

Monday 30 January 2012

**Cerebral Palsy Alliance** is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy.

Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. This free weekly bulletin is just one of our activities. Please find out more at [www.cpresearch.org.au](http://www.cpresearch.org.au)

**Professor Nadia Badawi**

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

## Interventions and Management

### 1. Arch Phys Med Rehabil. 2012 Jan 20. [Epub ahead of print]

#### **Relationship Between Gross Motor and Intellectual Function in Children With Cerebral Palsy: A Cross-Sectional Study.**

Dalvand H, Dehghan L, Hadian MR, Feizy A, Hosseini SA.

Department of Occupational Therapy, Faculty of Rehabilitation, Tehran University of Medical Sciences (TUMS), Tehran.

**OBJECTIVE:** To explore the relationship between gross motor and intellectual function in children with cerebral palsy (CP). **DESIGN:** A cross-sectional study. **SETTING:** Occupational therapy clinic. **PARTICIPANTS:** Children with CP (N=662; 281 girls, 381 boys; age range, 3-14y). **INTERVENTIONS:** Not applicable. **MAIN OUTCOME MEASURES:** Intelligence testing was carried out by means of the Wechsler Preschool and Primary Scale of Intelligence and the Wechsler Intelligence Scale for Children-Revised. Gross motor function level was determined by the Gross Motor Function Classification System Expanded and Revised (GMFCS E&R). **RESULTS:** Of the children, 10.4% were at level I of the GMFCS E&R, 38% at levels II and III, and 51.5% at levels IV and V. The lowest level of intelligence or profound intellectual disability was found in children with spastic quadriplegia (n=28, 62.2%). Children at the lowest levels (I-IV, GMFCS E&R) obtained higher ratings in terms of intelligence in comparison with children at level V. Based on the present results, the diagnosis was statistically related to the intellectual level as dependent variable ( $P<.01$ ); accordingly, hypotonic, quadriplegic, and hemiplegic patients had the highest odds to assign higher ratings in abnormal intelligence, respectively. Sex and age were not statistically related to the dependent variable. **CONCLUSIONS:** The study results demonstrated a significant association between GMFCS E&R and intellectual function. Therefore, we suggest that particular attention should be paid to the intellectual level in terms of evaluations of gross motor function. These results, in respect, might be interested for occupational and physical therapists who are involved in rehabilitation programs for these children.

Copyright © 2012 the American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

[PMID: 22265344](https://pubmed.ncbi.nlm.nih.gov/22265344/) [PubMed - as supplied by publisher]

**2. Arch Phys Med Rehabil. 2012 Jan 20. [Epub ahead of print]****Postural Adjustment of Children With Spastic Diplegic Cerebral Palsy During Seated Hand Reaching in Different Directions.**

Ju YH, Hwang IS, Cheng RJ.

Institute of Allied Health Sciences, National Cheng Kung University, Tainan, Taiwan; Department of Physical Therapy, Kaohsiung Medical University, Kaohsiung, Taiwan; Department of Rehabilitation, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan.

**OBJECTIVES:** To examine the effect of reaching in different directions on postural adjustment in children with diplegic cerebral palsy (CP), and to examine the relationship between hand reach performance and postural adjustment, and between postural control ability and postural adjustment. **DESIGN:** Cross-sectional study. **SETTING:** A movement science laboratory at a medical university. **PARTICIPANTS:** Children with CP (n=12) and typically developing (TD) children (n=16). **INTERVENTIONS:** Not applicable. **MAIN OUTCOME MEASURES:** Two force platforms were used to measure the ground reaction force (GRF) and center of pressure (COP) data. Absolute peak COP velocity, COP sway ratio (SR), and mean GRF in the anterior posterior direction during the acceleration and deceleration segments of a reaching task were the main outcome measures. **RESULTS:** Children with CP showed a greater absolute peak COP velocity in the medial lateral direction, a smaller SR (wider COP pattern), and greater amplitude of force modulation (exaggerated postural adjustments) than TD children in lateral or medial reaches. There was a moderate correlation between SR and total Pediatric Reach Test score. The chair SR was also negatively correlated with the hand movement units. **CONCLUSIONS:** Children with CP showed wider, more crooked, and less efficient COP patterns than TD children, especially on medial or lateral reaches. Reaching medially or laterally involves trunk rotation, which produces more postural challenges than reaching anteriorly to children with CP. The patterns of postural adjustments in children with CP were correlated with their postural control ability and hand-reach smoothness.

Copyright © 2012 the American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

[PMID: 22265343](#) [PubMed - as supplied by publisher]

**3. IEEE Int Conf Rehabil Robot. 2011 Jun;2011:1-5.****A comparison of motor adaptations to robotically facilitated upper extremity task practice demonstrated by children with cerebral palsy and adults with stroke.**

Qinyin Qiu, Adamovich S, Saleh S, Lafond I, Merians AS, Fluet GG.

