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# CP Research News

Monday 21 April 2008

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**1: J Pediatr. 2008 May;152(5):648-54. Epub 2007 Dec 26.**

## **Neurodevelopmental outcome of preterm infants with severe intraventricular hemorrhage and therapy for post-hemorrhagic ventricular dilatation.**

Brouwer A, Groenendaal F, van Haastert IL, Rademaker K, Hanlo P, de Vries L.

Department of Neonatology, Wilhelmina Children's Hospital, University Medical Center, Utrecht, The Netherlands.

**OBJECTIVE:** To evaluate the neurodevelopmental outcome of preterm infants with a grade III or IV hemorrhage and to assess the effect of routine low-threshold therapy of post-hemorrhagic ventricular dilatation (PHVD) on neurodevelopmental outcome. **STUDY DESIGN:** Of the 214 preterm infants (< or = 34 weeks gestational age), 94 (44%) had a grade III intraventricular hemorrhage (IVH), and 120 (56%) had a grade IV hemorrhage. We evaluated the natural evolution of IVH, the need for intervention for PHVD, and neurodevelopmental outcome at 24 months corrected age. **RESULTS:** PHVD developed significantly more often in the surviving infants with a grade III hemorrhage (53/68, 78%) than in infants with a grade IV hemorrhage (40/76, 53%;  $P = .002$ ). Intervention for PHVD was required significantly more often in the grade III group, than in the grade IV group ( $P < .001$ ). In the grade III group, cerebral palsy developed in 5 of the 68 surviving infants (7.4%), compared with 37 of the 76 infants (48.7%) with a grade IV hemorrhage ( $P < .001$ ). The mean developmental quotient (DQ) in the grade III group was 99, and in the grade IV-group it was 95 at 24 months corrected age. **CONCLUSIONS:** Short-term neurodevelopmental outcome of preterm infants with grade III or IV hemorrhage was better than reported earlier. Requiring intervention for PHVD only had a negative effect on DQ in infants with a grade IV hemorrhage. Infants with cerebral palsy had significantly lower DQs, irrespective of the severity of IVH.

PMID: 18410767 [PubMed - in process]



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**2: Nat Clin Pract Neurol. 2008 Apr 15 [Epub ahead of print]**

**Hemiplegic cerebral palsy: role of repeat botulinum toxin A injections as an adjunct to occupational therapy.**

Brunstrom JE.

JE Brunstrom is Associate Professor of Neurology and Pediatrics, and Director of the Pediatric Neurology Cerebral Palsy Center at Washington University School of Medicine and St Louis Children's Hospital, St Louis, MO, USA.

PMID: 18414468 [PubMed - as supplied by publisher]

**3: Brain Cogn. 2008 Apr 9 [Epub ahead of print]**

**Acetylcholine esterase activity and behavioral response in hypoxia induced neonatal rats: Effect of glucose, oxygen and epinephrine supplementation.**

Chathu F, Krishnakumar A, Paulose CS.

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Brain damage due to an episode of hypoxia remains a major problem in infants causing deficit in motor and sensory function. Hypoxia leads to neuronal functional failure, cerebral palsy and neurodevelopmental delay with characteristic biochemical and molecular alterations resulting in permanent or transitory neurological sequelae or even death. During neonatal hypoxia, traditional resuscitation practices include the routine administration of 100% oxygen, epinephrine and glucose. In the present study, we assessed the changes in the cholinergic system by measuring the acetylcholinesterase (AChE) activity and the behavioral responses shown by hypoxia induced neonatal rats and hypoxic rats supplemented with glucose, oxygen and epinephrine using elevated plus-maze and open-field test. The acetylcholine esterase enzyme activity showed a significant decrease in cerebral cortex, whereas it increased significantly in the muscle of experimental rats when compared to control. Hypoxic rats supplemented with glucose, glucose and oxygen showed a reversal to the control status. Behavioral studies were carried out in experimental rats with elevated plus-maze test and open-field test. Hypolocomotion and anxiogenic behavioral responses were observed in all experimental rats when compared to control, hypoxic rats supplemented with glucose, glucose and oxygen. Thus, our results suggest that brain damage due to hypoxia, oxygen and epinephrine supplementation in the neonatal rats cause acetylcholine-neuromuscular-defect leading to hypolocomotion and anxiogenic behavioral response. Glucose and glucose with oxygen supplementation to hypoxic neonates protect the brain damage for a better functional status in the later life.

