Cerebral Palsy INSTITUTE

CP Research News

Monday 26 April 2010

Interventions

1. J Sch Nurs. 2010 Apr 19. [Epub ahead of print]

Childhood Educational Experiences of Women With Cerebral Palsy.

Freeborn D, Mandleco B.

The purpose of this study was to examine the childhood experiences of women with cerebral palsy (CP), from the perspectives of these women. Using the feminist biographical method, eight women with CP participated in two in-depth interviews. Participants ranged in age from 22 to 55 years and had moderate to severe athetoid or spastic CP. Four themes emerged: (a) academic experiences, (b) experiences with teachers, (c) experiences with peers, and (d) coping methods, with both positive and negative subthemes for each theme. Participants with positive academic experiences and positive interactions with teachers and peers were able to develop better ways of dealing with the negative experiences they encountered in education and attained higher levels of education. Participants who primarily had poorer educational experiences developed negative coping mechanisms that continued to affect their lives. Findings support ways in which school nurses can support the educational experiences of students with CP.

PMID: 20404356 [PubMed - as supplied by publisher]

2. BMC Musculoskelet Disord. 2010 Apr 16;11(1):71. [Epub ahead of print]

Study of the therapeutic effects of an advanced hippotherapy simulator in children with cerebral palsy: a randomised controlled trial.

Herrero P, Asensio A, Garcia E, Marco A, Olivan B, Ibarz A, Gomez-Trullen EM, Casas R.

BACKGROUND: Although hippotherapy treatment has been demonstrated to have therapeutic effects on children with cerebral palsy, the samples used in research studies have been very small. In the case of hippotherapy simulators, there are no studies that either recommend or advise against their use in the treatment of children with cerebral palsy. The aim of this randomised clinical study is to analyse the therapeutic effects or the contraindications of the use of a commercial hippotherapy simulator on several important factors relating to children with cerebral palsy such as their motor development, balance control in the sitting posture, hip abduction range of motion and electromyographic activity of adductor musculature. METHODS: The study is a randomised controlled trial. It will be carried out with a sample of 37 children with cerebral palsy divided into two treatment groups. Eligible participants will be randomly allocated to receive either (a) Treatment Group with hippotherapy simulator, maintaining sitting posture, with legs in abduction and rhythmic movement of the simulator or (b) Treatment Group maintaining sitting posture, with legs in abduction and without rhythmic movement of the simulator. Data collection and analysis: all measurements will be carried out by a specially trained blind assessor. To ensure standardization quality of the assessors, an inter-examiner agreement will be worked out at the start of the study. The trial is funded by the Department of Research, Innovation and Development of the Regional Government of Aragon (Official Bulletin of

Aragon 23 July 2007), project number PM059/2007. DISCUSSION: Interest in this project is due to the following factors: Clinical originality (there are no previous studies analysing the effect of simulators on the population group of children with cerebral palsy, nor any studies using as many variables as this project); Clinical impact (infantile cerebral palsy is a chronic multisystemic condition that affects not only the patient but also the patient's family and their close circle of friends); Practical benefits (the development of an effective treatment is very important for introducing this element into the rehabilitation of these children). Trial registration Current Controlled Trials ISRCTN03663478.

PMID: 20398394 [PubMed - as supplied by publisher]

3. Pediatr Neurol. 2010 May;42(5):381; author reply 382.

The effect of frequency of cerebral palsy treatment: a matched-pair pilot study.

Rosenbaum P, Russell D, Palisano R.

Comment on:

Pediatr Neurol. 2008 Nov;39(5):335-40.

PMID: 20399400 [PubMed - in process]

4. Child Care Health Dev. 2010 Apr 15. [Epub ahead of print]

Short-term changes in parents' resolution regarding their young child's diagnosis of cerebral palsy.

Rentinck IC, Ketelaar M, Schuengel C, Stolk J, Lindeman E, Jongmans MJ, Gorter JW.

Rehabilitation Centre De Hoogstraat, Centre of Excellence for Rehabilitation Medicine Utrecht, Utrecht, The Netherlands.

