Cerebral Palsy ALLIANCE

NEWS
Cerebral Palsy Research

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Interventions and Management

1. Dev Med Child Neurol. 2012 Jun 20. doi: 10.1111/j.1469-8749.2012.04312.x. [Epub ahead of print]

Inter-relationships of functional status in cerebral palsy: analyzing gross motor function, manual ability, and communication function classification systems in children.

Hidecker MJ, Ho NT, Dodge N, Hurvitz EA, Slaughter J, Workinger MS, Kent RD, Rosenbaum P, Lenski M, Messaros BM, Vanderbeek SB, Deroos S, Paneth N.

Department of Speech-Language Pathology, University of Central Arkansas, Conway, AR; Department of Epidemiology, Michigan State University, East Lansing, MI; Department of Neurodevelopmental Pediatrics, Helen DeVos Children's Hospital, Grand Rapids, MI; Department of Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, MI; Marshfield Clinic Research Foundation, Marshfield, WI; Waisman Center, University of Wisconsin-Madison, Madison, WI, USA. CanChild Centre for Childhood Disability Research, McMaster University, Hamilton, ON, Canada. Department of Biomedical Research and Informatics Core, Michigan State University, East Lansing, MI; Department of Neurology, Helen DeVos Children's Hospital, Grand Rapids, MI, USA.

Aim: To investigate the relationships among the Gross Motor Function Classification System (GMFCS), Manual Ability Classification System (MACS), and Communication Function Classification System (CFCS) in children with cerebral palsy (CP). Method: Using questionnaires describing each scale, mothers reported GMFCS, MACS, and CFCS levels in 222 children with CP aged from 2 to17 years (94 females, 128 males; mean age 8y, SD 4). Children were referred from pediatric developmental/behavioral, physiatry, and child neurology clinics, in the USA, for a case-control study of the etiology of CP. Pairwise relationships among the three systems were assessed using Spearman's correlation coefficients (r(s)), stratifying by age and CP topographical classifications. Results: Correlations among the three functional assessments were strong or moderate. GMFCS levels were highly correlated with MACS levels (r(s) =0.69) and somewhat less so with CFCS levels (r(s) =0.47). MACS and CFCS were also moderately correlated (r(s) =0.54). However, many combinations of functionality were found. Of the 125 possible combinations of the three five-point systems, 62 were found in these data. Interpretation: Use of all three classification systems provides a more comprehensive picture of the child's function in daily life than use of any one alone. This resulting functional profile can inform both clinical and research purposes.

PMID: 22715907 [PubMed - as supplied by publisher]

2. Phys Occup Ther Pediatr. 2012 Jun 22. [Epub ahead of print]

Evidence to Practice Commentary: The Evidence Alert Traffic Light Grading System.

Novak I.

Cerebral Palsy Alliance, School of Medicine, University of Notre Dame Australia , Darlinghurst NSW , Australia.

PMID: 22721003 [PubMed - as supplied by publisher]

3. Dev Med Child Neurol. 2012 Jun 20. doi: 10.1111/j.1469-8749.2012.04336.x. [Epub ahead of print]

Description of children with cerebral palsy: steps for the future.

Cans C.

RHEOP-ThEMAS, UJF-Grenoble1, France.

PMID: 22715931 [PubMed - as supplied by publisher]

4. Dev Med Child Neurol. 2012 Jun 12. doi: 10.1111/j.1469-8749.2012.04340.x. [Epub ahead of print]

The impact of botulinum toxin A and abduction bracing on long-term hip development in children with cerebral palsy.

Willoughby K, Ang SG, Thomason P, Graham HK.

Orthopaedic Department, The Royal Children's Hospital, Parkville, Victoria; Hugh Williamson Gait Laboratory, The Royal Children's Hospital, Parkville, Victoria; Murdoch Childrens Research Institute, Parkville, Victoria; Department of Paediatrics, The University of Melbourne, Carlton, Victoria, Australia.

Aim: To study the long-term impact of 3 years of botulinum toxin A (BoNT-A) injections and abduction bracing on hip development in children with bilateral spastic cerebral palsy (CP). We wanted to know if early treatment improved hip development and reduced the need for surgery. Method A long-term review of hip morphology and surgery requirements in children who participated in a multicentre, randomized controlled trial. The trial investigated short-term effects of BoNT-A injections combined with an abduction brace, compared with usual care, on hip displacement in children with bilateral spastic CP. Results Forty-six children with bilateral spastic CP (31 males, 15 females; 10 with diplegia, 36 with quadriplegia; mean age at enrolment of 3y 2mo, mean age at most recent clinical review 13y 11mo [range 10y 6mo-16y 8mo]; three children in Gross Motor Function Classification System level II, 11 in level III, 20 in level IV, 12 in level V) were followed for a mean of 10 years 10 months from recruitment to the trial. Mean migration percentage was 15.9% in the BoNT-A group and 15.2% in the comparison group (t=0.26, p=0.79). Eighty-nine percent of hips in the treatment group and 91% hips in the comparison group had satisfactory development, using a valid scale (Mann-Whitney U test=867.50, z=-1.59, p=0.11). Forty children had preventive surgery (21 treatment group, 19 comparison group) and 18 children had reconstructive surgery (10 treatment, 8 comparison). Interpretation In children with bilateral spastic CP, early treatment with BoNT-A and hip abduction bracing does not reduce the need for surgery or improve hip development at skeletal maturity.