Nine children with cerebral palsy and nine adults with stroke were trained using 5 different upper extremity simulations using the NJIT-RAVR system for approximately nine to twelve hours over a three week period. Both groups made improvements in clinical measurements of upper extremity function and reaching kinematics. Patterns and magnitudes of improvement differ between the two groups. Responses to training required adjustment of the robotic system to accommodate the rehabilitation needs of children with cerebral palsy.

[PMID: 22275632](#) [PubMed - in process]

**4. IEEE Int Conf Rehabil Robot. 2011 Jun;2011:1-6.****Instrumented sorting block box for children, a preliminary experiment.**

Klein J, Chen A, Burdet E.

This paper presents a prototype for an instrumented sorting block box designed for large-scale use in medical centers. A preliminary experiment was performed with unimpaired adults. Low-cost force sensors located under the top lid and realtime data processing allowed us to accurately estimate the position of the block. The data extracted from these sensors was used to develop and calculate suitable outcome measures such as the average distance to the target, overall time to complete the task, percentage of time spent far from the target, average force applied to

the lid and number of mistrials. Results suggest a strong influence of the block shape, target location and movement number on the outcome measures. The tool and measures will be used for early assessment of abnormal development of motor skills in infants and for evaluation of pathological conditions such as cerebral palsy.

[PMID: 22275656](#) [PubMed - in process]

**5. J Rehabil Med. 2012 Jan 26. doi: 10.2340/16501977-0920. [Epub ahead of print]**

**Effect of forced use therapy on posture in children with hemiplegic cerebral palsy: A pilot study.**

Ballaz L, Huffenus AF, Lamarre C, Koclas L, Lemay M.

Centre de Réadaptation Marie-Enfant, CHU Sainte-Justine, Montréal (Québec), Canada. E-mail: laurent.ballaz@gmail.com.

Objective: To evaluate the impact of forced use therapy on posture in children with hemiplegic cerebral palsy. Design: Single group pre- and post-training assessments. Subjects: Eight children (mean age 10.5 years (standard deviation 1.26 years)) with hemiplegic cerebral palsy Levels I and II on the gross motor function classification scale. Methods: All participants underwent 12 days (6 h/day) of forced use therapy. Postural asymmetry as well as the centre of pressure range and peak velocity during quiet standing were evaluated before and after the therapy. Upper limb functional level was also assessed using the Bruininks Oseretsky test of Motor Proficiency and the Assisting Hand Assessment. Results: Before forced use therapy, postural asymmetry tended to decrease when the participants wore the upper limb constraint. After forced use therapy, upper limb functional scores improved significantly, and postural asymmetry tended to decrease, compared with the pre-therapy values. Postural improvement was correlated with postural asymmetry before forced use therapy. No significant differences were observed on the centre of pressure displacement parameters during the quiet standing tests in all conditions. Conclusion: This pilot study showed that forced use therapy may be an efficient way to improve postural asymmetry in children with hemiplegic cerebral palsy.

[PMID: 22278090](#) [PubMed - as supplied by publisher]

**6. IEEE Int Conf Rehabil Robot. 2011 Jun;2011:1-7.**

**Walking assistance apparatus using a spatial parallel link mechanism and a weight bearing lift.**

Tanaka E, Ikehara T, Sato Y, Yusa H, Sakurai T, Saegusa S, Ito K, Yuge L.

A prototype for a walking assistance apparatus for the elderly or motor palsy patients was developed as a next-generation vehicle or movable neuro-rehabilitation training appliance, using a novel spatial parallel link mechanism and a bearing lift. The flat steps of the apparatus move in parallel with the ground; the apparatus can support entire leg alignment (including soles) and assist; walking behavior at ankle, knee and hip joints simultaneously. In order to respond the variation of equipped person's walking velocity, the length of stride and walking cycle while walking with wearing the apparatus were compensated by using the relation of walking ratio. Therefore the apparatus can be controlled in response to equipped person's will. Motor palsy and muscle weakness patients can walk by themselves by using the apparatus; patients who have ambulation difficulty can use the apparatus with weight bearing lift that we developed. Using the apparatus with the weight bearing lift prevents stumbling and enables input of walking movement to the brain motor area. It is very effective for rehabilitation to use the apparatus with the weight bearing lift. This newly developed system facilitates motor palsy and muscle weakness patients in the rehabilitation program.

[PMID: 22275667](#) [PubMed - in process]

**7. Dev Med Child Neurol. 2012 Jan 23. doi: 10.1111/j.1469-8749.2011.04172.x. [Epub ahead of print]****Prophylactic femoral varization osteotomy for contralateral stable hips in non-ambulant individuals with cerebral palsy undergoing hip surgery: decision analysis.**

Park MS, Chung CY, Kwon DG, Sung KH, Choi IH, Lee KM.

