Cerebral Palsy INSTITUTE

CP Research News

Monday 5 April 2010

This free weekly bulletin lists the latest research on cerebral palsy (CP), as indexed in the NCBI, PubMed (Medline) and Entrez (GenBank) databases. These articles were identified by a search using the key term "cerebral palsy".

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Interventions

1. Clin Rehabil. 2010 Mar 30. [Epub ahead of print]

Relative contribution of motor impairments to limitations in activity and restrictions in participation in adults with hemiplegic cerebral palsy.

Chiu HC, Ada L, Butler J, Coulson S.

Discipline of Exercise and Sport Science, The University of Sydney, Sydney, Australia.

Objective: To determine which motor impairments make a significant relative contribution to upper limb activity limitations, and whether activity limitations are related to participation restrictions in people with hemiplegic cerebral palsy.Design: An observational study.Setting: Neurological Rehabilitation Research Group at Faculty of Health Sciences, The University of Sydney.Subjects: Twenty-three people with hemiplegic cerebral palsy participated.Main measures: Four motor impairments (strength, coordination, spasticity and contracture), upper limb activity and participation were measured. Multiple regression was used to determine the relative contribution of motor impairments to activity limitations. Linear regression was used to determine the correlation between activity and participation.Results: The four motor impairments accounted for 63% of the variance in upper limb activity with coordination independently accounting for 21% ($P < 0.01$). Upper limb activity accounted for 13% of the variance in participation ($P = 0.10$).Conclusions: The findings imply that coordination of four motor impairments makes the largest independent relative contribution to activity limitations, whereas upper limb activity makes less contribution to participation in people with mild and moderate hemiplegic cerebral palsy.

PMID: 20354058 [PubMed - as supplied by publisher]

2. J Pediatr Orthop. 2010 Apr-May;30(3):240-3.

Development of calcaneal gait without prior triceps surae lengthening: an examination of predictive factors.

Huh K, Rethlefsen SA, Wren TA, Kay RM.

Childrens Orthopaedic Center, Childrens Hospital, Los Angeles, CA, USA.

BACKGROUND: Although equinus is more common in cerebral palsy (CP), the prevalence of calcaneal gait (CG) has been reported at more than 30% among patients with CP, even in the absence of prior surgical intervention. The goal of this study was to identify patient characteristics predictive of the development of CG in patients without prior triceps surae lengthening. METHODS: Gait data were reviewed for 58 participants with bilateral involvement owing to CP (116 limbs) who had 2 gait analysis tests with no triceps surae lengthening between tests. None of the patients exhibited CG at the initial gait study. Patients were grouped according to whether or not they exhibited CG patterns at the second test. Factors potentially predictive of calcaneal gait patterns were compared statistically

between groups. RESULTS: CG was shown by 24/116 extremities (21%) at the second study. The CG group experienced greater increase in body weight and body mass index between tests (P=0.006 and 0.03 respectively). Passive dorsiflexion range with the knee flexed was significantly greater in the CG group (P=0.008). The CG group also showed a tendency toward greater plantarflexor weakness, although this only approached statistical significance (P=0.08) likely owing to small sample size. Age, CP subtype, time to follow-up, hamstring range, selective motor control, and gross motor functional level were not predictive. CONCLUSIONS: Patients who undergo (or have potential to undergo) significant weight gain, and have tendencies toward excessive passive dorsiflexion with the knee flexed may be at risk for development of CG over time. In such patients, treatment regimens should include therapy to maintain or improve plantarflexor strength, and methods to prevent overstretching the plantarflexors. Nonsurgical treatments for triceps surae contractures, such as serial casting, may be preferable, to avoid hastening development of calcaneal crouch gait over time. LEVEL OF EVIDENCE: Prognostic study---Level III (case-control).

PMID: 20357589 [PubMed - in process]

3. J Child Neurol. 2010 Mar 31. [Epub ahead of print]

Safety, Tolerability, and Efficacy of High-Frequency Chest Wall Oscillation in Pediatric Patients With Cerebral Palsy and Neuromuscular Diseases: An Exploratory Randomized Controlled Trial.

Yuan N, Kane P, Shelton K, Matel J, Becker BC, Moss RB.

Department of Pediatrics, Division of Pulmonology, Stanford University, Palo Alto, California.

