

Monday 29 March 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. *Int J Adolesc Med Health*. 2009 Oct-Dec;21(4):623-33.

Physical activity and health among adolescents with cerebral palsy in Sweden.

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Cerebral palsy (CP) is the most common disorder of movement and posture in children. The disorder results from a non-progressive brain lesion occurring in the fetal or infant brain. Children with CP have challenges with movement, posture, and mobility that last a life time. Few studies describe physical activity and health among adolescents with CP. AIM: The aim of this study was to describe self-related health, physical activity, and body complaints among adolescents with CP in Sweden. METHODS: A questionnaire was answered by 64 adolescents with CP, with 143 adolescents without disabilities serving as controls. RESULTS: Adolescents with CP reported their general health to be better than adolescents without disabilities ($p = .001$). Adolescents with CP participated less than adolescents without disabilities in sport during recreation time ($p = .009$). About 19% of adolescents with CP were never or seldom physically active, compared with 8% in the control group ($p = .025$). A total of 50% of adolescents with CP reported musculoskeletal complaints during the last three months, compared with 69.5% in the control group. There was a correlation between musculoskeletal complaints and self-related health in adolescents with CP ($p = .015$) but not in the controls. CONCLUSION: Adolescents with CP reported their general health to be good. Adolescents with CP were less physically active than adolescents without disabilities. There was a correlation between musculoskeletal complaints and self-related health among adolescents with CP. Further research is needed to determine the cause of the low physical activity among adolescents with CP and also to determine the relationship between musculoskeletal complaints and physical activity.

PMID: 20306774 [PubMed - in process]

2. *Br J Nurs*. 2010 Mar 25-Apr 7;19(6):368-73.

Cerebral palsy: classification, diagnosis and challenges of care.

Hayes C.

This article aims to build capacity between nursing and allied healthcare practitioner staff in highlighting the unique challenges that caring for people with cerebral palsy (CP) brings. It gives an insight into how CP is classified and diagnosed, and briefly outlines issues of political correctness in labelling people with this condition. It covers the complexities of brain development in people with CP, with consideration of the key aetiological contributors to the incidence of the condition. A straightforward approach to unravelling the classification of movement disorders in CP is adopted. It concludes that a multidisciplinary approach to the management of CP, with the nurse at the centre of this holistic approach to patient care, is pivotal to future healthcare provision.

PMID: 20335916 [PubMed - in process]

3. Gait Posture. 2010 Mar 23. [Epub ahead of print]

Energy cost of walking: A comparison of two recognised methods for defining steady state in a group of unimpaired children and children with cerebral palsy.

Plasschaert F, Jones K, Forward M.

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Measurement of VO_2 based 'energy cost of walking' indices provide quantitative information that can be used clinically to ascertain progress and relative functional impairment in pathology. The accuracy and validity of these indices relies on being able to identify periods of steady state conditions, since it is only in steady state that there is a direct and predictable relationship between VO_2 consumption and energy expenditure. This paper presents a comparison of two new mathematically based approaches that have recently gained recognition as methods for identifying steady state during an energy cost assessment. The first applies a mathematically defined threshold for steady state within a (non-treadmill) walking trial. This method is compared with a statistically based approach that relies on the calculation of the correlation coefficient, Kendall's Tau to define steady state data. To examine the impact of both methods on the calculation of the energy cost of walking, each was applied to the calculation of two oxygen based energy cost of walking parameters, the non-dimensional net oxygen cost and the net oxygen cost with speed normalised to height in a cohort of unimpaired subjects and children with cerebral palsy. The results revealed that overall there were no clinically significant differences between the two methods. It is suggested that the methods can be used interchangeably to calculate the energy cost of walking. Copyright © 2010 Elsevier B.V. All rights reserved.

PMID: 20338764 [PubMed - as supplied by publisher]

4. Gait Posture. 2010 Mar 23. [Epub ahead of print]

Variability and symmetry of gait in early walkers with and without bilateral cerebral palsy.