Objective: This study aimed to describe changes in parents' resolution regarding their young child's diagnosis of cerebral palsy over a period of 1 year, and to describe the changes in strategies of resolution. Methods: In this longitudinal study, 38 parents of children with cerebral palsy (mean age 18.4 months, SD = 1.1 at baseline) were followed with the Reaction to Diagnosis Interview, assessing their personal reactions to their child's diagnosis (i.e. resolution status). Changes at main and subclassification level of the Reaction to Diagnosis Interview were investigated using a binominal test. Results: Twenty-nine parents (76%) were found to be stable with respect to their main resolution status (i.e. 'resolved' or 'unresolved'), while 24% of the parents either had changed from 'unresolved' to 'resolved' or in the opposite way. Furthermore, of the 28 parents who were classified as 'resolved' at both times, 15 (54%) had changed at subclassification level with respect to the specific strategies used. Conclusion: Resolution at a main level of parental reactions to their child's diagnosis was predominantly stable. Most parents were classified as 'resolved' at both baseline and follow-up assessment. However, more detailed analyses at subclassification level showed that most parents with a 'resolved' main status showed changing patterns of resolution strategies to their child's diagnosis, suggesting that resolution is an ongoing process.

PMID: 20412145 [PubMed - as supplied by publisher]

5. No Shinkei Geka. 2010 Mar;38(3):209-28.

Functional posterior rhizotomy for treatment of spasticity [Article in Japanese]

Morota N.

Department of Neurosurgery, National Children's Medical Center, National Center for Child Health and Development, 1-10-2 Ohkura, Setagaya-ku, Tokyo 157-8535, Japan.

PMID: 20229767 [PubMed - indexed for MEDLINE]

6. Dev Med Child Neurol. 2010 Feb;52(2):186-93.

Determinants of responsiveness to botulinum toxin, casting, and bracing in the treatment of spastic equinus in children with cerebral palsy.

Yap R, Majnemer A, Benaroch T, Cantin MA.

Shriners Hospitals for Children, Montreal, Quebec, Canada. ryap@shrinenet.org

AIM: The objective was to determine whether specific intrinsic (age, pattern of cerebral palsy [CP], child's motivation) and extrinsic (number of treatments, parenting stress) characteristics were associated with responsiveness to botulinum toxin A (BoNT-A) injections in children with CP 3 months after injection into the gastrocnemius muscle. METHOD: Children with hemiplegia or diplegia recruited from a BoNT-A programme were evaluated before and 3 months following injection of BoNT-A into the gastrocnemius. Outcome measures included muscle tone, range of motion, gait pattern, level of ambulation, gross motor function, and functional independence. Determinants of responsiveness to BoNT-A considered were age, number of treatments, distribution of CP, parenting stress, and motivation. RESULTS: Thirty-one children were recruited (17 males, 14 females)--22 with hemiplegia and nine with diplegia. Twenty-eight were classified at Gross Motor Function Classification System (GMFCS) level I and three at level III. The mean age was 6 years 4 months (SD 2y 11mo). Younger age (p=0.015) and fewer number (p=0.024) of BoNT-A treatments were associated with greater change in gross motor function. Child's motivation and parenting stress were significantly associated with improvements in muscle tone (p=0.006-0.017), passive range of motion (p=0.008-0.033), gait pattern (p=0.005-0.042), level of ambulation (p=0.001-0.043), and functional independence (p=0.004-0.027). INTERPRETATION: The results indicate that child, family, and treatment characteristics influence the degree of responsiveness to BoNT-A treatment. The contribution of contextual factors (personal and environmental) on responsiveness may be underappreciated in children with CP.

PMID: 20412253 [PubMed - in process]

7. Dev Med Child Neurol. 2010 Feb;52(2):139-44.

Systemic adverse events following botulinum toxin A therapy in children with cerebral palsy.

Naidu K, Smith K, Sheedy M, Adair B, Yu X, Graham HK.

The Royal Children's Hospital, Melbourne, Victoria, Australia.

AIM: We studied the incidence of incontinence and respiratory events in children with cerebral palsy who received injections of botulinum toxin A (BoNT-A). METHOD: We used multivariable logistic regression to investigate relationships between (BoNT-A) dose, Gross Motor Function Classification System (GMFCS) level, and the incidence of bladder or bowel incontinence, unplanned hospital admission, emergency department consultation or prescription of antibiotics for respiratory symptoms, and diagnosis of upper respiratory tract infection. RESULTS: Of 1980 injection episodes in 1147 children (mean age 4y 7mo, SD 1y 10mo, range 9mo-23y), 488 (25%) were in children with unilateral involvement and 1492 (75%) in children with bilateral involvement. At the time of injection 440 (22.2%) of children were at GMFCS level I, 611 (30.9%) were at level II, 330 (16.7%) were at level III, 349 (17.6%) were at level IV, and 250 (12.6%) were at level V. The incidence of serious adverse events was low, with 19 episodes of incontinence (1% of injection episodes) and 25 unplanned hospital admissions due to respiratory symptoms (1.3%). Incontinence typically resolved spontaneously 1 to 6 weeks after injection. The incidence of adverse events was associated with GMFCS level and dose of BoNT-A. INTERPRETATION: The incidence of serious adverse events was low but suggests systemic spread as well as a procedural effect. We recommend reviewing upper dose limits for children at all GMFCS levels, particularly those at levels IV and V with a history of aspiration and respiratory disease. In these children, alternatives to mask anaesthesia may be particularly important.