PMID: 22686491 [PubMed - as supplied by publisher]

5. Dev Med Child Neurol. 2012 Jun 12. doi: 10.1111/j.1469-8749.2012.04335.x. [Epub ahead of print]

The role of botulinum toxin A and abduction bracing in the management of hip development in children with cerebral palsy.

Theologis T.

Nuffield Orthopaedic Center, Headington, Oxford, UK.

PMID: 22686460 [PubMed - as supplied by publisher]

6. J Pediatr Rehabil Med. 2012 Jan 1;5(2):107-15.

Reliability and validity of Hebrew Pediatric Evaluation of Disability Inventory (PEDI) in children with cerebral palsy~-- health care professionals vs. mothers.

Elad D, Barak S, Eisenstein E, Bar O, Herzberg O, Brezner A.

The Edmond and Lily Safra Children's Hospital, The Chaim Sheba Medical Center, Ramat Gan, Israel.

Aim: To evaluate the reliability and validity of the PEDI in Hebrew (PEDI-H) in children with cerebral palsy (CP) using health care professionals' (HCP) and mothers' evaluations. Methods: The sample comprised 73 participants (40 males, 33 females) with CP. Two modes of PEDI-H administration were used: interview of the mothers by a social worker and HCP evaluation. PEDI-H reliability was examined by two modes: 1) internal consistency via Cronbach's alpha and 2) overall absolute agreement within subject reliability via intraclass correlation coefficient (ICC). Discriminative validity using collapsed strata of the Gross Motor Functional Classification System (GMFCS) (area under the curve=AUC) were examined for each of the PEDI-H sub-domains.Results: Participants' mean age was 8 years 8 months (standard deviation (SD) 2 years 10 months). The reliability of mothers' PEDI-H was good-to-excellent (Cronbach's alpha=0.889-0.964, ICC=0.845-0.938). The HCPs' reliability was excellent (Cronbach's alpha and ICCs > 0.90). The PEDI-H was also reliable in children with mild, moderate, and severe CP (GMFCS=I+II, III and IV+V, respectively), in younger (6-7 years) and older children (8-12 years), and in children with various CP distribution. Mothers and HCPs had low accuracy in Social-Function domains (AUC=0.538-0.686) and moderate-to-high accuracy in Mobility and Self-Care domains (AUC=0.887-0.967). PEDI-H was able to distinguish between children with various CP severities. Conclusion: The PEDI-H has good psychometric properties when administered by mothers and HCPs and can be used in older children with CP.

PMID: 22699101 [PubMed - in process]

7. Rev Bras Fisioter. 2012 Jun 14. pii: S1413-35552012005000026. [Epub ahead of print]

Cross-cultural adaptation and reliability analysis of the Brazilian version of Pediatric Balance Scale (PBS) [Article in Portuguese, English]

Ries LG, Michaelsen SM, Soares PS, Monteiro VC, Allegretti KM.

Postgraduate Program in Physical Therapy, Universidade do Estado de Santa Catarina, Florianópolis, SC, Brazil.

BACKGROUND: The Pediatric Balance Scale (PBS) was developed from a modified version of the Berg Balance Scale aiming to obtain a balance scale more appropriate for the child population. OBJECTIVES: To adapt the PBS into Brazilian-Portuguese and to evaluate the intra and inter-rater reliability of the Brazilian-Portuguese version of PBS. METHODS: To perform the cross-cultural adaptation of the American version of PBS four translators were involved, who have performed two translations and their respective back-translations. Then, a review by a multidisciplinary committee and a subsequent an assessment of the equivalence of meaning between the back-translations and the original English scale were performed by 3 and 30 healthcare professionals respectively. The intra-rater reliability of the final version of the Brazilian-Portuguese PBS was evaluated using a test-retest design with one-week interval. The Brazilian-Portuguese version of the PBS was tested twice on the same day by two different raters to test the inter-rater reliability. The inter-rater reliability, which was measured from a video of the volunteers performance, was evaluated by comparing the score given by five raters independently. Reliability was

evaluated by Intraclass Correlation Coefficient (ICC). Fifteen volunteers (11±2.7 years) diagnosed with Cerebral Palsy (CP) classified at level I and II on the Gross Motor Function Classification System (GMFCS) were assessed. RESULTS: The reliability of the PBS total score for both intra-rater (ICC=0.85) and inter-rater (ICC=0.91) was excellent. The inter-rater reliability (measured from the video) for the total score was also classified as excellent (ICC=0.98). CONCLUSION: The results showed adequate reliability for the PBS for pediatric population with CP diagnostic classified at level I and II on the GMFCS.