PMID: 18406032 [PubMed - as supplied by publisher]

**4: Eur J Phys Rehabil Med. 2008 Jun;44(2):203-11.**

**The term diplegia should be enhanced. Part II: contribution to validation of the new rehabilitation oriented classification.**

Cioni G, Lodesani M, Pascale R, Coluccini M, Sassi S, Paolicelli PB, Perazza S, Ferrari A.

Department of Developmental Neuroscience, IRCCS Stella Maris, Pisa, ferrari.adriano@asmn.re.it.

Recent proposals of classification for cerebral palsy (CP), mainly revised for epidemiological purposes, suggest to abandon the use of the term diplegia. Conversely, in this paper data are presented to support the proposal to maintain the distinction between spastic tetraplegia and diplegia, and to subdivide this

latter according to four main clinical patterns of walking observable in these children. This proposal of classification was validated by testing a group of 467 subjects with CP, of whom 213 with diplegia and 115 with tetraplegia, consecutively admitted between January 2005 and December 2006 to two national reference centers for this disability. The results were compared with findings obtained by other methods of classifying gross and fine motor function and associated disorders. The subjects with tetraplegia strongly differ from those of diplegia, both for motor functions and for other disabilities. The four main walking patterns of spastic diplegia were easily recognizable and observers were able to assign most of the subjects to one form of the classification. Significant correlations between walking forms of diplegia and distribution of Gross Motor Function Classification System (GMFCS) levels were found. Some of the forms significantly differ also for fine motor and mental disability. These findings suggest that in clinical practice the category of diplegia not only can be kept as a separate form of CP, but it may be enhanced, through the identification of different subcategories of children, divided according to their walking patterns.

PMID: 18418340 [PubMed - in process]

#### **5: Eur J Phys Rehabil Med. 2008 Jun;44(2):195-201**

##### **The term diplegia should be enhanced. Part I: a new rehabilitation oriented classification of cerebral palsy.**

Ferrari A, Alboresi S, Muzzini S, Pascale R, Perazza S, Cioni G.

Department of Neuroscience, University of Modena and Reggio Emilia, Italy ferrari.adriano@asmn.re.it.

The classification systems for cerebral palsy (CP) need to be continuously updated, according to specific aims and to significant changes observed over the years in the panorama of CP. A simplification of CP categories, abandoning the use of the term diplegia, has been recently suggested. Conversely, in this paper a new proposal for classification of CP is briefly presented, where special attention is given to diplegia which is suggested to be divided into four main clinical forms, according to the patterns of walking observable in these subjects. The proposed classification was applied to a large population of 213 subjects with diplegia, among 467 cases of CP admitted to two reference centres for this disorder. The relative incidence of the four forms is reported. The adopted classification criteria, based on a primary ability of professionals working in rehabilitation, i.e. observation capacity, makes this approach simple and easy to use at all levels of the rehabilitation services for CP.

PMID: 18418339 [PubMed - in process]

#### **6: Przegl Lek. 2007;64(11):929-33.**

##### **Assessment of the Doppler cerebral blood flow measurement in infants with perinatal trauma [Article in Polish]**

Gergont A, Nowak A, Krocicka S.

Pracownia Neurosonografii Dopplerowskiej, Uniwersytecki Szpital Dziecigcy w Krakowie. neu-pedkr@cm-uj.krakow.pl

