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# CP Research News

Monday 13 October 2008

This free weekly bulletin lists the latest research on cerebral palsy (CP), as indexed in the NCBI PubMed (Medline) and Entrez (GenBank) databases.

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## 1: J Mol Neurosci. 2008 Oct 10. [Epub ahead of print]

### Importance of Schedule of Administration in the Therapeutic Efficacy of Guanosine: Early Intervention After Injury Enhances Glutamate Uptake in Model of Hypoxia-ischemia.

Moretto MB, Boff B, Lavinsky D, Netto CA, Rocha JB, Souza DO, Wofchuk ST.

Departamento de Análises Clínicas e Toxicológicas, Universidade Federal de Santa Maria, Santa Maria, RS, Brazil, [beatriz@smail.ufsm.br](mailto:beatriz@smail.ufsm.br).

Perinatal cerebral hypoxia-ischemia (HI) is an important cause of mortality and neurological disabilities such as cerebral palsy, epilepsy, and mental retardation. The potential for neuroprotection in HI can be achieved mainly during the recovery period. In previous work, we demonstrated that guanosine (Guo) prevented the decrease of glutamate uptake by hippocampal slices of neonatal rats exposed to a hypoxic-ischemic (HI) insult in vivo when administered before and after insult. In the present study, we compared the effect of Guo administration only after HI using various protocols. When compared with the control, a decrease of [(3)H] glutamate uptake was avoided only when three doses of Guo were administered immediately, 24 h and 48 h after insult, or at 3 h, 24 h, and 48 h after injury or at 6 h, 24 h, and 48 h after HI. These findings indicate that early Guo administration (until 6 h) after HI, in three doses may enhance glutamate uptake into brain slices after hypoxia/ischemia, probably resulting in decreased excitotoxicity.

PMID: 18846436 [PubMed - as supplied by publisher]



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**2: J Pediatr Psychol. 2008 Oct 9. [Epub ahead of print]**

**Parental Reactions Following the Diagnosis of Cerebral Palsy in Their Young Child.**

Rentinck I, Ketelaar M, Jongmans M, Lindeman E, Gorter JW.

Rehabilitation Centre De Hoogstraat, Centre of Excellence for Rehabilitation Medicine Utrecht, the Netherlands, University Medical Center, Rudolf Magnus Institute of Neuroscience, Department of Rehabilitation and Sports Medicine, Utrecht, the Netherlands, Utrecht University, Department of Special Education, Utrecht, the Netherlands, University Medical Center Utrecht, Department of Pediatric Psychology, Utrecht, the Netherlands, CanChild Centre for Childhood Disability Research, McMaster University, Hamilton, Ontario, Canada, Partner of NetChild, Network for Childhood Disability Research in the Netherlands.

**OBJECTIVE:** To investigate parental reactions following the diagnosis of cerebral palsy (CP) in their young children. **METHODS:** In this cross-sectional study, 51 parents of children with CP (mean age = 18.5 months, SD = 1.5) completed the Reaction to Diagnosis Interview, assessing their personal reactions to their children's diagnosis. Relationships between these reactions and the severity of CP in terms of motor abilities and the child's cognitive functioning, as well as coping of parents and perceived social support, were investigated using univariate and multivariate logistic regression analyses. **RESULTS:** Thirty-nine parents (77%) were classified as "resolved." Multivariate regression analysis revealed that severity of CP was associated with an "unresolved" status. **CONCLUSION:** The majority of parents of children with CP have come to terms with this diagnosis by the time their children is 18 months old. The child's gross motor limitations seem to represent an important factor explaining negative parental reactions at this time.

PMID: 18845588 [PubMed - as supplied by publisher]

**3: Am J Obstet Gynecol. 2008 Oct 7. [Epub ahead of print]**

**Intrauterine administration of endotoxin leads to motor deficits in a rabbit model: a link between prenatal infection and cerebral palsy.**

Saadani-Makki F, Kannan S, Lu X, Janisse J, Dawe E, Edwin S, Romero R, Chugani D.