PMID: 22699691 [PubMed - as supplied by publisher]

8. J Pediatr Rehabil Med. 2012 Jan 1;5(2):99-106.

Characteristics associated with improved knee extension after strength training for individuals with cerebral palsy and crouch gait.

Steele KM, Damiano DL, Eek MN, Unger M, Delp SL.

Department of Mechanical Engineering, Stanford University, Stanford, CA, USA.

Muscle weakness may contribute to crouch gait in individuals with cerebral palsy, and some individuals participate in strength training programs to improve crouch gait. Unfortunately, improvements in muscle strength and gait are inconsistent after completing strength training programs. The purpose of this study was to examine changes in knee extensor strength and knee extension angle during walking after strength training in individuals with cerebral palsy who walk in crouch gait and to determine subject characteristics associated with these changes. A literature review was performed of studies published since January 2000 that included strength training, three-dimensional motion analysis, and knee extensor strength measurements for individuals with cerebral palsy. Three studies met these criteria and individual subject data was obtained from the authors for thirty crouch gait subjects. Univariate regression analyses were performed to determine which of ten physical examination and motor performance variables were associated with changes in strength and knee extension during gait. Change in knee extensor strength ranged from a 25% decrease to a 215% increase, and change in minimum knee flexion angle during gait ranged from an improvement of 9° more knee extension to 15° more knee flexion. Individuals without hamstring spasticity had greater improvement in knee extension after strength training. Hamstring spasticity was associated with an undesired increase in knee flexion during walking. Subject-specific factors such as hamstring spasticity may be useful for predicting which subjects will benefit from strength training to improve crouch gait.

PMID: 22699100 [PubMed - in process]

9. J Pediatr Rehabil Med. 2012 Jan 1;5(2):75-88.

Randomized controlled trial assessing participation and quality of life in a supported speed treadmill training exercise program vs. a strengthening program for children with cerebral palsy.

Gates PE, Banks D, Johnston TE, Campbell SR, Gaughan JP, Ross SA, Engsberg JR, Tucker C.

Shriners Hospitals for Children®, Shreveport, LA, USA.

Objective: A multi-site Randomized-Controlled Trial compared a home-based Supported Speed Treadmill Training Exercise Program (SSTTEP) with a strengthening exercise program in children with cerebral palsy (CP) on the following categories; Participation, quality of life (QOL), self-concept, goal attainment, and satisfaction. Design: Twenty-six children with spastic cerebral palsy were assigned by site-based block randomization to the SSTTEP (n=14) or strengthening exercise (n=12) group. Both groups participated in a two week clinic-based induction period and continued the intervention at home for ten weeks. Data were collected at baseline, post-intervention (12 weeks), and follow-up (16 weeks). Assessments included the Canadian Occupational Performance Measure, Children's Assessment of Participation and Enjoyment Scale, Pediatric Quality of Life Cerebral Palsy Module, and Piers-Harris Children's Self-Concept Scale. Evaluators were blinded to group assignment at two sites. Results: Satisfaction and performance on individual goals, participation, and parent-reported QOL improved in both groups with improvement maintained for four weeks post intervention. Conclusion: The hypothesis that the SSTTEP group would have better outcomes than the exercise group was not supported. However, both groups showed that children with CP can make gains in participation, individual goals, and satisfaction following a 12-week intensive

exercise intervention, and these findings persisted for four weeks post intervention.

PMID: 22699098 [PubMed - in process]

10. Int J Pediatr. 2012;2012:504387. Epub 2012 May 22.

Evaluation of functional electrical stimulation to assist cycling in four adolescents with spastic cerebral palsy.

Harrington AT, McRae CG, Lee SC.

Interdisciplinary Program in Biomechanics and Movement Science, University of Delaware, Newark, DE 19716, USA.

Introduction. Adolescents with cerebral palsy (CP) often have difficulty participating in exercise at intensities necessary to improve cardiovascular fitness. Functional electrical stimulation- (FES-) assisted cycling is proposed as a form of exercise for adolescents with CP. The aims of this paper were to adapt methods and assess the feasibility of applying FES cycling technology in adolescents with CP, determine methods of performing cycling tests in adolescents with CP, and evaluate the immediate effects of FES assistance on cycling performance. Materials/Methods. Four participants (12-14 years old; GMFCS levels III-IV) participated in a case-based pilot study of FES-assisted cycling in which bilateral quadriceps muscles were activated using surface electrodes. Cycling cadence, power output, and heart rate were collected. Results. FES-assisted cycling was well tolerated (n = 4) and cases are presented demonstrating increased cadence (2-43?rpm), power output (19-70%), and heart rates (4-5%) and decreased variability (8-13%) in cycling performance when FES was applied, compared to volitional cycling without FES assistance. Some participants (n = 2) required the use of an auxiliary hub motor for assistance. Conclusions. FES-assisted cycling is feasible for individuals with CP and may lead to immediate improvements in cycling performance. Future work will examine the potential for long-term fitness gains using this intervention.