**BACKGROUND:** Birth trauma may lead in infants to developmental delay, cerebral palsy, epilepsy and complications with increasing risk of the death. Several complications are of vascular origin. The aim of the study was the assessment of the transcranial Doppler-sonographic (TCD) measurement of cerebral blood flow in infants with perinatal CNS pathology. **MATERIAL AND METHODS:** 14 infants, 9 females and 5 males, within 12 premature infants, with the CNS perinatal pathology were examined. In children during the neonatal period respiratory distress syndrome, sepsis, apnoe and seizures were also observed. Neuroimaging was performed in each neonate and TCD measurement as well, in 1-7 month of age. Pulsatility index (PI) and resistive index (RI) in anterior cerebral artery (ACA) and in middle cerebral

artery (MCA) were established. RESULTS: In 10 children neuroradiologic examination revealed pathological changes: intraventricular hemorrhage, subdural hematoma, subarachnoid hemorrhage, porencephalic cyst of parietal lobes, agenesis of corpus callosum or lateral ventricles dilatation. In 7 children of this group blood flow changes were registered and in 3 of them (21%) the blood flow was normal. The most severe decrease of blood flow in ACA and MCA associated with decreased PI and RI were detected in a case after subdural hematoma operation, prior to death. In other 4 children with normal brain imaging but abnormal neurological examination, cerebral blood flow was disturbed. In three of them blood flow velocity in ACA was decrease with PI increase and in other one blood flow velocity in MCA was increased. CONCLUSIONS: 1. In 79% of the infants with CNS perinatal pathology transcranial Doppler identified blood flow changes. 2. The further research is necessary for the confirmation that a significant decrease of blood flow velocities and indexes in such cases is a poor prognostic factor.

Publication Types:  
English Abstract

PMID: 18409406 [PubMed - in process]

**7: *Pediatr Neurol.* 2008 May;38(5):329-34.**

**Very early arterial ischemic stroke in premature infants.**

Golomb MR, Garg BP, Edwards-Brown M, Williams LS.

Division of Pediatric Neurology, Department of Neurology, Indiana University School of Medicine, Indianapolis, Indiana.

Early stroke in the premature infant has rarely been described. Presented here are the cases of 23 infants, born between 23 and 35 weeks gestational age, with focal arterial ischemic stroke occurring before 44 weeks gestational age. Ten (43%) were male. Five children (22%) were half of a twin pair; no co-twin died. The most commonly affected territory was the middle cerebral artery territory. Three children with extreme prematurity ( $\leq 26$  weeks) had cerebellar infarcts. Twelve children had unilateral or bilateral intraventricular hemorrhages (grade 3 or higher in 8 of the 12). Twelve children had white matter injury: periventricular leukomalacia, hypoxic-ischemic encephalopathy, or both. Most children had multiple comorbidities, and the median neonatal intensive care unit stay was 63 days (range, 14-365). One child died in the neonatal intensive care unit (age 123 days). All 22 survivors were left with disabilities. Seventeen (77%) had cerebral palsy, 10 (45%) had epilepsy, and 17 (77%) had cognitive impairment. Arterial ischemic stroke appears to add to the neurologic disabilities commonly associated with prematurity.

PMID: 18410848 [PubMed - in process]

**8: *J Pediatr.* 2008 May;152(5):739.**

**Exercise training increases physical fitness for children with cerebral palsy.**

Hornyak JE, Hurvitz EA.

University of Michigan, Ann Arbor, Michigan, USA.

Publication Types:  
Comment

PMID: 18410788 [PubMed - in process]

**9: Dev Neurorehabil. 2008 Apr-Jun;11(2):159-65.****Outpatient evaluation of vision and ocular motricity in 123 children with cerebral palsy.**

Matta AP, Nunes G, Rossi L, Lawisch V, Dellatolas G, Braga L.

Sarah Network of Rehabilitation Hospitals, Rio de Janeiro, Brazil.

Purpose: Children with cerebral palsy (CP) may present varied ophthalmological problems. Paradoxically, however, investigation of visual function and possible related disorders is not routinely conducted in this population during medical consultations. Method: This paper proposes a simple, practical guide for assessing vision and ocular motricity in children with CP. One-hundred and twenty-three patients (mean age: 8.4 years +/- 2.3) from the Sarah Network of Rehabilitation Hospitals (Brasilia, Rio de Janeiro and São Luis units) were studied. Various parameters were investigated (smooth pursuit movements, strabismus, visual acuity, visual field, visuospatial neglect and nystagmus) using the following assessment tools: adapted smooth pursuit test for ocular motricity; Snellen test for visual acuity; confrontation method for visual field; cancellation test (star test) for visual neglect; and cover test for strabismus. Nystagmus was assessed based on patient observation. Results: Eighty-one children completed all the evaluations. Among these, 38 (47%) had no visual problems (hemiplegia 60.5%; diplegia 41.4%; triplegia 12.5%; mixed tetraplegic 33.3%); 23 had difficulties in one of the tested items; and 20 had problems in two or more areas of vision. Conclusions: Visual and oculomotor tests are of significant importance in children with CP and provide relevant information for creating a rehabilitation programme aimed at the individual as a whole.