Airway secretions and infections are common in cerebral palsy and neuromuscular diseases. Chest physiotherapy is standard therapy but effort is substantial. High-frequency chest wall oscillation is used in cystic fibrosis but tolerability and safety data in cerebral palsy and neuromuscular disease are limited. A prospective, randomized, controlled trial of high-frequency chest wall oscillation and standard chest physiotherapy was performed in participants with neuromuscular disease or cerebral palsy. Outcome measures included respiratory-related hospitalizations, antibiotic therapy, chest radiographs, and polysomnography. Caregivers were questioned regarding therapy adherence. A total of 28 participants enrolled, 23 completed (12 chest physiotherapy, mean study period 5 months). No adverse outcomes were reported. Adherence to prescribed regimen was higher with high-frequency chest wall oscillation (P = .036). Our data suggest safety, tolerability, and better compliance with high-frequency chest wall oscillation. Improvement in airway clearance may help prevent hospitalizations. Larger controlled trials are required to confirm these results.

PMID: 20357238 [PubMed - as supplied by publisher]

4. J Hand Surg Eur Vol. 2010 Mar 26. [Epub ahead of print]

Long-term outcome of division of the C8 nerve root for spasticity of the hand in cerebral palsy.

Lin H, Hou C, Chen A, Xu Z.

Department of Orthopedic Surgery, Changzheng Hospital, The Second Military Medical University Shanghai, P. R. China.

Division of the C8 nerve root results in short-term relief of spasticity in the hands of cerebral palsy patients. In the present study, we assessed the long-term outcome of C8 nerve root division. Between March 1997 and January 2002, this procedure was done in 13 patients. All received consistent postoperative functional rehabilitation training. The hands were assessed before operation and at follow-up using the Lazareff grading system. The average follow-up time was 8.6 years. Two hands showed excellent improvement, three limbs showed good improvement and eight hands showed no improvement. No long-term complications occurred in any patient. These results indicate that the long-term outcome of C8 nerve root rhizotomy for the treatment of hand spasticity in CP is generally poor.

PMID: 20348269 [PubMed - as supplied by publisher]

5. Cell Transplant. 2010 Mar 26. [Epub ahead of print]

Intracranial Transplant of Olfactory Ensheathing Cells in Children and Adolescents with Cerebral Palsy: A Randomized Controlled Clinical Trial.

Chen L, Huang H, Xi H, Xie Z, Liu R, Jiang Z, Zhang F, Liu Y, Chen D, Wang Q, Wang H, Ren Y, Zhou C.

Successful repair of damage in cerebral palsy needs effective clinical interventions other than simply symptomatic treatments. To elucidate the feasibility of using olfactory ensheathing cells (OECs) to treat cerebral palsy (CP) in children and adolescents, we conducted a randomized controlled clinical trial (RCT) on 33 patients. The patients were randomly assigned into two groups (treatment group, n=18; control group, n=15), and OECs derived from aborted fetal tissue were injected into the bilateral corona radiata in the frontal lobes (a Key Point for Neural Network Restoration, KPNNR). The Gross Motor Function Measure (GMFM-66) and the Caregiver Questionnaire Scale were used to evaluate the patients' neurological function and overall health status. Among the 14 patients who completed the 6-month study, 6 received the cell transplantation and the other 8 served as controls. In OEC treatment group, GMFM-66 scores were 26.67+/-25.33 compared with 19.00+/-20.00 for the control group; Concurrently, the Caregiver Questionnaire Scale score decreased to 77.83+/-15.99 in the treatment group in comparison to 138.66+/-64.06 of the control group. This trial, albeit small in sample size, indicates OEC KPNNR transplantation is effective for functional improvement in children and adolescents with CP, yet without obvious side effects. This small-scale study suggests that the procedure may be a plausible alternative method to treat this not yet curable disorder, and we urge further evaluation with a large-scale RCT.

PMID: 20350360 [PubMed - as supplied by publisher]

6. Clin Nutr. 2010 Mar 24. [Epub ahead of print]

Energy intake does not correlate with nutritional state in children with severe generalized cerebral palsy and intellectual disability.

Calis EA, Veugelers R, Rieken R, Tibboel D, Evenhuis HM, Penning C.

Intellectual Disability Medicine, Department of General Practice, Erasmus MC, PO Box 2040, 3000 CA Rotterdam, The Netherlands; Department of Pediatric Surgery, Erasmus MC, Sophia Children's Hospital, PO Box 2060, 3000 CB Rotterdam, The Netherlands.

BACKGROUND & AIMS: The majority of children with cerebral palsy and intellectual disability has a poor nutritional state compared with their healthy peers. Several studies have found reduced daily energy intake in this population. The hypothesis is tested that low daily energy intake correlates with poor nutritional state. METHODS: In a population-based sample of 176 children with severe generalized cerebral palsy and intellectual disability (mean age 10 years, SD 2 months; 16% GMFCS score 4; 84% GMFCS score 5) anthropometric parameters (weight, upper arm and tibia length, biceps, triceps, subscapular and suprailiacal skinfold thickness, mid upper arm circumference) were measured and dietary intake was registered. RESULTS: No correlation was found between energy intake(% EAR) and anthropometric Z-scores. Higher age, female gender, mobility, and to a lesser extent the absence of tube feeding predicted lower anthropometric Z-scores. CONCLUSIONS: In children with severe generalized cerebral palsy and intellectual disability nutritional state is not primarily determined by energy intake. Differences in energy expenditure presumably play an important role, although more research is needed to clarify the complex association between energy intake and nutritional state. Individualized nutritional care is suggested, preferably based on energy expenditure, in order to avoid malnutrition, but also overweight.