Prosser LA, Lauer RT, Vansant AF, Barbe MF, Lee SC.

Rehabilitation Medicine Department, National Institutes of Health, Bethesda, MD, United States.

PURPOSE: Investigating gait characteristics during the early stages of walking in CP may contribute to the understanding of the development of impaired gait. The objective of this study was to investigate differences in the variability and symmetry of spatiotemporal gait characteristics during the early years of walking in children with bilateral spastic CP compared to children with similar amounts of walking experience and typical development (TD). **METHODS:** The spatiotemporal gait parameters of 31 children (15 with spastic CP, 16 with TD) who had an average of 28.5 (18.1 SD) months of walking experience were collected using an instrumented walkway. **RESULTS:** All primary spatiotemporal parameters were reduced in the CP group, who also demonstrated greater stride-to-stride variability, compared to the TD group. There were no statistically significant differences in side-to-side symmetry between groups. **IMPLICATIONS:** Clinical trials investigating gait interventions during the early years of walking in children with CP should be conducted to determine if treatment can reduce the functional limitations that are present during the emergence of walking skills. Further investigation should examine variability and symmetry in the kinematics, kinetics, and muscle activity patterns of early walkers with CP, and the effect of treatment on the variability and symmetry of walking characteristics. Published by Elsevier B.V.

PMID: 20338763 [PubMed - as supplied by publisher]

5. Gait Posture. 2010 Mar 19. [Epub ahead of print]

Reproducibility and validity of video screen measurements of gait in children with spastic cerebral palsy.

Grunt S, van Kampen PJ, van der Krogt MM, Brehm MA, Doorenbosch CA, Becher JG.

Department of Rehabilitation Medicine, VU University Medical Center, Amsterdam, The Netherlands; Department of Child Neurology, University Children's Hospital, Inselspital, Bern, Switzerland.

PURPOSE: To determine the reproducibility and validity of video screen measurement (VSM) of sagittal plane joint angles during gait. **METHODS:** 17 children with spastic cerebral palsy walked on a 10m walkway. Videos were recorded and 3d-instrumented gait analysis was performed. Two investigators measured six sagittal joint/segment angles (shank, ankle, knee, hip, pelvis, and trunk) using a custom-made software package. The intra- and interrater reproducibility were expressed by the intraclass correlation coefficient (ICC), standard error of measurements (SEM) and smallest detectable difference (SDD). The agreement between VSM and 3d joint angles was illustrated by Bland-Altman plots and limits of agreement (LoA). **RESULTS:** Regarding the intrarater reproducibility of VSM, the ICC ranged from 0.99 (shank) to 0.58 (trunk), the SEM from 0.81 degrees (shank) to 5.97 degrees (trunk) and the SDD from 1.80 degrees (shank) to 16.55 degrees (trunk). Regarding the interrater reproducibility, the ICC ranged from 0.99 (shank) to 0.48 (trunk), the SEM from 0.70 degrees (shank) to 6.78 degrees (trunk) and the SDD from 1.95 degrees (shank) to 18.8 degrees (trunk). The LoA between VSM and 3d data ranged from 0.4+/-13.4 degrees (knee extension stance) to 12.0+/-14.6 degrees (ankle dorsiflexion swing). **CONCLUSION:** When performed by the same observer, VSM mostly allows the detection of relevant changes after an intervention. However, VSM angles differ from 3d-IGA and do not reflect the real sagittal joint position, probably due to the additional movements in the other planes. Copyright © 2010 Elsevier B.V. All rights reserved.

PMID: 20304653 [PubMed - as supplied by publisher]

6. J Pediatr Orthop B. 2010 Mar 19. [Epub ahead of print]

Genu recurvatum in cerebral palsy - part B: hamstrings are abnormally long in children with cerebral palsy showing knee recurvatum.