Department of Orthopaedic Surgery, Seoul National University Bundang Hospital, Kyungki. Department of Orthopaedic Surgery, Inha University Hospital, Incheon. Department of Orthopaedic Surgery, Seoul National University Children's Hospital, Seoul, South Korea.

**Aim:** This study was undertaken to determine the need for concurrent prophylactic femoral varization osteotomy (FVO) of contralateral stable hips at the time of hip reconstructive surgery on unstable hips in non-ambulant individuals with cerebral palsy (Gross Motor Function Classification System levels IV and V). **Method:** A decision analysis model was constructed that included (1) the probability of unstable hips during observation of the contralateral stable hips, (2) unstable hip rate (subluxation or dislocation rate) after prophylactic FVO or after delayed reconstructive surgery (including FVO) for unstable hips, and (3) complication rates after concurrent prophylactic FVO or after hip reconstructive surgery. The final outcome score was based on pain utility measures. The probabilities of all cases and the utility score were obtained by literature review. **Results:** The decision model favoured concurrent prophylactic FVO for the contralateral stable hips over observation (pain utility measure scores 0.814 vs 0.781). In a one-way sensitivity analysis, the decision model favoured concurrent prophylactic FVO when the unstable hip rate of contralateral stable hips during observation was 27% or over. Concurrent prophylactic surgery also demonstrated higher utility scores than observation when the unstable hip rate after FVO was between 0% and 29%. **Interpretation:** The decision analysis model demonstrated that concurrent prophylactic FVO for a contralateral stable hip in individuals with cerebral palsy undergoing hip reconstructive surgery was beneficial from a medical perspective, which was based on current evidence.

© The Authors. Developmental Medicine & Child Neurology © 2012 Mac Keith Press.

[PMID: 22268527](#) [PubMed - as supplied by publisher]

**8. J Rehabil Med. 2012 Jan 23. doi: 10.2340/16501977-0916. [Epub ahead of print]****Longitudinal changes in mobility following single-event multilevel surgery in ambulatory children with cerebral palsy.**

Harvey A, Rosenbaum P, Hanna S, Yousefi-Nooraie R, Graham KH.

McMaster Child Health Research Institute, Canada and Murdoch Children's Research Institute Melbourne, Melbourne, Victoria, Australia. E-mail: harvey.adrienne@gmail.com, adrienne.harvey@rch.org.au.

**Objective:** To examine changes in mobility longitudinally following single-event multilevel surgery in ambulant children with cerebral palsy, focusing on those using assistive devices for functional mobility because they are most at risk of declining gross motor function. **Participants:** A consecutive sample of 156 ambulant children with cerebral palsy (99 males), 96 without devices (Gross Motor Function Classification System (GMFCS) I/II), 60 with devices (GMFCS III) who had single-event multilevel surgery at mean age 11 years 1 month. **Methods:** GMFCS and Functional Mobility Scale (FMS) ratings were recorded pre-operatively and at 2 and 5 years post-operatively. A proportional odds logistic regression model was used for the GMFCS III group to predict the probability of assistive device requirements post-operatively conditional on baseline FMS. **Results:** Children in GMFCS III showed more change than those in I/II at home and school. Those in GMFCS III using crutches pre-operatively at home and school were more likely to continue using them at 5 years, whereas those using walkers were more likely to change to crutches or wheelchairs. Wheelchairs were most commonly used in the community before and after single-event multilevel surgery. **Conclusion:** Mobility was generally stable or improved at 5 years after single-event multilevel surgery; however, a small number of children used more assistance to facilitate mobility.

[PMID: 22266600](#) [PubMed - as supplied by publisher]

**9. Neural Plast. 2012;2012:375148. Epub 2012 Jan 4.****From Spinal Central Pattern Generators to Cortical Network: Integrated BCI for Walking Rehabilitation.**

Cheron G, Duvinage M, De Saedeleer C, Castermans T, Bengoetxea A, Petieau M, Seetharaman K, Hoellinger T, Dan B, Dutoit T, Sylos Labini F, Lacquaniti F, Ivanenko Y.

Laboratoire de Neurophysiologie et de Biomécanique du Mouvement, Université Libre de Bruxelles, CP 168, 50 Avenue F Roosevelt, 1050 Brussels, Belgium.