PMID: 20346547 [PubMed - as supplied by publisher]

7. Dev Med Child Neurol. 2010 Mar 19. [Epub ahead of print]

Assessing selective motor control in children with cerebral palsy.

Dobson F.

Murdoch Childrens Research Institute, Hugh Williamson Gait Analysis Laboratory, Parkville, Victoria, Australia.

PMID: 20345962 [PubMed - as supplied by publisher]

8. Dev Med Child Neurol. 2010 Mar 19. [Epub ahead of print]

Risk factors for emergence and progression of scoliosis in children with severe cerebral palsy: a systematic review.

Loeters MJ, Maathuis CG, Hadders-Algra M.

Department of Paediatrics - Developmental Neurology, University Medical Center Groningen, Groningen, the Netherlands.

Aim: Scoliosis is a frequently occurring and serious complication of severe cerebral palsy (CP). This systematic review aims to the assess the risk factors associated with the emergence and progression of scoliosis in children with CP functioning at level IV or V of the Gross Motor Function Classification System (GMFCS). Method: Relevant studies conducted from 1966 to March 2009 were identified in Embase, Medline, and Scopus. The methodological quality of the studies was assessed and relations between risk factors and scoliosis were documented systematically. Results: Ten studies were included. They had a low level of evidence and heterogeneous methodological quality. No systematic associations were found between type of CP and scoliosis or between age, type, and location of scoliotic curve and progression of scoliosis. Weak evidence was present for an association between the severity of CP, hip dislocation, and pelvic obliquity and scoliosis. Interpretation: The low level of evidence precludes the drawing of firm conclusions on risk factors for the emergence and progression of scoliosis in children with severe CP. However, given the high prevalence of the disorder and its serious consequences for daily life, more research in this area is urgently needed.

PMID: 20345960 [PubMed - as supplied by publisher]

9. Dev Med Child Neurol. 2010 Mar 19. [Epub ahead of print]

Book Review: The Identification and Treatment of Gait Problems in Cerebral Palsy.

Paterson JM.

Royal London Hospital, London, UK.

PMID: 20345949 [PubMed - as supplied by publisher]

10. PM R. 2010 Mar;2(3):S3-S11.

Pediatric Rehabilitation: 1. Common Medical Conditions in Children With Disabilities.

Kim CT, Moberg-Wolff E, Trovato M, Kim H, Murphy N.

Department of PM&R, University of Pennsylvania, School of Medicine, 3405 Civic Center Boulevard, Philadelphia, PA 19096; The Children's Hospital of Philadelphia, Philadelphia, PA(1).

OBJECTIVE: This self-directed learning module focuses on the physiatric management of the common morbidities associated with pediatric traumatic brain injury and cerebral palsy. It is part of the study guide on pediatric rehabilitation in the Self-Directed Physiatric Education Program for practitioners and trainees in physical medicine and rehabilitation and pediatric medicine. The goal of this article is to enhance the learner's knowledge regarding current physiatric management of complications related with pediatric traumatic brain injury and cerebral palsy.

PMID: 20359677 [PubMed - as supplied by publisher]

11. J Rehabil Med. 2010 Feb 24. doi: 10.2340/16501977-0522. [Epub ahead of print]

Effect of shock wave stimulation on hypertonic plantar flexor muscles in patients with cerebral palsy: A placebo-controlled study.

Amelio E, Manganotti P.

Background: Extracorporeal shock wave therapy has been reported to be effective in reducing muscle hypertonia in adults. Aim: To evaluate the effect of shock wave treatment of spastic muscles in children with cerebral palsy. Methods: Twelve children with spastic equinus foot (6 boys, 6 girls; mean age 8 years (standard deviation (SD) 2.31)) were monitored. Clinical (Ashworth Scale, passive range of motion) and instrumental (pedobarography) examination were performed. This is an open study with one placebo treatment session, followed 6 weeks later by one active shock wave treatment session. Gastrocnemius muscles and soleus muscles were treated. Results: After placebo stimulation no clinical or instrumental effect was seen. After a single active shock wave stimulation a significant decrease in the Ashworth Scale (from 3 to 2), an increase in the range of motion (from 20 degrees to 50 degrees), and an increase in the whole plantar surface area of the treated limb (from 40.3 to 80.2 cm2) were observed in all patients. This effect lasted for 4 weeks in all patients. Conclusions: A single active shock wave stimulation produced a significant long-lasting reduction in hypertonia in the plantar flexors in children with cerebral palsy.