PMID: 20412252 [PubMed - in process]

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.

8. Pediatr Neurol. 2010 May;42(5):375-9.

Early diffusion-weighted images in infants with subcortical leukomalacia.

Kato T, Hayakawa F, Tsuji T, Natsume J, Okumura A.

Department of Pediatrics, Okazaki City Hospital, Okazaki, Aichi 444-8553, Japan. kato-jes@umin.ac.jp

We describe two infants with subcortical leukomalacia and decreased water diffusivity in widespread white matter on magnetic resonance imaging. In both infants, diffusion-weighted imaging at age 1 day revealed a widespread increase in signal intensities, predominantly in subcortical areas. The corticospinal tract in the brainstem was not involved. Subsequently, diffusion-weighted imaging produced apparently normal results, and conventional magnetic resonance imaging indicated diffuse but subcortical-dominant white matter lesions in the subacute phase. Follow-up magnetic resonance imaging revealed a volume loss and gliosis of the white matter. In one infant, psychomotor development was mildly delayed, and epilepsy occurred. The other infant experienced normal development and no epilepsy. Neither infant developed spastic cerebral palsy. These infants represent a characteristic group with perinatal brain injury.

PMID: 20399397 [PubMed - in process]

9. Neuroradiology. 2010 Apr 20. [Epub ahead of print]

Correlation of quantitative sensorimotor tractography with clinical grade of cerebral palsy.

Trivedi R, Agarwal S, Shah V, Goyel P, Paliwal VK, Rathore RK, Gupta RK.

Department of Radiodiagnosis, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, 226014, India.

INTRODUCTION: The purpose of this study was to determine whether tract-specific diffusion tensor imaging measures in somatosensory and motor pathways correlate with clinical grades as defined using the Gross Motor Function Classification System (GMFCS) in cerebral palsy (CP) children. METHODS: Quantitative diffusion tensor tractography was performed on 39 patients with spastic quadriparesis (mean age = 8 years) and 14 age/sex-matched controls. All patients were graded on the basis of GMFCS scale into grade II (n = 12), grade IV (n = 22), and grade V (n = 5) CP and quantitative analysis reconstruction of somatosensory and motor tracts performed. RESULTS: Significant inverse correlation between clinical grade and fractional anisotropy (FA) was observed in both right and left motor and sensory tracts. A significant direct correlation of mean diffusivity values from both motor and sensory tracts was also observed with clinical grades. Successive decrease in FA values was observed in all tracts except for left motor tracts moving from age/sex-matched controls to grade V through grades II and IV. CONCLUSION: We conclude that white matter tracts from both the somatosensory and the motor cortex play an important role in the pathophysiology of motor disability in patients with CP.

PMID: 20405112 [PubMed - as supplied by publisher]

10. Brain. 2010 May;133(Pt 5):1470-83. Epub 2010 Apr 19.

Transmission within several spinal pathways in adults with cerebral palsy.

Achache V, Roche N, Lamy JC, Boakye M, Lackmy A, Gastal A, Quentin V, Katz R.

UPMC Univ Paris 06, ER6, Physiologie et Physiopathologie de la Motricité chez l'Homme, Service de Médecine

Physique et Réadaptation, Hôpital de la Pitié-Salpêtrière, 47, boulevard de l'Hôpital, 75651 Paris cedex 13, France. rose.katz@upmc.fr.