Carman and Ann Adams Department of Pediatrics, Wayne State University School of Medicine, Detroit, MI.

**OBJECTIVE:** This study was undertaken to determine whether maternal intrauterine endotoxin administration leads to neurobehavioral deficits in newborn rabbits. **STUDY DESIGN:** Pregnant New Zealand white rabbits were injected with 1 mL saline solution (n = 8) or 20 mug/kg of lipopolysaccharide in saline solution (n = 8) into the uterine wall on day 28/31 of gestation. On postnatal day 1, kits (saline solution [n = 30] and lipopolysaccharide in saline solution [n = 18] from 4 consecutive litters) underwent neurobehavioral testing. Neonatal brains were stained for microglial cells and myelin. **RESULTS:** Kits in the lipopolysaccharide in saline solution group were hypertonic and demonstrated significant impairment in posture, righting reflex, locomotion, and feeding, along with neuroinflammation indicated by activated microglia and hypomyelination in the periventricular regions. A greater mortality was noted in the lipopolysaccharide in saline solution group (16 stillbirths from 3 litters vs 3 from 1 litter). **CONCLUSION:** Maternal intrauterine endotoxin administration leads to white matter injury and motor deficits in the newborn rabbit, resulting in a phenotype that resembles those found in periventricular leukomalacia and cerebral palsy.

PMID: 18845289 [PubMed - as supplied by publisher]

**4: BMC Pediatr. 2008 Oct 8;8(1):41. [Epub ahead of print]**

**Lower limb strength training in children with cerebral palsy - a randomized controlled trial protocol for functional strength training based on progressive resistance exercise principles.**

Scholtes VA, Dallmeijer AJ, Rameckers EA, Verschuren O, Tempelaars E, Hensen M, Becher JG.

**ABSTRACT: BACKGROUND:** Until recently, strength training in children with cerebral palsy (CP) was considered to be inappropriate, because it could lead to increased spasticity or abnormal movement patterns. However, the results of recent studies suggest that progressive strength training can lead to increased strength and improved function, but low methodological quality and incomplete reporting on the training protocols hampers adequate interpretation of the results. This paper describes the design and training protocol of a randomized controlled trial to assess the effects of a school-based progressive functional strength training program for children with CP. **METHODS:** Fifty-one children with Gross Motor Function Classification Systems levels I to III, aged of 6 to 13 years, were recruited. Using stratified randomization, each child was assigned to an intervention group (strength training) or a control group (usual care). The strength training was given in groups of 4-5 children, 3 times a week, for a period of 12 weeks. Each training session focussed on four exercises out of a 5-exercise circuit. The training load was gradually increased based on the child's maximum level of strength, as determined by the 8 Repetition Maximum (8RM). To evaluate the effectiveness of the training, all children were evaluated before, during, directly after, and 6 weeks after the intervention period. Primary outcomes in this study were gross motor function (measured with the Gross Motor Function Measure and functional muscle strength tests) and walking ability (measured with the 10-meter, the 1-minute and the timed stair test). Secondary outcomes were lower limb muscle strength (measured with a 6RM test, isometric strength tests, and a sprint capacity test), mobility (measured with a mobility questionnaire), and sport activities (measured with the Children's Assessment of Participation and Enjoyment). Spasticity and range of motion were assessed to evaluate any adverse events. **DISCUSSION:** Randomized clinical trials are considered to present the highest level of evidence. Nevertheless, it is of utmost importance to report on the design, the applied evaluation methods, and all elements of the intervention, to ensure adequate interpretation of the results and to facilitate implementation of the intervention in clinical practice if the results are positive. Trial Registration: Trial Register NTR1403.

PMID: 18842125 [PubMed - as supplied by publisher]

**5: J Pediatr Orthop B. 2008 Nov;17(6):277-80.**

**Range of motion measures under anesthesia compared with clinical measures for children with cerebral palsy.**

McMulkin ML, Gordon AB, Caskey PM, Ferguson RL, Baird GO.