PMID: 22685479 [PubMed - in process] PMCID: PMC3364582

11. PM R. 2012 Jun 12. [Epub ahead of print]

Feasibility of Using Active Video Gaming as a Means for Increasing Energy Expenditure in Three Nonambulatory Young Adults With Disabilities.

Rowland JL, Rimmer JH.

Department of Disability and Human Development, University of Illinois at Chicago, 1640 West Roosevelt, Chicago, IL 60608-6904.

OBJECTIVE: To examine the feasibility of adapting active video games (AVGs) for nonambulatory wheelchair users at functionally diverse levels and to examine these AVGs as a method for increasing energy expenditure (EE) for 3 young adults with severe (SEV), moderate (MOD), and no upper extremity limitation (NL). DESIGN: Case study. SETTING: Residential special education school for youth and young adults with physical disabilities. PARTICIPANTS: Two young adults with spastic cerebral palsy (SEV, MOD) and one young adult with spina bifida (NL). All participants were nonambulatory wheelchair users. METHODS: Each participant performed Wii bowling and tennis and an adapted upper extremity version of a Dance Dance Revolution (DDR) game pad. MAIN OUTCOME MEASUREMENTS: EE was measured through indirect calorimetry (VO(2)). Heart rate data were collected with the use of a Polar Heart Rate Monitor. RESULTS: SEV and MOD participants showed a higher percentage increase in EE for the Wii games (SEV, 25.6%; MOD, 30.8%) compared with DDR (SEV, 10.8%; MOD, 29.1%), whereas the participant with NL had a greater EE increase for the DDR (173.5%) compared with Wii (59.5%). CONCLUSIONS: AVGs showed clinically significant increases in EE for all 3 participants and can be performed by nonambulatory wheelchair users ranging from those with NL to those with SEV upper extremity limitation with the appropriate adaptations.

PMID: 22698849 [PubMed - as supplied by publisher]

12. Arch Phys Med Rehabil. 2012 Jun 18. [Epub ahead of print]

Six-Minute Walk Test in children with cerebral palsy GMFCS level I and II : reproducibility, validity and training effects.

Leunkeu AN, Shephard RJ, Ahmaidi S.

EA: 3300 " Adaptations Physiologiques àl'Exercice et Réadaptation àl'Effort", Université de Picardie Jules Verne, F-80025, Amiens, France.

OBJECTIVES: To assess the reproducibility and validity of the 6-minute walking test with gas collection (6mwt), and to evaluate effectiveness of a walking program in children with cerebral palsy (CP). DESIGN: Assessment and controlled training study. SETTING: Rehabilitation Service. PARTICIPANTS: Children/adolescents with CP (16 boys, 8 girls, mean age 14.2±2.0 years, GMFCS levels I and II). INTERVENTION: Following a cycle ergometer stress test and 6mwt, subjects were assigned to training (n = 12, 40 minutes of moderate walking exercise 3 times/ week for 8 weeks) or a matched control group (n =12). OUTCOMES MEASURES: V?O (2peak), peak ventilation, peak heart rate and 6mwt distance. RESULTS: Test-retest correlations for 6mwt were good (V?O(2peak): r=0. 90, p<0.001, ICC=0.85; peak ventilation: r=0.88, p<0.001, ICC=0.83; peak heart rate: r=0.86, p<0.001, ICC=0.82; distance walked: r=0.87; p=0.007, ICC=0.80). Mean scores for the 6mwt also closely matched corresponding cycle-ergometer data. Significant improvements in 6mwt V?O (2peak), peak ventilation and peak heart rate were found after 8 weeks of training (p<0.05). CONCLUSIONS: The 6mwt appears reproducible and valid relative to cycle-ergometer assessments of cardio-respiratory responses, and offers a simple method of clinical assessment. An 8-week moderate walking program improves the cardiopulmonary fitness of children with CP as measured by 6mwt.

PMID: 22721868 [PubMed - as supplied by publisher]

13. No To Hattatsu. 2012 May;44(3):225-7.

Botulinum toxin in the treatment of cerebral palsy: case conference [Article in Japanese]

Nezu A, Adachi M.

nezu@jyuuairyouikukai.or.jp

PMID: 22712224 [PubMed - in process]

14. BMC Oral Health. 2012 Jun 18;12(1):15. [Epub ahead of print]

Parental reports of the oral health-related quality of life of children with cerebral palsy.

Abanto J, Carvalho TS, Bönecker M, Ortega AO, Ciamponi AL, Raggio DP.