Success in locomotor rehabilitation programs can be improved with the use of brain-computer interfaces (BCIs). Although a wealth of research has demonstrated that locomotion is largely controlled by spinal mechanisms, the brain is of utmost importance in monitoring locomotor patterns and therefore contains information regarding central pattern generation functioning. In addition, there is also a tight coordination between the upper and lower limbs, which can also be useful in controlling locomotion. The current paper critically investigates different approaches that are applicable to this field: the use of electroencephalogram (EEG), upper limb electromyogram (EMG), or a hybrid of the two neurophysiological signals to control assistive exoskeletons used in locomotion based on programmable central pattern generators (PCPGs) or dynamic recurrent neural networks (DRNNs). Plantar surface tactile stimulation devices combined with virtual reality may provide the sensation of walking while in a supine position for use of training brain signals generated during locomotion. These methods may exploit mechanisms of brain plasticity and assist in the neurorehabilitation of gait in a variety of clinical conditions, including stroke, spinal trauma, multiple sclerosis, and cerebral palsy.

[PMID: 22272380](#) [PubMed - in process] PMID: PMC3261492

**10. IEEE Int Conf Rehabil Robot. 2011 Jun;2011:1-6.****Ankle control and strength training for children with cerebral palsy using the Rutgers Ankle CP.**

Cioi D, Kale A, Burdea G, Engsberg J, Janes W, Ross S.

The purpose of the study described here was to develop and feasibility test the Rutgers Ankle CP, aimed at ankle strengthening and improved control for children with cerebral palsy (CP). The system was an upgrade in hardware (new foot attachment, new robot controller) and software (new games and programming language) of the earlier Rutgers Ankle in order to permit training of children with CP. The new Rutgers Ankle CP was used to train ankle strength and motor control in a 7 year old boy with CP during 36 rehabilitation sessions (12 weeks, 3 times/week). Assessments for impairment, function and quality of life were taken before and after training. Results indicated improvements in both strength and motor control. Gait function improved substantially in ankle kinematics, speed and endurance. Overall function (GMFM) indicated improvements that were typical of other ankle strength training programs. Quality of life increased beyond what would be considered a minimal clinically important difference. While these results are only for a single participant, they are very encouraging toward improving the function and quality of life of children with cerebral palsy. Further research with a larger number of participants is planned.

[PMID: 22275633](#) [PubMed - in process]

**10. IEEE Int Conf Rehabil Robot. 2011 Jun;2011:1-5.****Pediatric anklebot.**

Krebs HI, Rossi S, Kim S, Artemiadis PK, Williams D, Castelli E, Cappa P.

In this paper we present the alpha-prototype of a novel pediatric ankle robot. This lower-extremity robotic therapy module was developed at MIT to aid recovery of ankle function in children with cerebral palsy ages 5 to 8 years old. This lower-extremity robotic module will commence pilot testing with children with cerebral palsy at Blythedale Childrens Hospital (Valhalla, NY), Bambino Gesù Children's Hospital (Rome, Italy), Riley Children's Hospital (Indianapolis, IN). Its design follows the same guidelines as our upper-extremity robots and adult anklebot designs, i.e. it is a low friction, backdriveable device with intrinsically low mechanical impedance. We show the ankle robot characteristics and stability range. We also present pilot data with healthy children to demonstrate the potential of

this device.

[PMID: 22275613](#) [PubMed - in process]

#### **11. IEEE Int Conf Rehabil Robot. 2011 Jun;2011:1-6.**

##### **Design of a novel mobility device controlled by the feet motion of a standing child.**

Schoepflin ZR, Xi Chen, Ragonesi CB, Galloway JC, Agrawal SK.

Self-generated mobility is a major contributor to the physical, emotional, cognitive, and social development of infants and toddlers. When young children have disorders that hinder self locomotion, their development is at risk for delay. Independent mobility via traditional power mobility devices may prevent this delay, but do little to encourage the child's development of gross motor skills. This research aims to develop a bio-driven mobile-assistive device that is controlled and driven by moving the feet, which may encourage the development of gross motor skills. In this study, system feasibility is shown by experiments on five typically developing toddlers and one special needs toddler with spastic cerebral palsy. Children were placed in the bio-driven device and instructed to navigate through a maze. All subjects were able to successfully complete the maze in multiple trials. Additionally, two toddlers showed evidence of improved driving skill by completing the maze in shorter times in successive trials on a given testing day. The results suggest that such a device is feasible for purposeful driving. Recommendations are given for the device and protocol redesign for related future testing.

[PMID: 22275559](#) [PubMed - in process]

#### **12. IEEE Int Conf Rehabil Robot. 2011 Jun;2011:1-6.**

##### **Characterizing head motor disorders to create novel interfaces for people with cerebral palsy: Creating an alternative communication channel by head motion.**

Raya R, Rocon E, Ceres R, Harlaar J, Geytenbeek J.