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Hyperextension of the knee in stance (knee recurvatum) is a common disorder in patients with spastic cerebral palsy (CP). A group 35 children with CP (47 lower limbs) was divided into two subgroups according to the timing of maximum knee extension during the stance phase of gait. Gait analysis and musculoskeletal modelling data were compared with a control group of 12 normally developing children. We observed no difference in kinematics between the CP groups who showed an equinus position of the foot at initial contact. Both groups showed increased external extensor moments across the knee. The muscle-tendon lengths of the hamstrings were abnormally long at initial contact, and in both recurvatum groups, contracted faster compared with the control group. Surface electromyography revealed prolonged activity of the hamstrings in stance and early activation in swing. Abnormally long hamstrings at initial contact together with equinus position of the foot are the main causes of genu recurvatum in children with CP.

PMID: 20308923 [PubMed - as supplied by publisher]

7. Arq Neuropsiquiatr. 2010 Feb;68(1):143.

Effects of the treatment of spasticity with botulinum toxin type a in the gross motor function of infants with hemiplegic cerebral palsy.

Zonta MB.

PMID: 20339674 [PubMed - in process]

8. Int J Stroke. 2010 Feb;5(1):21-7.**Hand up! Yawn and raise your arm.**

Walusinski O, Neau JP, Bogousslavsky J.

walusinski@yawning.info

BACKGROUND: In some cases of hemiplegia, the initiation of yawning is associated with involuntary raising of the paralysed arm. Reports are scarce in the literature, probably because the phenomenon has largely been overlooked. **METHODS:** We studied six patients from two neurologic units, and compared them with published cases from the last 200 years. Brain imaging typically shows a small vascular lesion most often located in the internal capsule. **RESULTS:** After comparison with experimental models in cats, we suggest that damage to the cortico-neocerebellar tract of the extrapyramidal system disinhibits the spino-archeocerebellar tract, enabling a motor stimulation of the arm by the lateral reticular nucleus, which harmonises both central respiratory and locomotor rhythms. **CONCLUSIONS:** When phylogenetically primitive structures are disinhibited, they regain autonomy in the homeostatic process associating the massive inspiration of yawning--a form of behaviour that stimulates vigilance--with a motor control mechanism that is active during locomotion. For this phenomenon, we coined the term 'parakinesia brachialis oscitans'.

PMID: 20088989 [PubMed - indexed for MEDLINE]

9. Neurosurgery. 2010 Feb;66(2):E402-3.**Infraclavicular fossa as an alternate site for placement of intrathecal infusion pumps: technical note.**

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OBJECTIVE: Intrathecal infusion using an implantable pump is a common method of delivering medication for spasticity or chronic pain. The classic site for placement of the pump is in the abdominal wall. In some patients, there are confounding factors that make placement of an abdominal pump impractical. The purpose of this study was to report the implantation of Synchronomed II pumps (Medtronic, Inc, Minneapolis, Minnesota) in the infraclavicular fossa. **METHODS:** Four patients, aged 13 to 33 years, underwent infraclavicular placement of a Synchronomed II infusion pump. In one patient, severe scoliosis and hip joint contractures precluded placement of the pump in the traditional position. Another patient had several ostomies on the abdominal wall, leaving no place for the pump. In a third, a combination of scoliosis and ostomy rendered the abdomen inappropriate for pump placement. **RESULTS:** In 3 patients, a 20-mL pump was placed in the infraclavicular fossa. In the fourth, a 40-mL pump was placed in the left infraclavicular fossa. All patients tolerated the operation well. There were no postoperative reports of local pain or discomfort. One patient died from unrelated respiratory compromise several months after pump placement. At last follow-up (average of 11 months), the pumps were functioning well, and there were no wound-related complications. Selected pre- and postoperative photographs are presented. **CONCLUSION:** The infraclavicular fossa is a viable alternative to the abdomen as the site for placement of a drug infusion pump.

PMID: 20087109 [PubMed - indexed for MEDLINE]

10. Case Report Med. 2010;2010:417806. Epub 2010 Mar 22.**Gait Analysis before and after Gastrocnemius Fascia Lengthening for Spastic Equinus Foot Deformity in a 10-Year-Old Diplegic Child.**

Galli M, Cimolin V, Santambrogio GC, Crivellini M, Albertini G.