BACKGROUND: The severity of physical and mental impairments and oral problems, as well as socioeconomic factors, may have an impact on quality of life of children with cerebral palsypalsied (CP).) children. The aim of this research was to assess the impact of impairments and oral health conditions, adjusted by socioeconomic factors, on the Oral Health-Related Quality of Life (OHRQoL) of children with CP using their parents as proxies. METHODS: Sixty children, between 6-14 years of age were selected. Their parents answered a children's OHRQoL instrument (5 domains) which combines the Parental-Caregivers Perception Questionnaire (P-CPQ) and Family Impact Scale (FIS). The severity of dental caries, type of CP, communication ability, gross motor function, seizures and socioeconomic conditions were assessed. RESULTS: Considering the total score of the OHRQoL instrument, only the reduction of communication ability and dental caries severity had a negative impact on the OHRQoL (p<0.05). Considering each domain of the instrument, the severity of the type of CP and its reduction of communication ability showed a negative impact on oral symptoms and functional limitations domains (p<0.05). Seizures have a negative

impact on oral symptoms domain (p=0.006). The multivariate fitted model showed that the severity of dental caries, communication ability and low family income were negatively associated with the impact on OHRQoL (p#0.001). CONCLUSIONS: The severity of dental caries, communication ability, and family income are conditions strongly associated with a negative impact on OHRQoL of children with CP.

PMID: 22708973 [PubMed - as supplied by publisher]

15. Dent Update. 2012 Jan-Feb;39(1):45-8.

Sedation for patients with movement disorders.

Curl C, Boyle C.

Dental Department, Hainault Health Centre, Manford Way, Chigwell, Essex IG7 4DF, UK.

The general features of the movement disorders are outlined and the effects of inhalational sedation with nitrous oxide and oxygen and intravenous sedation, using midazolam, are described.Two case reports of patients with cerebral palsy treated in a community care setting are presented, and the advantages of intravenous and inhalational sedation are explained. Clinical Relevance: Inhalational sedation (IS) with nitrous oxide and intravenous sedation (IVS) with midazolam can be useful aids to reduce unwanted movements in patients with movement disorders during dental treatment.

PMID: 22720380 [PubMed - in process]

16. Conf Proc IEEE Eng Med Biol Soc. 2011;2011:5360-3.

Brain-machine interfaces for real-time speech synthesis.

Guenther FH, Brumberg JS.

Departments of Speech, Language, & Hearing Sciences and Cognitive & Neural Systems, Boston University, Boston, MA 02215, USA. guenther@bu.edu

This paper reports on studies involving brain-machine interfaces (BMIs) that provide near-instantaneous audio feedback from a speech synthesizer to the BMI user. In one study, neural signals recorded by an intracranial electrode implanted in a speech-related region of the left precentral gyrus of a human volunteer suffering from locked-in syndrome were transmitted wirelessly across the scalp and used to drive a formant synthesizer, allowing the user to produce vowels. In a second, pilot study, a neurologically normal user was able to drive the formant synthesizer with imagined movements detected using electroencephalography. Our results support the feasibility of neural prostheses that have the potential to provide near-conversational synthetic speech for individuals with severely impaired speech output.

PMID: 22255549 [PubMed - indexed for MEDLINE]

17. J Pediatr. 2012 Jun 9. [Epub ahead of print]

Ten-Year Experience Using Antegrade Enemas in Children.

Mugie SM, Machado RS, Mousa HM, Punati JB, Hogan M, Benninga MA, Di Lorenzo C.

Division of Gastroenterology, Nationwide Children's Hospital, Columbus, OH; Division of Gastroenterology, Emma Children's Hospital, Academic Medical Center, Amsterdam, The Netherlands.

OBJECTIVE: To describe a single-center, 10-year experience with the use of antegrade enemas. STUDY DESIGN: Retrospective analysis of 99 patients treated with antegrade enemas at Nationwide Children's Hospital. RESULTS: Study subjects (median age 8 years) were followed for a mean time of 46 months (range 2-125 months) after cecostomy placement. Seventy-one patients had the cecostomy placed percutaneously and 28 by surgery. Thirty-

five patients had functional constipation and 64 patients an organic disease (spinal abnormalities, cerebral palsy, imperforate anus, Hirschsprung's disease). While using antegrade enemas, 71% became symptom-free, in 20 subjects symptoms improved, in 2 subjects symptoms did not change, and in 7 subjects symptoms worsened. Poor outcome was associated with surgical placement of the cecostomy (P < .001), younger age (P = .02), shorter duration of symptoms (P = .01), history of Hirschsprung's disease (P = .05), cerebral palsy (P = .03), previous abdominal surgery (P = .001), and abnormal colonic manometry (P = .004). In 88%, successful irrigation solution included use of a stimulant laxative, and subjects who used a stimulant did significantly better (P < .001) than subjects who started without a stimulant. In 13 patients, the cecostomy was removed 49.7 months after placement without recurrence of symptoms. Major complications occurred in 12 patients and minor complications in 47. CONCLUSIONS: Antegrade enemas represent a successful and relatively safe therapeutic option in children with severe defecatory disorders. Prognostic factors are identified.

PMID: 22683036 [PubMed - as supplied by publisher]

18. BMC Res Notes. 2012 Jun 15;5(1):300. [Epub ahead of print]

Predictors of drop-out in a multi-centre longitudinal study of participation and quality of life of children with cerebral palsy.