Many studies have investigated the changes of spinal neuronal networks in patients with cortico-subcortical or spinal lesions occurring during adulthood. In contrast, little is known about modifications of transmission within spinal networks implied in motor control for patients suffering from perinatal lesions. In the present series of experiments, we have investigated, in adult patients with cerebral palsy who suffered cerebral damage in the perinatal period, the efficacy of transmission within four spinal networks known for exhibiting pathophysiological changes following a central nervous system lesion occurring in adulthood. These are presynaptic Ia inhibition, post-activation depression, disynaptic reciprocal Ia inhibition and propriospinally-mediated Group I and Group II facilitations. In 28 patients with cerebral palsy and 35 age-matched healthy subjects we were able to show that: (i) disynaptic reciprocal Ia inhibition is intact in patients with cerebral palsy; (ii) both presynaptic Ia inhibition and post-activation depression are impaired in patients with cerebral palsy; and (iii) propriospinally-mediated Group I facilitation is undamaged in patients with cerebral palsy, whereas Group II facilitation is strongly enhanced. Only diminished post-activation depression was highly correlated to the severity of spasticity. Differences in the spinal transmission between patients with cerebral palsy and patients who suffered neuronal damage in adulthood are discussed.

PMID: 20403961 [PubMed - in process]

11. Int J Dev Neurosci. 2010 Apr 19. [Epub ahead of print]

NEUROBID-an EU-funded project to study the developing brain barriers.

Bueter W, Saunders NR, Mallard C, Bauer HC, Stolp HB, Kavelaars A, Dammann O; for the NEUROBID consortium.

Hannover Medical School, Hannover, Germany.

Brain diseases are one of the most prevalent groups of diseases in Europe with estimated annual costs amounting to euro386 billion. Data collected by the WHO suggest that brain diseases are responsible for 35% of Europe's total disease burden. In the treatment of neurological disease, the blood brain barrier (BBB) still represents an obstacle for the delivery of drugs to the brain and thus a major challenge for the development of therapeutic regimens. Understanding the molecular basis and functioning of the BBB in health and disease, including transport mechanisms across the BBB, therefore holds significant potential for future strategies to prevent and ameliorate neurological disease. Recent research indicates that some neurological disorders have a developmental etiologic component. The major goal of the NEUROBID project is thus to understand the molecular mechanisms and function of the BBB in health and disease both in the developing brain and the adult central nervous system. With an interdisciplinary consortium from the fields of developmental neurobiology and BBB research, NEUROBID aims to (i) understand the involvement of normal and disturbed BBB function in normal and abnormal brain development and (ii) to develop novel strategies for drug delivery to the brain. Unique transport mechanisms across the BBB will be used to target potential therapeutic macromolecular and cellular agents specifically to the brain barriers and transport them into the brain. The main target disorders of NEUROBID are non-inherited neurodevelopmental disorders arising from perinatal adverse exposure, such as cerebral palsy, and classic adult neurological disorders such as multiple sclerosis and stroke. In the long term, NEUROBID hopes to pave the way for new treatment strategies and thus reduce the economic and social burden of neurological disease.

PMID: 20412847 [PubMed - as supplied by publisher]

12. Mol Cell Neurosci. 2010 Apr 16. [Epub ahead of print]

Regulated lysosomal trafficking as a mechanism for regulating GABA(A) receptor abundance at synapses in Caenorhabditis elegans.

Davis KM, Sturt BL, Friedmann AJ, Richmond JE, Bessereau JL, Grant BD, Bamber BA.

Department of Biological Sciences, University of Toledo, 2801 W Bancroft St. Toledo, OH 43606.

GABA(A) receptor plasticity is important for both normal brain function and disease progression. We are studying

GABA(A) receptor plasticity in Caenorhabditis elegans using a genetic approach. Acute exposure of worms to the GABA(A) agonist muscimol hyperpolarizes postsynaptic cells, causing paralysis. Worms adapt after several hours, but show uncoordinated locomotion consistent with decreased GABA signaling. Using patch clamp and immunofluorescence approaches, we show that GABA(A) receptors are selectively removed from synapses during adaptation. Subunit mRNA levels were unchanged, suggesting a post-transcriptional mechanism. Mutants with defective lysosome function (cup-5) show elevated GABA(A) receptor levels at synapses prior to muscimol exposure. During adaptation, these receptors are removed more slowly, and accumulate in intracellular organelles positive for the late endosome marker GFP-RAB-7. These findings suggest that chronic agonist exposure increases endocytosis and lysosomal trafficking of GABA(A) receptors, leading to reduced levels of synaptic GABA(A) receptors and reduced postsynaptic GABA sensitivity.

PMID: 20403442 [PubMed - as supplied by publisher]

13. Dev Med Child Neurol. 2010 Apr 12. [Epub ahead of print]

Quantitative diffusion tensor tractography of the motor and sensory tract in children with cerebral palsy.

Yoshida S, Hayakawa K, Yamamoto A, Okano S, Kanda T, Yamori Y, Yoshida N, Hirota H.

Department of Radiology, Kyoto City Hospital, Kyoto, Japan.