Bioengineering Department, Politecnico Di Milano, Piazza Leonardo da Vinci 32, 20133 Milano, Italy.

Purpose. This case study quantified kinematic and kinetic effects of gastrocnemius lengthening on gait in a Cere-

bral Palsy child with equinus foot. **Methods.** A 10-year-old diplegic child with Cerebral Palsy was evaluated with Gait Analysis (GA) before and after gastrocnemius fascia lengthening, investigating the lower limb joints kinematics and kinetics. **Results.** Kinematics improved at the level of distal joints, which are directly associated to gastrocnemius, and also at the proximal joint (like hip); improvements were found in ankle kinetics, too. **Conclusions.** This case study highlighted that GA was effective not only to quantify the results of the treatment but also to help preoperative decision making in dealing with CP child.

PMID: 20339527 [PubMed - in process]

11. Disabil Rehabil. 2010;32(9):723-8.

Pain prevalence and its impact on the quality of life in a sample of Turkish children with cerebral palsy.

Tüzün EH, Guven DK, Eker L.

Department of Physical Therapy and Rehabilitation, Faculty of Health Sciences, Başkent University, Bağlica, Ankara, Turkey.

Purpose. To investigate the measurement properties of the Pain Evaluation Scale (PES), to estimate the prevalence of pain based on the PES data, and to evaluate the impact of pain on the quality of life (QoL) in a sample of Turkish children with CP. **Method.** A total of 346 children with CP participated in a cross-sectional study. The Gross Motor Function Classification System (GMFCS), PES, Wong-Baker FACES Pain Rating Scale, and the Child Health Questionnaire (CHQ-PF50) were used as the assessment tools. **Results.** The Cronbach's alpha coefficient was 0.90 for the PES. The PES score was moderately correlated with the bodily pain subscale score, and very weakly with the mental health subscale score of the CHQ-PF50. For the threshold value of 2 on the PES, sensitivity and specificity were 91.1% and 100%, respectively. Overall, apparent prevalence and true prevalence of pain were 69.1% and 75.9%, respectively. There was a significant negative effect of pain on the QoL of subjects. The pain also negatively affected parent's personal time and caused limitations in family activities. **Conclusions.** The PES is valid and reliable pain assessment tool for children with CP. Pain is a frequent health problem and has severe consequences both on the cerebral palsied children's QoL and their family.

PMID: 20302440 [PubMed - in process]

12. Rehab Manag. 2010 Jan-Feb;23(1):18-21.

The importance of strengthening.

Koscielny R.

Pediatric Fitness Center, Keego Harbor, Mich, USA.

PMID: 20143619 [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. J Am Chem Soc. 2010 Mar 25. [Epub ahead of print]

Unexpected Binding Modes of Nitric Oxide Synthase Inhibitors Effective in the Prevention of a Cerebral Palsy Phenotype in an Animal Model.

Delker SL, Ji H, Li H, Jamal J, Fang J, Xue F, Silverman RB, Poulos TL.

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Selective inhibition of the neuronal isoform of nitric oxide synthase NOS (nNOS) has been shown to prevent brain injury and is important for the treatment of various neurodegenerative disorders. However, given the high active site conservation among all three NOS isoforms, the design of selective inhibitors is an extremely challenging problem. Here we present the structural basis for why novel and potent nNOS inhibitors exhibit the highest level of selectivity over eNOS reported so far (approximately 3,800-fold). By using a combination of crystallography, computational methods, and site-directed mutagenesis, we found that inhibitor chirality and an unanticipated structural change of the target enzyme control both the orientation and selectivity of these novel nNOS inhibitors. A new hot spot generated as a result of enzyme elasticity provides important information for the future fragment-based design of selective NOS inhibitors.

PMID: 20337441 [PubMed - as supplied by publisher]

14. J Vet Med Sci. 2010 Mar 25. [Epub ahead of print]

Lesions of the Central Nervous System Induced by Intracerebral Inoculation of BALB/c Mice with Rabies Virus (CVS-11).