Dickinson HO, Rapp M, Arnaud C, Carlsson M, Colver AF, Fauconnier J, Lyons A, Marcelli M, Michelsen SI, Parkes J, Parkinson K.

BACKGROUND: SPARCLE is a study across nine European regions which examines the predictors of participation and quality of life of children with cerebral palsy. Children and their families were initially interviewed in 2004/2005 when the children were aged 8-12 years (SPARCLE1); they were approached again in 2009/2010 at age 13-17 years (SPARCLE2). The objective of this report is to assess potential for bias due to family non-response in SPARCLE2. Logistic regression was used to assess whether socio-demographic factors, parental stress and child impairment were related to non-response, both overall and by category (failure to trace families, death of child, traced families declining to participate). RESULTS: Of the 818 families who participated in SPARCLE1, 224/818 (27%) did not participate in SPARCLE2. 51/818 (6%) were not traced. Among the 767 traced families, 32/767 (4%) children with cerebral palsy had died, seven children had been incorrectly diagnosed as having cerebral palsy, thirteen families had moved out of the region and one family had language problems. Of the remaining 714 families, 120/714 (17%) declined to participate. Drop-out between SPARCLE1 and SPARCLE2 varied significantly between regions; families were more difficult to trace and more likely to decline to participate if the parents' educational qualifications, as recorded in SPARCLE1, were lower; they were also more likely to decline to participate if SPARCLE1 recorded that they were more stressed or if they had not completed a SPARCLE1 stress questionnaire. CONCLUSIONS: To reduce the risk of bias, all SPARCLE2 analyses should allow for factors (region and walking ability) which determined the sampling strategy, either by adjusting for these factors or by using sampling weights. Further analyses should be performed, adjusting for additional factors that were associated with non-response: parents' educational qualifications, family structure and parental stress. To allow for differential non-response in studies which sample from population registers, such registers should routinely record socio-demographic information.

PMID: 22704327 [PubMed - as supplied by publisher]

19. Child Care Health Dev. 2012 Jun 18. doi: 10.1111/j.1365-2214.2012.01408.x. [Epub ahead of print]

Reliability and validity of the Korean version of the manual ability classification system for children with cerebral palsy.

Jang DH, Sung IY, Kang JY, Lee SI, Park JY, Yuk JS, Byun EM.

Department of Rehabilitation, Incheon St. Mary's Hospital, The Catholic University of Korea, Incheon, Korea.

BACKGROUND: To investigate the inter- and intra-rater reliability of the Korean version of the Manual Ability Classification System (MACS) for children with cerebral palsy. METHODS: After a two-step forward and one-step

backward translation, the inter-rater reliability of the Korean version of the MACS was assessed separately by parents, occupational therapists and physicians. A second assessment for intra-rater reliability was performed 4 weeks later. RESULTS: Sixty-nine children were enrolled. The intra-class correlation coefficients were 0.956 between occupational therapists and physicians, 0.927 between parents and physicians, and 0.960 between parents and occupational therapists. Intra-rater reliability ranged from 0.965 to 0.987. CONCLUSIONS: The Korean version of the MACS is reliable and valid and is suitable for assessing manual ability in Korean children with cerebral palsy.

PMID: 22708965 [PubMed - as supplied by publisher]

20. J Pediatr Rehabil Med. 2012 Jan 1;5(2):133-42.

Constraint-induced movement therapy (CIMT) for young children with cerebral palsy: Effects of therapeutic dosage.

Deluca SC, Case-Smith J, Stevenson R, Ramey SL.

Department of Occupational Therapy, The University of Alabama, Birmingham, AL, USA.

Objective: To compare effects of 2 dosage levels of constraint-induced movement therapy (CIMT) for children with hemiplegic cerebral palsy (CP). We hypothesized that high-dosage CIMT would produce larger benefits than moderate-dosage. Methods: Three sites enrolled a total of 18 children (6 children per site from 3-6 years) with unilateral CP. Children were randomly assigned to CIMT for 21 days for either 6 hours/day (high-dosage=126 hours) or 3 hours/day (moderate-dosage=63 hours); both groups wore a long-arm cast. Evaluators (blind to dosage) assessed children 1-week prior, then 1-week and 1-month after treatment with the Assisting Hand Assessment (AHA), The Quality of Upper Extremity Skills Test (QUEST) Dissociated Movement and Grasp sections, the Shriners Hospital Upper Extremity Evaluation (SHUEE), and the Pediatric Motor Activity Log (PMAL). Results: All children responded well to casting and received the full intended dosage. Both groups showed statistically significant gains on the AHA, QUEST, SHUEE, and PMAL. Effect sizes ranged from 0.36-0.79. Overall, both groups showed comparable improvements at 1-week and 1-month post-treatment. Conclusions: Pediatric CIMT at both moderate and high dosages produced positive effects across multiple reliable, valid outcome measures. The findings refuted the hypothesis of differential dosage benefits. Future research should address long-term effects, enroll larger and more diverse samples, and assess lower dosages to ascertain a minimal-efficacy threshold.