Walter E and Agnes M Griffin Motion Analysis Laboratory, Shriners Hospitals for Children, Spokane, WA 99204, USA. mmcmulkin@shrinenet.org

The purpose of this study was to determine whether there is a difference in range of motion at the ankle and knee when measured in the clinic versus under anesthesia for ambulatory children with cerebral palsy. Dorsiflexion and popliteal angle were measured on 70 limbs in the clinic and under surgical anesthesia with the assessor blinded. For the group of patients under 11 years of age, dorsiflexion with the knee flexed significantly increased a mean of 9.5 degrees ( $P < 0.05$ ) and with the knee extended significantly increased 8.5 degrees when patients were under anesthesia compared with the clinical measures. Dorsiflexion angles did not change significantly between the two conditions for the group of patients older than 11 years of age. Mean popliteal angle did not change significantly between the two conditions for either age group.

PMID: 18841059 [PubMed - in process]

**6: Scientific World Journal. 2008 Sep 21;8:873-82.**

**Understanding fetal alcohol spectrum disorders (FASDs): toward identification of a behavioral phenotype.**

Nash K, Sheard E, Rovet J, Koren G.

The Hospital for Sick Children, Toronto and the Ontario Institute for Studies in Education, University of Toronto, Toronto, Canada. knash@oise.utoronto.ca

Fetal alcohol spectrum disorders (FASDs) currently represent the leading cause of mental retardation in North America, ahead of Down syndrome and cerebral palsy. The damaging effects of alcohol on the developing brain have a cascading impact on the social and neurocognitive profiles of affected individuals. Researchers investigating the profiles of children with FASDs have found impairments in learning and memory, executive functioning, and language, as well as hyperactivity, impulsivity, poor communication skills, difficulties with social and moral reasoning, and psychopathology. The primary goal of this review paper is to examine current issues pertaining to the identification of a behavioral phenotype in FASDs, as well as to address related screening and diagnostic concerns. We conclude that future research initiatives comparing children with FASDs to nonalcohol-exposed children with similar cognitive and socioemotional profiles should aid in uncovering the unique behavioral phenotype for FASDs.

PMID: 18836653 [PubMed - in process]

**7: J Clin Epidemiol. 2008 Sep 30. [Epub ahead of print]**

**The Internet is valid and reliable for child-report: An example using the ASK and PedsQL.**

Young NL, Varni JW, Snider L, McCormick A, Sawatzky B, Scott M, King G, Hetherington R, Sears E, Nicholas D.

School of Rural and Northern Health, Laurentian University, Sudbury, Ontario, Canada; Child Health Evaluative Sciences, SickKids, Toronto, Ontario, Canada.

**OBJECTIVE:** This study tested the impact of web administration on well-established measures of children's physical function and quality of life. **STUDY DESIGN AND SETTING:** Participants were recruited from clinics at six hospitals. They completed the Activities Scale for Kids (ASK) and the Pediatric Quality of Life Inventory (PedsQL) questionnaires twice, in a crossover design that used paper and web-based modes of administration. Intraclass correlation coefficients were used to assess the validity of the new web formats relative to the original paper formats and their test-retest reliability. **RESULTS:** Sixty-nine children ranging in age from 8.0 to 13.4 years (mean=11.0 years) completed the study. The sample included children with cerebral palsy (19), spina bifida (23), and cystic fibrosis (27). The mean ASK score was 77.5 and the mean PedsQL score was 69.1. The intermethod intraclass correlation coefficients were 0.98 (lower limit 0.94) for the ASK and 0.64 (lower limit 0.35) for the PedsQL. These compare to intraclass correlation coefficients of 0.99 and 0.94, respectively, for traditional paper formats. **CONCLUSION:** The web ASK was valid in comparison to the original paper format. Consistency in mode of administration may be more important when using the PedsQL. Both measures were highly reliable on paper and on the web.

PMID: 18834710 [PubMed - as supplied by publisher]

**8: Dev Med Child Neurol. 2008 Oct;50(10):784-9.****Behaviour in children with cerebral palsy with and without epilepsy.**

Carlsson M, Olsson I, Hagberg G, Beckung E.