This paper aims to validate a head mounted inertial interface to characterize disorder movements in people with cerebral palsy (CP). The kinematic patterns extracted from this study will be used to design an alternative communication channel (using head motion) adapted to user's capabilities and limitations. Four people with CP participated (GMFCS level V) and three healthy subjects as reference group. The main outcome measures were divided into 1) Time-domain, 2) Frequency-domain and 3) Spatial domain. Results showed that the inertial interface succeeds assessing the pathological motion. Firstly, the system differentiates between voluntary and involuntary motion in terms of motor control, frequency and range of motion. Secondly some motion disorders such as hypertonia, hypotonia can be identified. These results suggest that people with motor disorders could benefit from the developed inertial system in three fields: 1) diagnosis of motor disorder by means of an objective quantification, 2) physical and cognitive rehabilitation by means of proprioceptive enhancement through visual-motor feedback and 3) functional compensation by means of an inertial person-machine interface for controlling computer and assistive devices (e.g. wheelchairs or walkers).

[PMID: 22275612](#) [PubMed - in process]

#### **13. PLoS Med. 2012 Jan;9(1):e1001158. Epub 2012 Jan 17.**

##### **Trends in resource utilization by children with neurological impairment in the United States inpatient health care system: a repeat cross-sectional study.**

Berry JG, Poduri A, Bonkowsky JL, Zhou J, Graham DA, Welch C, Putney H, Srivastava R.

Complex Care Service, Children's Hospital Boston, Harvard Medical School, Boston, Massachusetts, United States of America.

BACKGROUND: Care advances in the United States (US) have led to improved survival of children with

neurological impairment (NI). Children with NI may account for an increasing proportion of hospital resources. However, this assumption has not been tested at a national level. **METHODS AND FINDINGS:** We conducted a study of 25,747,016 US hospitalizations of children recorded in the Kids' Inpatient Database (years 1997, 2000, 2003, and 2006). Children with NI were identified with International Classification of Diseases, 9th Revision, Clinical Modification diagnoses resulting in functional and/or intellectual impairment. We assessed trends in inpatient resource utilization for children with NI with a Mantel-Haenszel chi-square test using all 4 y of data combined. Across the 4 y combined, children with NI accounted for 5.2% (1,338,590) of all hospitalizations. Epilepsy (52.2% [n=538,978]) and cerebral palsy (15.9% [n=164,665]) were the most prevalent NI diagnoses. The proportion of hospitalizations attributable to children with NI did not change significantly ( $p=0.32$ ) over time. In 2006, children with NI accounted for 5.3% (n=345,621) of all hospitalizations, 13.9% (n=3.4 million) of bed days, and 21.6% (US\$17.7 billion) of all hospital charges within all hospitals. Over time, the proportion of hospitalizations attributable to children with NI decreased within non-children's hospitals (3.0% [n=146,324] in 1997 to 2.5% [n=113,097] in 2006,  $p<.001$ ) and increased within children's hospitals (11.7% [n=179,324] in 1997 to 13.5% [n=209,708] in 2006,  $p<0.001$ ). In 2006, children with NI accounted for 24.7% (2.1 million) of bed days and 29.0% (US\$12.0 billion) of hospital charges within children's hospitals. **CONCLUSIONS:** Children with NI account for a substantial proportion of inpatient resources utilized in the US. Their impact is growing within children's hospitals. We must ensure that the current health care system is staffed, educated, and equipped to serve this growing segment of vulnerable children. Please see later in the article for the Editors' Summary.

[PMID: 22272190](#) [PubMed - in process] [PMCID: PMC3260313](#)

#### **14. *Pediatr Emerg Care.* 2012 Jan 20. [Epub ahead of print]**

##### **Profile of Patients Visiting the Pediatric Emergency Service in an Egyptian University Hospital.**

Bazaraa HM, El Houchi S, Rady HI.

From the Pediatric Cairo University Mounira Children Hospital (Abou EL Reeshe), the Pediatric Department, Kasr El Aini Faculty of Medicine, Cairo University, Cairo, Egypt.

**BACKGROUND:** The emergency department (ED) is an essential component of the medical service offered in any hospital. Yet, the published information about patients' profile and utilization of emergency services in both developing and developed countries is scarce. **AIM:** This study aimed to characterize the presentation and outcome of patients visiting the ED of a university-based tertiary pediatric hospital. **METHODS:** This is a descriptive study reporting the profile of patients visiting the ED for 1 year. **RESULTS:** The total number of patients visiting the hospital was 249,552, with a monthly average of 20,046 patients, including 3639 monthly ED visits. "Treat-and-release" cases represented 46.7% and infants represented the largest age group (44.4%). The main presentation was respiratory distress (24.4%) and wheezy chest (17.3%), followed by convulsions (15%) and then pallor (10.7%). Long-term illnesses were predominantly congenital heart diseases, cerebral palsy, chronic hemolytic anemia, and asthma. The overall mortality rate was 0.8%. **CONCLUSIONS:** Appropriate and ongoing data collection and analysis could guide more efficient utilization of pediatric emergency services to achieve better outcomes.