PMID: 20358168 [PubMed - as supplied by publisher]

12. Conf Proc IEEE Eng Med Biol Soc. 2009;2009:5973-6.

Development of an interactive upper extremity gestural robotic feedback system: from bench to reality.

Wood KA, Lathan CE, Kaufman KR.

Motion Analysis Laboratory, Mayo Clinic, Rochester, MN 55905, USA. colemanwood.krista@mayo.edu

Development of an interactive system to treat patients with movement impairments of the upper extremity is described. Gestures and movement of patients as instructed by therapists are detected by accelerometers and feedback is provided directly to the patient via a robot.

PMID: 19964144 [PubMed - indexed for MEDLINE]

Epidemiology / Aetiology / Diagnosis & Early Treatment

Please note: This is not yet a comprehensive outline of cerebral palsy prevention literature. It is expected that more research will be included when the search terms are expanded to include key terms other than "cerebral palsy". It is a work-in-progress and it will be expanded in coming months.

13. Dev Med Child Neurol. 2010 Mar 19. [Epub ahead of print]

'The relationship of cerebral palsy subtype and functional motor impairment: a population-based study'

Rosenbaum P, Gorter JW, Palisano R, Morris C.

McMaster University, Hamilton, Ontario, Canada.

PMID: 20345951 [PubMed - as supplied by publisher]

14. J Perinatol. 2010 Apr 1. [Epub ahead of print]

Clinical characterization and long-term prognosis of neurological development in preterm infants with late-onset circulatory collapse.

Nakanishi H, Yamanaka S, Koriyama T, Shishida N, Miyagi N, Kim TJ, Kusuda S.

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Objective:To characterize the risk factors for late-onset circulatory collapse (LCC) in preterm infants responsive to corticosteroid therapy and evaluate the long-term neurological prognosis.Study Design:A retrospective case-control study for preterm infants (</=32 weeks' gestation) admitted to our neonatal intensive care unit from 1994 through 2002.Result:Sixty-five infants (11%) were diagnosed with LCC. Infants with a shorter gestation and lower birth weight had a higher incidence of LCC. LCC infants had a significantly lower 1-min Apgar score, significantly higher incidence of severe intraventricular hemorrhage, chronic lung disease, and postnatal periventricular leukomalacia, and significantly longer duration of ventilation use, oxygen use, and hospital stay. Somatic growth at 36 weeks' postmenstrual age was poorer in infants with LCC than without LCC (controls). LCC infants were significantly more likely than controls to have cerebral palsy at 3 years.Conclusion:LCC is associated with poor neurodevelopmental outcomes. Prevention of LCC can lead to improved neurological prognoses.Journal of Perinatology advance online publication, 1 April 2010; doi:10.1038/jp.2010.41.

PMID: 20357811 [PubMed - as supplied by publisher]

15. Reprod Sci. 2010 Apr 1. [Epub ahead of print]

Brain Injury Caused by Chronic Fetal Hypoxemia Is Mediated by Inflammatory Cascade Activation.

Guo R, Hou W, Dong Y, Yu Z, Stites J, Weiner CP.

The prevalence of cerebral palsy (CP) shows little temporal or geographic variation and is associated with preterm birth, maternal/fetal infection/inflammation, and fetal growth restriction (IUGR), a potential surrogate for chronic fetal hypoxemia (CHX). We previously demonstrated CHX causes a fetal inflammatory response syndrome (FIRS). Herein, we test the hypothesis that CHX may cause fetal brain injury by upregulating inflammatory cytokine cascades, culminating in apoptosis pathway activation. Time-mated guinea pigs were housed in 12% or 10.5% O2 for the last 21% of gestation. Chronic fetal hypoxemia increased the lactate/pyruvate and decreased the glutathione (GSH)/oxidized glutathione (GSSH) ratios, confirming a shift to a prooxidant state. The end result was a >30% decrease in hippocampal neuron density. Based on a microarray spotted with 113 cytokines and receptors, 22 genes were upregulated by CHX in proportion to the degree of hypoxia; the findings were confirmed by quantitative polymerase chain reaction (PCR). Thus, CHX triggers fetal brain inflammation inversely proportional to its severity characterized by increased apoptosis and neuronal loss. We suggest CHX fetal brain injury is not directly caused by oxygen depravation but rather is an adaptive response that becomes maladaptive.

PMID: 20360591 [PubMed - as supplied by publisher]