PMID: 22699104 [PubMed - in process]

21. J Pediatr Rehabil Med. 2012 Jan 1;5(2):65-74.=

Forced-use therapy for children with cerebral palsy in the community setting: A single-blinded randomized controlled pilot trial.

Eugster-Buesch F, de Bruin ED, Boltshauser E, Steinlin M, Küenzle C, Müller E, Capone A, Pfann R, Meyer-Heim A.

Rehabilitation Centre Affoltern am Albis, University Children's Hospital Zurich, Affoltern am Albis, Switzerland.

Objective: The aim of this study was to elucidate the feasibility, efficacy, and sustainability of a home-based, two-week, forced-use therapy (FUT) program for children with hemiplegic cerebral palsy (CP). Methods: A single-blinded, randomized controlled design was chosen. The Melbourne Assessment of Unilateral Upper Limb Function (MA) was carried out at baseline, pretest, post-test, and follow-up at two weeks, three months, and 12 months. Additionally, a questionnaire was used to evaluate the clinical relevance and integration of FUT in the home setting. 23 children, ages six to 16 years, took part in the study and were randomized into either an intervention group (n=12, mean age 9.8 ± 3.5 years) or a control group ($n=$ 11, mean age 11.7 ± 3.7 years). The intervention consisted of constraint of the unaffected hand for six hours per day and promotion of different activities of daily living according to an age-related manual for the use of the non-constraint hand. Results: Unpaired t-tests for the

change in MA scores relative to the pre-test values showed no difference between the groups at any time point: post-test (p=0.304), two weeks (p=0.193), or three months (p=0.957). Improvements in Activities of Daily Living (ADLs) assessed by questionnaires were observed by 64% of parents of the intervention group. Fifty-five percent of parents stated that the FUT program was exhausting and only 45% indicated that they achieved constraint for 6 hours per day. Conclusion: Our results evaluating a home-based FUT program of 14 days show no statistically significant improvement of upper extremity function in children with CP. The lack of compliance and absence of structured exercises proved to be considerable pitfalls of the home-based FUT program. Therefore, future home based FUT concepts should put special emphasis on the close monitoring and support of children and their families, as well as the integration of structured exercise sessions.

PMID: 22699097 [PubMed - in process]

22. Rehabil Psychol. 2012 May;57(2):149-58.

The Pediatric Motor Activity Log-Revised: Assessing real-world arm use in children with cerebral palsy.

Uswatte G, Taub E, Griffin A, Vogtle L, Rowe J, Barman J.

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Objective: Widely accepted models of disability suggest that actual use of an impaired upper extremity in everyday life frequently deviates from its motor capacity, as measured by laboratory tests. Yet, direct measures of real-world use of an impaired upper extremity are rare in pediatric neurorehabilitation. This paper examines how well the Pediatric Motor Activity Log-Revised (PMAL-R) measures this parameter, when the PMAL-R is administered as a structured interview as originally designed. Design: Parents of 60 children between 2 and 8 years of age with upper -extremity hemiparesis due to cerebral palsy completed the PMAL-R twice. Additionally, the children were videotaped during play structured to elicit spontaneous arm use. More-affected arm use was scored by masked raters; it was thought to reflect everyday activity since no cues were given about which arm to employ. Testing sessions were separated by 3 weeks, during which 29 children received upper-extremity rehabilitation and 31 did not. Results: The PMAL-R had high internal consistency (Cronbach's alpha = .93) and test-retest reliability (r = .89). Convergent validity was supported by a strong correlation between changes in PMAL-R scores and more-affected arm use during play, r(53) = .5, p < .001. Conclusions: The PMAL-R interview is a reliable and valid measure of upper-extremity pediatric neurorehabilitation outcome. (PsycINFO Database Record (c) 2012 APA, all rights reserved).

PMID: 22686553 [PubMed - in process] PMCID: PMC3375622 [Available on 2013/5/1]

23. J Neurosurg Pediatr. 2012 Jun 15. [Epub ahead of print]

Cervical implantation of intrathecal baclofen pump catheter in children with severe scoliosis.

Ughratdar I, Muquit S, Ingale H, Moussa A, Ammar A, Vloeberghs M.

Department of Neurosurgery, Queen's Medical Centre; and.