[PMID: 22270495](#) [PubMed - as supplied by publisher]

## Prevention and Cure

### 15. Curr Opin Pediatr. 2012 Jan 21. [Epub ahead of print]

#### Clinical importance of hypothyroxinemia in the preterm infant and a discussion of treatment concerns.

La Gamma EF, Paneth N.

a. Regional Neonatal Intensive Care Unit, Maria Fareri Children's Hospital at Westchester Medical Center bDivision of Newborn Medicine, Department of Pediatrics, Biochemistry & Molecular Biology, New York Medical College, New York, New York cDepartments of Epidemiology and Pediatrics & Human Development, Michigan State University, East Lansing, Michigan, USA.

**PURPOSE OF REVIEW:** Survival for the extremely low gestational age neonate (ELGAN; 24-28 weeks) has risen to more than 80%. This extraordinary achievement is tempered by the persistence of cognitive delays and cerebral palsy (CP) affecting nearly one in eight survivors, and requiring subsequent rehabilitative services. A major priority in newborn medicine must be to translate the gains in survival achieved over the past 40 years into gains in healthy survival without the current high frequency of impairments. **RECENT FINDINGS:** Transient hypothyroxinemia in ELGANs is strongly associated with lower IQ scores, behavioral abnormalities and CP. Limited evidence suggests the possibility of a benefit from hormone replacement therapy, but the optimal trial has yet to be conducted. A continuous infusion of 4 µg/kg per day thyroxine for 42 days can safely correct transient hypothyroxinemia without markedly lowering thyroid stimulating hormone levels, thus creating a biochemical euthyroid state. Whether this treatment will make an impact on long-term outcomes is not yet known. **SUMMARY:** With 25000 neonates born in less than 28 weeks each year in the USA, the economic impact of the very high rates of cognitive disabilities and related neurological dysfunction in survivors is substantial. The lifetime direct and indirect costs of CP are estimated at US\$1 million per person and the costs of mental retardation are even higher. If reversal of transient hypothyroxinemia proves effective in reducing the risks of CP or mental retardation in ELGANs by 30%, we estimate an overall saving of US\$ 3 billion per year. There is a pressing need for a phase III trial of thyroid hormone that is of sufficient duration and size to determine whether a clinically important reduction in risk of developmental impairments in ELGANs can be achieved.

[PMID: 22273635](#) [PubMed - as supplied by publisher]

### 16. Cytokine. 2012 Jan 20. [Epub ahead of print]

#### The association between proinflammatory cytokine polymorphisms and cerebral palsy in very preterm infants.

Kapitanović Vidak H, Catela Ivković T, Jokić M, Spaventi R, Kapitanović S.

Special Hospital for Children with Neurodevelopmental and Motor Difficulties, Goljak 2, Zagreb, Croatia.

Cerebral palsy (CP) is a nonprogressive motor disorder caused by white matter damage in the developing brain and is often accompanied with cognitive and sensory disabilities. The risk of CP is higher among infants born preterm than in more mature infants. Intrauterine infection/inflammation, activation of the cytokine network and elevated levels of proinflammatory cytokines in neonatal blood or in amniotic fluid to which the preterm infant is exposed, has been identified as the most common cause of preterm delivery, periventricular leukomalacia (PVL) and CP. The aim of our study was to evaluate the possible association of four TNFα promoter single nucleotide polymorphisms (SNPs) (-1031 T/C, -857 C/T, -308 G/A and -238 G/A), two IL1β SNPs (-511 C/T and +3954 C/T) and one IL6 (-174 C/G) polymorphism with susceptibility to CP in very preterm infants. Statistically significant association between TNFα -1031 T/C high expression genotypes (TC and CC) (OR, 2.339; p=0.016) as well as between TNFα -1031 C high expression allele (OR, 2.065; p=0.013) and risk of CP was observed. In addition, statistically significant association was found between TNFα TC, CC, GG, GG -1031/-857/-308/-238 genotypes combination (OR, 3.286; p=0.034) and risk of CP. Statistically significant association between IL1β TT, CC -511/+3954 genotypes combination and risk of CP (OR, 4.000; p=0.027) was also found. In CP patients with cystic PVL (cPVL) statistically significant association was found between TNFα -1031 T/C high expression genotypes (TC and

CC) (OR, 2.361; p=0.038), IL1 $\beta$  -511 C/T high expression genotype TT (OR, 3.215; p=0.030) as well as IL1 $\beta$  -511 T high expression allele (OR, 1.956; p=0.019) and risk of CP. Statistically significant association was also found in patients with cPVL between TNF $\alpha$  TC, CC, GG, GG -1031/-857/-308/-238 genotypes combination (OR, 4.107; p=0.024), as well as IL1 $\beta$  TT, CC -511/+3954 genotypes combination (OR, 7.333; p=0.005) and risk of CP. Our results suggest the role of TNF $\alpha$  and IL1 $\beta$  polymorphisms which have previously been associated with higher circulating levels of these cytokines in genetic susceptibility to white matter damage and consequently CP in very preterm infants.