Aim: The aim of this study was to compare the findings of quantitative diffusion tensor tractography of the motor and sensory tracts in children with cerebral palsy (CP) and typically developed comparison individuals, and also to evaluate the correlation with gross motor function. Method: Thirty-four children with CP (mean age 2y 2.mo, SD 2y 0mo; 19 with spastic diplegia, eight with hemiplegia, six with spastic quadriplegia, and one with spastic triplegia) and 21 healthy comparison children (mean 2y 1.68mo, SD 2y 8.64mo) were evaluated. The distribution of Gross Motor Function Classification System (GMFCS) levels in the CP group was as follows: level I, 7; level II, 14; level III, 5; level IV, 3; and level V, 5. The following three diffusion tensor imaging (DTI) parameters including tractography were evaluated for each tract (corticospinal tract [CST] and posterior thalamic radiation [PTR]): number of fibres, tract-based fractional anisotropy, and region of interest (ROI)-based fractional anisotropy. We compared each value between the two groups, and correlated each value with the GMFCS level. Results: The number of fibres and ROI-based fractional anisotropy values of both tracts were significantly lower in children with CP than in the comparison group ($p<0.05$-0.001). Additionally, there was significant negative correlation between GMFCS level and motor-sensory parameters ($p<0.001$-0.05). Interpretation: DTI parameters of the CST and PTR in children with CP were significantly lower than in comparison children. In addition, these parameters were significantly correlated with GMFCS level.

PMID: 20412261 [PubMed - as supplied by publisher]

14. J Neurosci. 2010 Mar 31;30(13):4693-706.

A chemical screen identifies novel compounds that overcome glial-mediated inhibition of neuronal regeneration.

Usher LC, Johnstone A, Ertürk A, Hu Y, Strikis D, Wanner IB, Moorman S, Lee JW, Min J, Ha HH, Duan Y, Hoffman S, Goldberg JL, Bradke F, Chang YT, Lemmon VP, Bixby JL.

Departments of Pharmacology, Neurological Surgery, and Ophthalmology, and Miami Project to Cure Paralysis, Neuroscience Program, University of Miami Miller School of Medicine, Miami, Florida 33136, USA.

A major barrier to regeneration of CNS axons is the presence of growth-inhibitory proteins associated with myelin and the glial scar. To identify chemical compounds with the ability to overcome the inhibition of regeneration, we screened a novel triazine library, based on the ability of compounds to increase neurite outgrowth from cerebellar neurons on inhibitory myelin substrates. The screen produced four "hit compounds," which act with nanomolar potency on several different neuronal types and on several distinct substrates relevant to glial inhibition. Moreover, the compounds selectively overcome inhibition rather than promote growth in general. The compounds do not affect neuronal cAMP levels, PKC activity, or EGFR (epidermal growth factor receptor) activation. Interestingly, one of the compounds alters microtubule dynamics and increases microtubule density in both fibroblasts and neurons. This

same compound promotes regeneration of dorsal column axons after acute lesions and potentiates regeneration of optic nerve axons after nerve crush in vivo. These compounds should provide insight into the mechanisms through which glial-derived inhibitors of regeneration act, and could lead to the development of novel therapies for CNS injury.

PMID: 20357120 [PubMed - indexed for MEDLINE]PMCID: PMC2855497 [Available on 2010/9/30]

15. Semin Perinatol. 2010 Feb;34(1):39-45.

Applications of positron emission tomography in the newborn nursery.

Kannan S, Chugani HT.

Department of Pediatrics, Children's Hospital of Michigan, Wayne State University School of Medicine, Detroit, MI 48201, USA.

Positron emission tomography (PET) is a relatively noninvasive imaging test that is able to detect abnormalities in different organs based on derangements in the chemical functions and/or receptor expression at the cellular level. PET imaging of the brain has been shown to be a powerful diagnostic tool for detecting neurochemical abnormalities associated with various neurologic disorders as well as to study normal brain development. Although its use in detecting neurological abnormalities has been well described in adults and pediatrics, its application in the newborn nursery has not been explored adequately. Early detection of brain injury secondary to intrauterine and perinatal insults using PET imaging can provide new insight in prognosis and in instituting early therapy. In this review, the authors describe applications of PET imaging in the newborn nursery specifically related to the detection of metabolic changes seen in hypoxic ischemic encephalopathy, neonatal seizures, and neuroinflammation in the neonatal period.

PMID: 20109971 [PubMed - indexed for MEDLINE]