Department of Paediatrics, Queen Silvia Children's Hospital, Sahlgrenska University Hospital, Gothenburg, Sweden.

The aim of the study was to describe behavioural problems in children with cerebral palsy (CP) with and without epilepsy. The children were sampled from the Western Sweden CP register and were part of a European Union project. The Strength and Difficulties Questionnaire and questions on epilepsy were answered by one parent of each child. Medical records were reviewed. Parents of 83 children (44 males, 39 females) age range participated: 30 at Gross Motor Function Classification System levels I and II, and 53 at levels III to V; 60 had spastic age range 8 to 12 years (bilateral 42, unilateral 18) and 23 dyskinetic CP; 34 children had active epilepsy. The proportion of children with normal behaviour on the total difficulties score (TDS) of the Strength and Difficulties Questionnaire was significantly lower than normative data (57% vs 80%,  $p < 0.001$ ). Parents of 21 children (25%) considered their child's behaviour to be abnormal. Children with CP and epilepsy had a significantly higher median TDS ( $p = 0.03$ ) than seizure-free children. In children with aided or no walking ability, the TDS was significantly higher in those with epilepsy ( $p = 0.04$ ). Parents of 32 children (39%) considered their children's behaviour to have an impact on themselves and others. We conclude that behavioural problems are common in children with CP, and even more when epilepsy is present. Parents identify these problems, and professionals need to address them.

PMID: 18834391 [PubMed - in process]

**9: Dev Med Child Neurol. 2008 Oct;50(10):765-71.****Comprehensive short-term outcome assessment of selective dorsal rhizotomy.**

Trost JP, Schwartz MH, Krach LE, Dunn ME, Novacheck TF.

Centre for Gait and Motion Analysis, Gillette Children's Specialty Healthcare, St Paul, MN, USA.

This study retrospectively evaluated the safety and efficacy of selective dorsal rhizotomy (SDR) in participants who underwent a rigorous selection process, uniform surgical procedure, and a standardized postoperative rehabilitation process. Outcome measures assessed were the Ashworth scale for spasticity, the Gillette Gait Index (GGI) for overall gait pathology, oxygen cost for gait efficiency, and the Gillette Functional Assessment Questionnaire (functional walking ability scale; [FAQ]) for functional mobility. Outcomes were evaluated for 136 children (81 males, 55 females; mean age 7y 3mo [SD 2y 1mo], range 3y 5mo-18y 9mo) for an average of 18.3 months (SD 4.4mo) postoperatively. All participants had a diagnosis of cerebral palsy (CP): 10 quadriplegia, 19 triplegia, and 107 diplegia. Preoperative Gross Motor Function Classification System levels were: Level I  $n = 6$ ; Level II  $n = 64$ ; Level III  $n = 59$ , and Level IV  $n = 7$ . All outcome measures improved for the group as a whole. Spasticity improved with 66 to 92% of possible gain in Ashworth scores; GGI was 7.5 times more likely to have a good as opposed to a poor outcome; energy efficiency improved in over half of the participants, and the FAQ demonstrated a statistically significant improvement of 0.9 levels ( $p < 0.001$ ). The rate of complications was low, with peri- and postoperative complications resolved by time of discharge.

PMID: 18834390 [PubMed - in process]

**10: Dev Med Child Neurol. 2008 Oct;50(10):759-64.**

**Muscle strength training to improve gait function in children with cerebral palsy.**

Eek MN, Tranberg R, Zügner R, Alkema K, Beckung E.

Department of Clinical Sciences, Sahlgrenska University Hospital, University of Gothenburg, Sweden.