PMID: 18415821 [PubMed - in process]

**10: BMC Gastroenterol. 2008 Apr 16;8(1):11 [Epub ahead of print]****Effects of Pectin Liquid on Gastroesophageal Reflux Disease in Children With Cerebral Palsy.**

Miyazawa R, Tomomasa T, Kaneko H, Arakawa H, Shimizu N, Morikawa A.

ABSTRACT: BACKGROUND: The use of thickeners is a standard therapy for decreasing episodes of regurgitation or vomiting in infants. However, it remains to be investigated whether thickener is effective for vomiting and/or chronic respiratory symptoms in children with cerebral palsy. METHODS: We enrolled 18 neurologically impaired children caused by cerebral palsy, with gastroesophageal reflux disease. In the first part of this study (pH monitoring), subjects were randomly allocated to two groups: fed with a high-pectin diet [enteral formula: pectin liquid=2:1 (v/v)], or a low-pectin diet [enteral formula: pectin liquid=3:1 (v/v)]. Two-channel esophageal pH monitoring was performed over 48 h. In the second part (clinical trial), subjects were fed a high- or low-pectin diet and non-pectin diet for 4 weeks in a crossover manner. Nurses recorded the feeding volume, number of episodes of vomiting, volume of gastric residue, episodes of cough and wheeze, frequency of using oxygen for dyspnea, and the day when the child could return to school. Cough and wheeze were recorded as a cough-score. RESULTS: The median value for the % time pH <4 at the lower and upper esophagus was significantly decreased with a high-pectin diet [9.2% (6.2-22.6) vs. 5.0% (3.1-13.1); P<0.01, 3.8% (2.9-11.2) vs. 1.6% (0.9-8.9); P<0.01 (interquartile range), non-pectin and high-pectin, respectively]. The number of reflux episodes per day and duration of longest reflux were decreased significantly with a high-pectin, but not with a low-pectin diet. The median number of episodes of vomiting decreased significantly with a high-pectin diet [2.5 / week (1.0-5.0) vs. 1.0 (1.0-1.5), P<0.05]. The median cough-score was significantly decreased by both concentrations of pectin [8.5 /week (1.0-11.5) vs. 2.0 /week (0.0-3.0), fed with a high-pectin diet; 7.0 / week (1.0-14.5) vs. 1.0 /w (0.0-5.0), fed with a low-pectin diet, P<0.05]. CONCLUSIONS: Pectin liquid partially decreases gastroesophageal reflux as measured by esophageal pH monitoring, and might improve vomiting and respiratory symptoms in children with cerebral palsy. Trial registration: ISRCTN19787793.

PMID: 18412980 [PubMed - as supplied by publisher]

**11: Br J Nutr. 2008 Apr 11;:1-6 [Epub ahead of print]****The distributions and correlates of serum albumin levels in institutionalised individuals with intellectual and/or motor disabilities.**

Ohwada H, Nakayama T.

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The serum albumin level is a widely accepted indicator of nutritional status in healthy adults and elderly individuals. However, there are few data regarding the distribution and correlates of serum albumin levels in individuals with intellectual and/or motor disabilities. We conducted a cross-sectional study at a public facility for individuals with intellectual and/or motor disabilities in Ibaraki prefecture, Japan. Health check-up data obtained in 2001 from 477 individuals with intellectual disability (286 males, average age 40.6 (sd 12.3) years; 191 females, average age 45.1 (sd 11.6) years) were retrospectively reviewed. With the exception of men with cerebral palsy, the serum albumin level was nearly normally distributed. The mean was 44 (sd 3.6) g/l for males and 44 (sd 3.6) g/l for females with intellectual disability, 43 (sd 3.2) g/l in males and 44 (sd 2.6) g/l for females with cerebral palsy, 41 (sd 2.7) g/l for males and 42 (sd 3.7) g/l for females with Down's syndrome, and 42 (sd 4.5) g/l for males and 41 (sd 3.2) g/l for females with severe motor and intellectual disabilities. Only six of 474 individuals (1.3 %) had a serum albumin  $\leq$  35 g/l. Low serum albumin was related to age, use of anticonvulsants and/or major tranquilisers, use of other medications, high C-reactive protein (CRP), high zinc sulfate turbidity test (ZTT), low serum Hb and low serum Fe among men; among women, high CRP and high ZTT were related to low serum albumin. The present study found an unexpectedly low incidence of low serum albumin among institutionalised individuals with intellectual and/or motor disabilities. Low serum albumin was associated with age, medications and inflammation in men, as well as inflammation in women.