Copyright © 2012 Elsevier Ltd. All rights reserved.

[PMID: 22266275](#) [PubMed - as supplied by publisher]

**17. Dev Med Child Neurol. 2012 Jan 23. doi: 10.1111/j.1469-8749.2011.04201.x. [Epub ahead of print]**

### **Heavy maternal alcohol consumption and cerebral palsy in the offspring.**

O'Leary CM, Watson L, D'Antoine H, Stanley F, Bower C.

National Drug Research Institute, Curtin University, Perth, WA, Australia. Division of Population Sciences, Telethon Institute for Child Health Research, Centre for Child Health Research, University of Western Australia, Perth, WA, Australia. Menzies School of Health Research, Charles Darwin University, Darwin, NT, Australia.

**Aim:** The aim of this study was to investigate the association between heavy maternal alcohol consumption and pre - peri- and postneonataly acquired cerebral palsy (CP). **Method:** The records of all mothers with an International Classification of Diseases, revision 9 or 10 (ICD-9/-10) alcohol-related diagnostic code, indicating heavy alcohol consumption, recorded on population-based health, mental health, and drug and alcohol data sets from 1983 to 2007, and their children were identified through the Western Australian Data-linkage System. This 'exposed' cohort was frequency matched with mothers without an alcohol-related diagnosis and their offspring (comparison group). Cases of CP were identified through linkage with the Western Australia CP Register. Analyses were undertaken using multivariate logistic regression. **Results:** There were 23 573 live births in the exposed group (58.6% non-Aboriginal; 41.4% Aboriginal) and 292 cases of CP. The odds of pre/perinatally acquired CP were elevated for children of non-Aboriginal mothers with an alcohol-related diagnosis recorded during pregnancy (adjusted odds ratio 3.32; 95% confidence interval [CI] 1.30-8.48) and for Aboriginal children when an alcohol-related diagnosis was recorded up to 12 months before the mother's pregnancy (adjusted odds ratio 2.49; 95% CI 0.99-6.25). Increased odds of postneonataly acquired CP following any alcohol-related diagnosis were found for non-Aboriginal children (adjusted odds ratio 7.92; 95% CI 2.23-28.14). **Interpretation:** These results suggest that heavy maternal alcohol consumption is a direct cause of pre/perinatally acquired CP, and an indirect cause of postneonataly acquired CP, in non-Aboriginal children. The lack of an association for Aboriginal children requires further investigation but may be due to under ascertainment of alcohol use disorders during pregnancy and other aetiological pathways.

© The Authors. Developmental Medicine & Child Neurology © 2012 Mac Keith Press.

[PMID: 22268559](#) [PubMed - as supplied by publisher]

**18. Early Hum Dev. 2012 Jan 24. [Epub ahead of print]**

### **Artificial neural networks based prediction of cerebral palsy in infants with central coordination disturbance.**

Lukić S, Cojbašić Z, Jović N, Popović M, Bjelaković B, Dimitrijević L, Bjelaković L.

Clinic of Neurology, Clinical centre Niš, Serbia; Faculty of Medicine, University of Niš, Serbia.

**BACKGROUND:** In a previous study we demonstrated that heart variability parameters (HRV) could be helpful clinically as well as a prognostic tool in infants with central coordination disturbance (CCD). In recent years, outcome predictions using artificial neural networks (ANN) have been developed in many areas of health care research, but there are no published studies considered ANN models for prediction of cerebral palsy (CP)

development. **OBJECTIVE:** To compare the results of an ANN analysis with results of regression analysis, using the same data set and the same clinical and HRV parameters. **METHODS:** The study included 35 infants with CCD and 37 healthy age and sex-matched controls. Time-domain HRV indices were analyzed from 24h electrocardiography recordings. Clinical parameters and selected time domain HRV parameters are used to predict CP by logistic regression, and then an ANN analysis was applied to the same data set. Input variables were age, gender, postural responses, heart rate parameters (minimum, maximum and average), and time domain parameters of HRV (SDNN, SDANN and RMSSD). For each of one the pairs of ANN and clinical predictors, the area under the receiver operating characteristic (ROC) curves with test accuracy parameters were calculated and compared. **RESULTS:** In the observed dataset, ANN model overall correctly classified all infants, compared with 86.11% correct classification for the logistic regression model, and compared with 67.65% and 77.14% for SDANN and SDNN respectively.

**CONCLUSIONS:** ANN model, based on clinical and HRV data can predict development of CP in patients with CCD with accuracy greater than 90%. Our results strongly indicate that a well-validated ANN may have a role in the clinical prediction of CP in infants with CCD.