The aim of the study was to investigate the influence of muscle strength training on gait outcomes in children with cerebral palsy. Sixteen children (two females, 14 males, Gross Motor Function Classification System levels I-II, mean age 12y 6mo, range 9y 4mo-15y 4mo) underwent muscle strength measurement using a handheld device, Gross Motor Function Measure (GMFM) assessment, three-dimensional gait analysis, joint range of motion assessment, and grading of spasticity before and after 8 weeks of training. All participants had a diagnosis of spastic diplegia and could walk without aids. Training consisted of exercises for lower extremity muscles with free weights, rubber bands, and body weight for resistance, three times a week. Values for muscle strength below normal were identified in all children; this was most pronounced at the ankle, followed by the hip muscles. After training, muscle strength and GMFM scores increased, velocity was unchanged, stride length increased, and cadence was reduced. There was an increase in hip extensor moment and power generated at push off. Eight weeks of muscle strength training can increase muscle strength and improve gait function.

PMID: 18834389 [PubMed - in process]

**11: Dev Med Child Neurol. 2008 Oct;50(10):751-8.**

**Participation and enjoyment of leisure activities in school-aged children with cerebral palsy.**

Majnemer A, Shevell M, Law M, Birnbaum R, Chilingaryan G, Rosenbaum P, Poulin C.

School of Physical and Occupational Therapy, McGill University, Montreal, Canada.

The objective of this study was to characterize participation in leisure activities in children with cerebral palsy (CP) and identify determinants of greater involvement. Ninety-five children of school age (9y 7mo [SD 2y 1mo]) with CP were recruited, and participation was evaluated with the Children's Assessment of Participation and Enjoyment in a subset (67/95; 42 males, 25 females) who could actively participate in completion of the assessment. Most had mild motor dysfunction (Gross Motor Function Classification System: 59% level I, 23% level II, 18% levels III-V) and had a spastic subtype of CP (23 hemiplegia, 17 diplegia, 16 quadriplegia, 11 other). Biomedical, child, family and environmental predictor variables were considered in the analysis. Results demonstrated that these children were actively involved in a wide range of leisure activities and experienced a high level of enjoyment. However, involvement was lower in skill-based and active physical activities as well as community-based activities. Mastery motivation and involvement in rehabilitation services enhanced involvement (intensity and diversity) in particular leisure activities, whereas cognitive and behavioral difficulties, activity limitations, and parental stress were obstacles to participation.

PMID: 18834388 [PubMed - in process]

**12: Dev Med Child Neurol. 2008 Oct;50(10):744-50.**

**Content validity of the expanded and revised Gross Motor Function Classification System.**

Palisano RJ, Rosenbaum P, Bartlett D, Livingston MH.

Programs in Physical Therapy and Rehabilitation Sciences, Drexel University, Philadelphia, PA, USA.

The aim of this study was to validate the expanded and revised Gross Motor Function Classification Sys-

tem (GMFCS-E&R) for children and youth with cerebral palsy using group consensus methods. Eighteen physical therapists participated in a nominal group technique to evaluate the draft version of a 12- to 18-year age band. Subsequently, 30 health professionals from seven countries participated in a Delphi survey to evaluate the revised 12- to 18-year and 6- to 12-year age bands. Consensus was defined as agreement with a question by at least 80% of participants. After round 3 of the Delphi survey, consensus was achieved for the clarity and accuracy of the descriptions for each level and the distinctions between levels for both the 12- to 18-year and 6- to 12-year age bands. Participants also agreed that the distinction between capability and performance and the concept that environmental and personal factors influence methods of mobility were useful for classification of gross motor function. The results provide evidence of content validity of the GMFCS-E&R. The GMFCS-E&R has utility for communication, clinical decision making, databases, registries, and clinical research.

PMID: 18834387 [PubMed - in process]

**13: Dev Med Child Neurol. 2008 Oct;50(10):727.**

**Epilepsy - an additional risk factor for psychological problems in cerebral palsy.**

McLellan A.

Department of Paediatric Neurosciences Royal Hospital for Sick Children, Edinburgh, Scotland.

PMID: 18834384 [PubMed - in process]

**14: Dev Med Child Neurol. 2008 Oct;50(10):726.**

**Participation of children with cerebral palsy in leisure activities supports the current ICF health paradigm.**

Parush S, Rihtman T.

School of Occupational Therapy, Hebrew University of Jerusalem, Israel.

PMID: 18834383 [PubMed - in process]



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