PMID: 18405401 [PubMed - as supplied by publisher]

**12: Eur J Phys Rehabil Med. 2008 Jun;44(2):213-20.****The term diplegia should be enhanced. Part III: inter-observer reliability of the new rehabilitation oriented classification.**

Pascale R, Perazza S, Borelli G, Bianchini E, Alboresi S, Paolicelli PB, Ferrari A, Cioni G.

Division of Child Neurology and Psychiatry, University of Pisa, Pisa, Italy [cioni@inpe.unipi.it](mailto:cioni@inpe.unipi.it).

**AIM:** The aim of this study was to validate a recent classification of gait in children with the spastic diplegic form of cerebral palsy (CP) by checking the reliability of different scorers in assigning subject walking performance to one of the four specific patterns described in the classification. **METHODS:** The gait patterns of 50 children and adolescents with CP (23 males, 27 females; age range 3-17 years) were selected among patients whose videos were stored in the archives of the Pisa and Reggio Emilia Hospitals. Only video recordings of gait with homogeneous features (duration of at least 90 s, simultaneous recordings on sagittal and frontal views, and other criteria) were taken for examination. The videos were blindly scored using an observational gait scale, at first by two of the authors of the classification system (defined as "maximum experts"), then by ten expert observers, and finally by 206 professionals of rehabilitation after a one-day training on the classification. Cohen's kappa statistics ( $k$ ) and intra class correlations (ICC) were calculated. **RESULTS:** Kappa and ICC indicate an almost perfect agreement both between the two maximum experts and among the ten expert observers. Good results were also obtained in the group of one-day trained scorers. Only a few cases were assigned to the "unclassified" category. The profession of the observer (doctor or therapist) and previous knowledge of the classification had no significant influence on reliability scores. **CONCLUSION:** The results suggest that the proposed classification can be reliably applied, even utilizing short video recordings, to arrange diplegic children into different patterns. Further studies are needed to validate the use of this classification system for clinical and research aims.

PMID: 18418341 [PubMed - in process]

**13: Coll Antropol. 2008 Jan;32 Suppl 1:143-7.**

**Neurodevelopmental outcome in children with periventricular leukomalacia.**

Resić B, Tomasović M, Kuzmanić-Samija R, Lozić M, Resić J, Solak M.

Department of Neurology and Endocrinology, Paediatric Clinic, University Hospital Split and School of Medicine, University of Split, Croatia. bresic@kbsplit.hr

The purpose of this study was to question the correlation of different grades of periventricular leukomalacia (PVL) and subsequent neurodevelopmental outcome. In a prospective study we followed 52 preterm infants. Infants were divided into three groups according to their cranial ultrasound findings of PVL (De Vries classification). Seventeen children had PVL 1, 20 children had PVL 2, and 15 children had PVL 3. All 15 (100%) children with PVL 3 developed cerebral palsy with additional visual perceptual dysfunctions and epilepsy. Children with PVL 1 had high frequency of mild neuromotoric delay and visual impairment. PVL 2 and 3 have great predictive value for subsequent severe neurodevelopmental disorder which refers to cerebral palsy, different cognitive deficits, vision impairment and epilepsy. We have determined that due to high frequency of visual impairment and epilepsy we need to include neurophysiologic examinations very early in children with PVL lesions.

