups. Informal carers are one such group.

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Prevention and Cure

18. BJOG. 2014 Jun 3. doi: 10.1111/1471-0528.12897. [Epub ahead of print]**The incidence and implications of cerebral palsy following potentially avoidable obstetric complications: a preliminary burden of disease study.**

Leigh S1, Granby P, Turner M, Wieteska S, Haycox A, Collins B.

OBJECTIVE: To determine the extent of cerebral palsy attributable to adverse obstetric events, and estimate the lifetime mortality and morbidity expectations of these individuals relative to age-matched members of the UK general population. **DESIGN:** Simulation model. **SETTING:** UK. **POPULATION:** All projected live births during 2014. **METHODS:** Using published data regarding the incidence and aetiology of cerebral palsy, we simulated the outcomes of a hypothetical cohort of UK live births. Survival and quality of life (QoL) for those with cerebral palsy were compared with age-matched individuals representative of the UK general population, in order to estimate the number of quality-adjusted life years (QALYs) lost following asphyxia-related cerebral palsy. **MAIN OUTCOME MEASURES:** Incidence of asphyxia-related cerebral palsy, QALYS, QoL, and survival. **RESULTS:** A total of 207 (95% CI 169-245) cases of asphyxia-related cerebral palsy were projected amongst UK children born during the year 2014, with approximately 15.2 QALYs lost per case. If these results held true in a real birth cohort, 3142 (95% CI 2321-3963) QALYs would be lost as a consequence of asphyxia-related cerebral palsy, a loss valued by the UK National Health Service at £62.9 m (95% CI £46.4-79.3 m). **CONCLUSIONS:** Cerebral palsy following intrapartum asphyxiation leads to significant reductions in QoL and survival; however, this may often be prevented. For those with GMFCS 1 and GMFCS 2 cerebral palsy (Gross Motor Function Classification System), lifetime QALYs accrued largely resemble those experienced by the UK general population, whereas for GMFCS 3 and GMFCS 4 QALYs

are reduced considerably, and are negative in the case of GMFCS 5.

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[PMID: 24893978](#) [PubMed - as supplied by publisher]

19. An Pediatr (Barc). 2014 May 27. pii: S1695-4033(14)00095-2. doi: 10.1016/j.anpedi.2014.02.017. [Epub ahead of print]

Incidence of cerebral palsy in a cohort of preterm infants with a gestational age of less than 28 weeks. Author's reply [Article in Spanish]

García González P.

[PMID: 24877614](#) [PubMed - as supplied by publisher] Free full text

20. Front Neurol. 2014 May 26;5:79. doi: 10.3389/fneur.2014.00079. eCollection 2014.

Insulin-Like Growth Factor Receptor Signaling is Necessary for Epidermal Growth Factor Mediated Proliferation of SVZ Neural Precursors in vitro Following Neonatal Hypoxia-Ischemia.

Alagappan D, Ziegler AN, Chidambaram S, Min J, Wood TL, Levison SW.

In this study, we assessed the importance of insulin-like growth factor (IGF) and epidermal growth factor (EGF) receptor co-signaling for rat neural precursor (NP) cell proliferation and self-renewal in the context of a developmental brain injury that is associated with cerebral palsy. Consistent with previous studies, we found that there is an increase in the in vitro growth of subventricular zone NPs isolated acutely after cerebral hypoxia-ischemia; however, when cultured in medium that is insufficient to stimulate the IGF type 1 receptor, neurosphere formation and the proliferative capacity of those NPs was severely curtailed. This reduced growth capacity could not be attributed simply to failure to survive. The growth and self-renewal of the NPs could be restored by addition of both IGF-I and IGF-II. Since the size of the neurosphere is predominantly due to cell proliferation we hypothesized that the IGFs were regulating progression through the cell cycle. Analyses of cell cycle progression revealed that IGF-1R activation together with EGFR co-signaling decreased the percentage of cells in G1 and enhanced cell progression into S and G2. This was accompanied by increases in expression of cyclin D1, phosphorylated histone 3, and phosphorylated Rb. Based on these data, we conclude that coordinate signaling between the EGF receptor and the IGF type 1 receptor is necessary for the normal proliferation of NPs as well as for their reactive expansion after injury. These data indicate that manipulations that maintain or amplify IGF signaling in the brain during recovery from developmental brain injuries will enhance the production of new brain cells to improve neurological function in children who are at risk for developing cerebral palsy.