Kojima D, Park CH, Tsujikawa S, Kohara K, Hatai H, Oyamada T, Noguchi A, Inoue S.

Department of Veterinary Pathology, School of Veterinary Medicine, Kitasato University.

BALB/c mice were inoculated intracerebrally with fixed rabies virus (CVS-11) and pathomorphological changes in the central nervous system were studied. Infected mice showed ruffled hair, hunchback, anorexia, emaciation and ataxia at 5 days postinoculation (DPI), but paralysis did not occur. Viral antigens were first detected in the pyramidal cells of the cerebral cortex and hippocampus at 3 DPI, and these cells exhibited apoptosis at 5 DPI. Microglial cells and astroglial cells significantly increased in the areas of the nerve cells which showed apoptosis. However, spinal neurons and spinal dorsal root ganglion cells did not exhibit apoptosis despite virus infection. These observations indicate that different mechanism which causes apoptosis exists among the neurons of the brain and spinal cord, and glial cells play an important role in pathogenesis of the experimental rabies.

PMID: 20339258 [PubMed - as supplied by publisher]

15. J Pediatr. 2010 Mar;156(3):347-9.

Role of intervention strategies for at-risk preterm infants.

Bos AF.

Comment on:

J Pediatr. 2010 Mar;156(3):366-71.

J Pediatr. 2010 Mar;156(3):359-65.

PMID: 20176181 [PubMed - indexed for MEDLINE]

16. Indian Pediatr. 2010 Jan 15. pii: S097475590900196-1. [Epub ahead of print]

Transient Tone Abnormalities in High Risk Infants and Cognitive Outcome at Five Years.

Chaudhari S, Bhalerao M, Chitale A, Patil B, Pandit A, Hoge M.

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Objective: To identify transient tone abnormalities and determine its prevalence in high risk infants and their cognitive outcome at 5 years. **Design:** Prospective cohort observational study. **Setting:** High risk infants discharged from a level II neonatal unit in a 12 month period, and followed upto 5 years. **Methods:** High risk infants and normal controls were assessed for abnormalities of tone using the method described by Amiel Tison at 3, 6, 9, 12 months. An IQ by Stanford Binet method and a preschool inventory by Ayres, Bobath was done at 5 years. Those infants who had normal tone at 6 and 12 months were called normal high risk (HR) group and those who had abnormalities at 6 months, which disappeared at 12 months, were called the transient tone abnormalities (TTA) group. **Results:** Out of 190 high risk infants, 113 were normal HR and 67 (35.2%) were labeled as TTA. Ten infants with cerebral palsy had abnormal tone throughout the first year. Controls had normal tone throughout the follow-up period. Although there was no difference in the IQ of the TTA group (98.5 +/- 12.4) and the normal HR (99.1 +/- 13.1) group, it was significantly less ($P=0.04$) than that of controls (106.1 +/- 9.1). Preschool inventory in TTA children showed poor language development ($P=0.014$). **Conclusion:** Many of the tone abnormalities detected at 6 months resolve by 12 months, hence a hasty diagnosis of cerebral palsy should not be made. High risk infants with transient tone abnormalities have a normal cognitive outcome at 5 years, except for poor language skills.

PMID: 20308766 [PubMed - as supplied by publisher]

17. Drug Chem Toxicol. 2010 Apr;33(2):160-5.

Behavioral and morphological endpoints: as an early response to sublethal malathion intoxication in the freshwater fish, *Labeo rohita*.

Patil VK, David M.

Karnatak University's Research Laboratory, Environmental and Molecular Toxicology Division, Department of Zoology, Karnatak Science College, Dharwad, Karnataka, India.