PMID: 18405074 [PubMed - in process]

**14: Gait Posture. 2008 Apr 9 [Epub ahead of print]**

**Comparison of upper extremity kinematics in children with spastic diplegic cerebral palsy using anterior and posterior walkers.**

Strifling KM, Lu N, Wang M, Cao K, Ackman JD, Klein JP, Schwab JP, Harris GF.

Orthopaedic and Rehabilitation Engineering Center (OREC), Marquette University, Academic Support Facility Room 105, 734 N 17th Street, Milwaukee, WI 53201, United States.

This prospective study analyzes the upper extremity kinematics of 10 children with spastic diplegic cerebral palsy using anterior and posterior walkers. Although both types of walkers are commonly prescribed by clinicians, no quantitative data comparing the two in regards to upper extremity motion has been published. The study methodology included testing of each subject with both types of walkers in a motion analysis laboratory after an acclimation period of at least 1 month. Overall results showed that statistically, both walkers are relatively similar. With both anterior and posterior walkers, the shoulders were extended, elbows flexed, and wrists extended. Energy expenditure, walking speed and stride length was also similar with both walker types. Several differences were also noted although not statistically significant. Anterior torso tilt was reduced with the posterior walker and shoulder extension and elbow flexion were increased. Outcomes analysis indicated that differences in upper extremity torso and joint motion were not dependent on spasticity or hand dominance. These findings may help to build an understanding of upper extremity motion in walker-assisted gait and potentially to improve walker prescription.

PMID: 18406138 [PubMed - as supplied by publisher]

**15: Pediatr Neurol. 2008 May;38(5):321-8.**

**Magnetic resonance imaging in children with bilateral spastic forms of cerebral palsy.**

Sööt A, Tomberg T, Kool P, Rein R, Talvik T.

Department of Pediatrics, University of Tartu, Tartu, Estonia; Children's Clinic, Tartu University Hospital, Tartu, Estonia.

We analyzed the relationship between magnetic resonance image findings in children with bilateral spastic cerebral palsy and its stages of severity in term and preterm children. Magnetic resonance image findings of 102 children (66 male and 36 female) with bilateral spastic cerebral palsy (median age, 2.5 years; range, 3 months to 15 years) were reevaluated. The study group consisted of children with confirmed perinatal asphyxia. Hypoxic-ischemic events were diagnosed in 64% of the children. Significant abnormalities relevant to cerebral palsy were evident on imaging in 85/102 (83%) children (in 77% of term and 93% of preterm children). Enlargement of the ventricles alone (48%) or accompanied by periventricular white-matter damage (25%) was the most frequent finding in term and preterm children, but was more highly expressed in preterm children ( $P < 0.05$ ). White-matter damage was more often found in preterm children ( $P < 0.05$ ). Enlargement of the lateral ventricles and periventricular leukomalacia may be attributable to ischemic damage to the neonatal brain. Significant correlations were found between magnetic resonance image findings and severity of cerebral palsy ( $P < 0.05$ ). Detection of brain abnormalities in children with cerebral palsy may prove useful in prognoses as well as in medical consultations and management.

PMID: 18410847 [PubMed - in process]

**16: Zhongguo Zhen Jiu. 2008 Feb;28(2):101-3.**

**Analysis on therapeutic effect of selective acupoint-injection on scissors gait in children of cerebral palsy [Article in Chinese]**

Yao XH.

Department of Pediatrics, The First Affiliated Hospital of Henan College of TCM, Zhengzhou 450000, China. yaoxianhua666@126.com

**OBJECTIVE:** To observe the effect of selective acupoint-injection on scissors gait in 60 children of cerebral palsy. **METHODS:** Sixty children of scissors gait were classified hypermyotonia and hypomyotonia according to muscular tension and femoral angle, and treated with injection into lateral acupoints, medial acupoints and lateral-medial acupoints of the lower limbs, respectively. **RESULTS:** The total effective rate was 87.5% for the hypermyotonia treated with injection into lateral acupoints of the lower limbs, and 100.0% for the hypomyotonia treated with injection into the medial acupoints of the lower limbs, and 80.0% for the patient treated with lateral-medial acupoints. **CONCLUSION:** The causes of forming scissors gait for children of cerebral palsy should be analyzed and different acupoints should be selected for different causes, and different acupoints have different therapeutic effects.

Publication Types:  
English Abstract

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