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The association between sex-related interleukin-6 gene polymorphisms and the risk for cerebral palsy.

Bi D, Chen M, Zhang X, Wang H, Xia L, Shang Q, Li T, Zhu D, Blomgren K, He L, Wang X, Xing Q, Zhu C.

BACKGROUND: The relationship between genetic factors and the development of cerebral palsy (CP) has recently attracted much attention. Polymorphisms in the genes encoding proinflammatory cytokines have been shown to be associated with susceptibility to perinatal brain injury and development of CP. Interleukin-6 (IL-6) is a proinflammatory cytokine that plays a pivotal role in neonatal brain injury, but conflicting results have been reported regarding the association between IL-6 single nucleotide polymorphisms (SNPs) and CP. The purpose of this study was to analyze IL-6 gene polymorphisms and protein expression and to explore the role of IL-6 in the Chinese CP population. **METHODS:** A total of 753 healthy controls and 713 CP patients were studied to detect the presence of five SNPs (rs1800796, rs2069837, rs2066992, rs2069840, and rs10242595) in the IL-6 locus. Of these, 77 healthy controls and 87 CP patients were selected for measurement of plasma IL-6 by Luminex assay. The SHESis

program was used to analyze the genotyping data. For all comparisons; multiple testing on each individual SNP was corrected by the SNPSpD program. RESULTS: There were no differences in allele or genotype frequencies between the overall CP patients and controls among the five genetic polymorphisms. However, subgroup analysis found significant sex-related differences in allele and genotype frequencies. Differences were found between spastic CP and controls in males for rs2069837; between CP with periventricular leukomalacia and controls in males for rs1800796 and rs2066992; and between term CP and controls in males for rs2069837. Plasma IL-6 levels were higher in CP patients than in the controls, and this difference was more robust in full-term male spastic CP patients. Furthermore, the genotype has an effect on IL-6 synthesis. CONCLUSIONS: The influence of IL-6 gene polymorphisms on IL-6 synthesis and the susceptibility to CP is related to sex and gestational age.

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Risk of cerebral palsy associated with neonatal encephalopathy in macrosomic neonates.

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AIM: To determine whether macrosomic infants with a birthweight of 4.0kg or more have increased risk of cerebral palsy associated with neonatal encephalopathy (Enc-CP). METHODS: A retrospective review of 132 singleton infants with Enc-CP fulfilling all of the following criteria: born at gestational week (GW) 37 or more (n=126) or weighing 2.5 kg or more at birth (n=116) in or after January 2009 in Japan; no identifiable causes of cerebral palsy other than antenatal or intrapartum hypoxia; and exhibition of neonatal encephalopathy. National statistics of Japan were used to determine the numbers of infants according to birthweight categories. RESULTS: Of the 116 infants with a birthweight of 2.5 kg or more, 46 (39.7%), 49 (42.2%), 17 (14.7%) and four (3.4%) infants had birthweights of 2.5-2.99, 3.0-3.49, 3.5-3.99 and 4.0 kg or more, respectively. Corresponding figures among Japanese infants born in 2009-2011 were 42.8%, 45.4%, 10.9% and 0.90%, respectively. Infants with a birthweight of 4.0 kg or more had a relative risk (95% confidence interval) of Enc-CP of 3.89 (1.52-9.95) compared to those with a birthweight of 2.5-2.99 kg. CONCLUSION: Japanese infants with a birthweight of 4.0 kg or more have increased risk of Enc-CP.

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