A short-term definitive test by the static renewal bioassay method was conducted to determine the acute toxicity (LC(50)) of commercial-grade organophosphate insecticide, malathion (50% EC) on the freshwater fish, *Labeo rohita*. Carp fingerlings were exposed to different concentrations of malathion for 96 hours. The acute toxicity (LC(50)) of malathion was found to be 4.5 microg/L. One tenth (1/10, 0.45 microg/L) of the acute toxicity value was selected as the sublethal concentration for subacute studies. The fish were exposed to sublethal concentration for 1, 5, 10, and 15 days and allowed to recover in toxicant-free medium for 15 days. Behavioral responses and morphological deformities were studied in the experimental tenures. Fish in toxic media exhibited irregular, random, circular swimming movements, hyperexcitability, loss of equilibrium, and sinking to the bottom. Caudal bending was the prime morphological malformation. The behavioral and morphological deformities were due to inhibition of acetylcholinesterase (AChE) activity. Inhibition of AChE activity results in excess accumulation of acetylcholine in cholinergic synapses, leading to hyperstimulation and cessation of neuronal transmission (i.e., paralysis). The carp were found under stress, but mortality was insignificant at the sublethal concentration tested. Impaired behavioral responses and morphological deformities were observed during recovery. This may be a consequence due to inhibition of brain and muscular AChE by malaoxon, via the biotransformation of sequestered malathion.

PMID: 20307142 [PubMed - in process]

18. J AOAC Int. 2009 Nov-Dec;92(6):1705-13.

Single-laboratory validation of the microplate receptor binding assay for paralytic shellfish toxins in shellfish.

Van Dolah FM, Leighfield TA, Doucette GJ, Bean L, Niedzwiadek B, Rawn DF.

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A single-laboratory validation (SLV) study was conducted for the microplate receptor binding assay (RBA) for paralytic shellfish poisoning (PSP) toxins in shellfish. The basis of the assay is the competition between [³H]saxitoxin (STX) and STX in a standard or sample for binding to the voltage dependent sodium channel. A calibration curve is generated by the addition of 0.01-1000 nM STX, which results in the concentration dependent decrease in [³H] STX-receptor complexes formed and serves to quantify STX in unknown samples. This study established the LOQ, linearity, recovery, accuracy, and precision of the assay for determining PSP toxicity in shellfish extracts, as performed by a single analyst on multiple days. The standard curve obtained on 5 independent days resulted in a half-maximal inhibition (IC₅₀) of 2.3 nM STX +/- 0.3 (RSD = 10.8%) with a slope of 0.96 +/- 0.06 (RSD = 6.3%) and a dynamic range of 1.2-10.0 nM. The LOQ was 5.3 microg STX equivalents/100 g shellfish. Linearity, established by quantification of three levels of purified STX (1.5, 3, and 6 nM), yielded an r² of 0.97. Recovery from mussels spiked with three levels (40, 80, and 120 microg STX/100 g) averaged 121%. Repeatability (RSD(r)), determined on six naturally contaminated shellfish samples on 5 independent days, was 17.7%. A method comparison with the AOAC mouse bioassay yielded r² = 0.98 (slope = 1.29) in the SLV study. The effects of the extraction method on RBA-based toxicity values were assessed on shellfish extracted for PSP toxins using the AOAC mouse bioassay method (0.1 M HCl) compared to that for the precolumn oxidation HPLC method (0.1% acetic acid). The two extraction methods showed linear correlation (r² = 0.99), with the HCl extraction method yielding slightly higher toxicity values (slope = 1.23). A similar relationship was observed between HPLC quantification of the HCl- and acetic acid-extracted samples (r² = 0.98, slope 1.19). The RBA also had excellent linear correlation with HPLC analyses (r² = 0.98 for HCl, r² = 0.99 for acetic acid), but gave somewhat higher values than HPLC using either extraction method (slope = 1.39 for HCl extracts, slope = 1.32 for acetic acid). Overall, the excellent linear correlations with the both mouse bioassay and HPLC method and sufficient interassay repeatability suggest that the RBA can be effective as a high throughput screen for estimating PSP toxicity in shellfish.

PMID: 20166588 [PubMed - indexed for MEDLINE]