Copyright © 2012 Elsevier Ltd. All rights reserved.

[PMID: 22281057](#) [PubMed - as supplied by publisher]

### **19. *Pediatr Surg Int.* 2012 Jan 25. [Epub ahead of print]**

#### **Does necrotizing enterocolitis affect growth and neurodevelopmental outcome in very low birth weight infants?**

Dilli D, Eras Z, Ozkan Ulu H, Dilmen U, Durgut Şakrucu E.

Department of Neonatology, Zekai Tahir Burak Maternity and Teaching Hospital, Ankara, Turkey, dilekdilli2@yahoo.com.

**AIM:** To evaluate the effect of necrotizing enterocolitis (NEC) on growth and neurodevelopmental outcome. **PATIENTS AND METHODS:** Neurodevelopmental outcome of 20 of 39 surviving very low birthweight infants (VLBW) diagnosed with NEC between 2007 and 2009 was compared with 40 control infants matched for gestational age and year of admission. Follow-up studies were performed at 18 and 24 months of corrected age. Bayley Scales of Infant Development-Second Edition scale was used for neurodevelopmental assessment. **RESULTS:** At 18-24 months corrected age, body weight, body length, and head circumference did not differ significantly between the NEC and without NEC groups. The median mental developmental index (62 vs. 75,  $p = 0.008$ ) and psychomotor developmental index points (72 vs. 91.5,  $p = 0.002$ ) were lower in infants with NEC compared to without NEC, respectively. Although the rate of neurodevelopmental impairment was slightly higher in infants with NEC, there were no differences between the groups according to the frequency of minimal impairment and cerebral palsy. Growth or neurodevelopmental outcome did not differ between the NEC survivors with and without surgery. **CONCLUSION:** Necrotizing enterocolitis has affected neurodevelopmental outcome but not growth in VLBW infants at 18-24 months of corrected age. Both those treated medically or requiring surgery need close neurodevelopmental follow-up for the first years of life.

[PMID: 22274546](#) [PubMed - as supplied by publisher]

### **20. *Stroke.* 2012 Jan 26. [Epub ahead of print]**

#### **Reduced Ipsilesional Cortical Volumes in Fetal Periventricular Venous Infarction.**

Li D, Hodge J, Wei XC, Kirton A.

From the Calgary Pediatric Stroke Program, Division of Neurology, Department of Pediatrics, and the Department of Diagnostic Imaging, Alberta Children's Hospital Research Institute, University of Calgary, Calgary, Alberta, Canada.

**BACKGROUND AND PURPOSE:** Perinatal stroke causes most term-born hemiplegic cerebral palsy. Many suffer additional sequelae. Periventricular venous infarction (PVI) is a common fetal stroke in which isolated subcortical

injury may cause only motor deficits. However, cognitive, language, and behavioral deficits also occur. We hypothesized that ipsilesional cortical gray matter volumes are reduced in PVI. **METHODS:** Children (12 months to 18 years) with MRI-confirmed PVI were identified through the Alberta Perinatal Stroke Project. We developed an MRI method to quantify sectional gray (GM) and white matter (WM) volumes from lesioned and unlesioned (control) hemispheres (OsiriX software). Differences in cortical GM and WM volumes were compared between hemispheres in preselected regions "above" the lesion (middle) and anterior and posterior to this. Outcomes dichotomized for "cortical dysfunction" (cognitive, behavioral, language) and motor deficit severity (Pediatric Stroke Outcome Measure) were compared with GM volumes. **RESULTS:** Twenty-two children (81% boys; median age, 8 years) were included. Methods demonstrated high intrarater and inter-rater reliabilities ( $\rho=0.988$ ,  $\rho=0.943$ ) and minimal observer bias. Ipsilesional GM volume was significantly reduced in the middle ( $P=0.007$ ) and posterior ( $P=0.03$ ) regions. Middle ipsilesional WM volumes were reduced ( $P<0.001$ ). The degree of GM reduction was not associated with cortical dysfunction or severity of motor deficit. **CONCLUSIONS:** Ipsilesional GM volume is diminished in PVI. Speculative mechanisms include retrograde neuronal degeneration and disrupted migration. Neuropsychological testing of larger samples is required to determine clinical significance.

[PMID: 22282891](#) [PubMed - as supplied by publisher]

### Subscribe to CP Research News

To subscribe to this research bulletin, please complete the online form at [www.cpresearch.org/subscribe/researchnews](http://www.cpresearch.org/subscribe/researchnews) You can bookmark this form on the home screen of your smart phone and also email the link to a friend.

To unsubscribe, please email [researchnews@cerebralpalsy.org.au](mailto:researchnews@cerebralpalsy.org.au) with 'Unsubscribe' in the subject line, and your name and email address in the body of the email.