Object Intrathecal baclofen (ITB) pump catheter placement is traditionally performed through entry into the spinal sac at the lumbar spine. A minority of children with cerebral palsy have severe concomitant neuromuscular scoliosis. In these children, whether surgically treated or not, access to the intradural space via the lumbar spine may prove technically challenging. The authors report on a series of children in whom, for various reasons, an ITB catheter was implanted using a posterior cervical spine approach. Methods The records of 20 children in whom a baclofen catheter had been placed were retrospectively reviewed to assess the demographic details, indications, and outcome of this procedure. Results This approach was successful in all but one of the children in whom the procedure was abandoned given the presence of significant extradural scar tissue. Of the 20 children, 7 had previously undergone lumbar ITB catheter implantation, although the catheter was subsequently, iatrogenically transected during scoliosis surgery. Nine children had had corrective scoliosis surgery, and the fusion mass obviated access to the lumbar spinal sac. Four children had untreated scoliosis and corrective surgery was being contemplated. Complications included infection requiring explantation (2 patients), catheter migration (1 patient), intolerance to ITB (1 patient), and failure of implantation (1 patient). All patients who tolerated the ITB experienced

improvement in spasticity. No complications were associated with the spinal level of catheter insertion. Conclusions Implantation of an ITB catheter via a cervical approach is safe and feasible and should be considered in children with severe corrected or uncorrected scoliosis, and thus avoiding the lumbar spinal sac.

PMID: 22702326 [PubMed - as supplied by publisher]

24. J Pediatr (Rio J). 2012 May;88(3):267-74.

Growth hormone/insulin-like growth factor-1 axis: a possible non-nutritional factor for growth retardation in children with cerebral palsy.

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OBJECTIVE: To assess growth hormone (GH)/insulin like growth factor-1 (IGF-1) axis as a possible non-nutritional factor for growth retardation in children with cerebral palsy (CP). METHODS: A case-control study was conducted at a tertiary university hospital. Thirty children with CP (seven children with normal growth [CP-N] and 23 with retarded growth [CP-R]), 30 children with protein energy malnutrition (PEM), and 30 healthy children (REF group) underwent an assessment of growth parameters, serum IGF-1, basal GH, and peak GH after stimulation with insulin. RESULTS: PEM patients had higher basal GH levels than CP-N, CP-R and REF groups ($p = 0.026$, $p < 0.001$, and $p < 0.001$ respectively). After insulin stimulation, CP-N, CP-R, and PEM patients had lower GH levels compared to the REF group ($p = 0.04$, $p = 0.007$, and $p = 0.036$ respectively). IGF-1 levels were lower in CP-R group compared to CP-N and REF groups ($p = 0.037$ and $p < 0.001$ respectively), and in PEM group compared to CP-N and REF groups ($p < 0.001$ and $p < 0.001$ respectively). CONCLUSIONS: CP-R patients failed to demonstrate the same high basal GH response as PEM patients, and responded inadequately to the insulin stimulation test, but they had IGF-1 levels comparable to those of PEM patients. On the other hand, CP-N patients behaved as controls regarding their basal GH and IGF-1 levels, but failed to respond adequately to the insulin stimulation test. The PEM group presented high basal GH and low IGF-1 levels. These findings suggest that non-nutritional factors contribute to growth retardation in CP children.

PMID: 22718113 [PubMed - in process]

25. J Pediatr Orthop. 2012 Jul;32(5):547-52.

Implant-related Fractures in Children: A 15-year Review.

Jain A, Erkula G, Leet AI, Ain MC, Sponseller PD.

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BACKGROUND: To our knowledge, there are no comprehensive clinical studies of implant-related fractures in children. Our goal was to identify the incidence, skeletal location, and associated diagnoses of implant-related fractures. METHODS: We reviewed our institutional database to identify cases of implant insertion (7584 cases) in patients less than 18 years old from January 1, 1995 through December 31, 2009. We calculated the overall incidence of these fractures and stratified the incidence by skeletal location and preoperative diagnoses. Fisher exact test was used to ascertain differences in fracture incidence. Risk ratios were calculated when appropriate. Significance was set at $P<0.05$. RESULTS: There were 25 cases of implant-related fractures: 22 in the femur, 2 in the tibia, and 1 in the radius. The overall incidence of implant-related fracture was 0.33%; the incidence by skeletal location was: femur, 0.89%; tibia, 0.1%; and radius, 0.14%. Associated diagnoses were cerebral palsy (9 cases), hip dysplasia (3 cases), spina bifida (2 cases), and avascular necrosis (1 case); 10 cases were associated with "other diagnoses," which included various skeletal syndromes (5 cases) and traumatic fractures (5 cases). The incidences of implant-related fractures by diagnoses were: cerebral palsy, 1.1%; hip dysplasia, 1.1%; spina bifida, 1.3%; and avascular necrosis, 0.35%. The incidence of implant-related fracture in the "other diagnoses" group was 0.16%, and the incidence of fracture in otherwise healthy patients was 0.084%. The femur was 15.2 times more likely to fracture than other bones ($P<0.001$). Diagnoses of cerebral palsy, hip dysplasia, spina bifida, and avascular necrosis were 6.1 times more likely to be associated with implant-related fractures than the "other diagnoses" ($P<0.001$). The mean time to fracture in the study was 2.8 years. The overall implant removal rate at our

institution was 24.3%, and it varied significantly by patient diagnosis (P<0.01). CONCLUSIONS: Skeletal location and preoperative diagnosis should be factors of consideration in a surgeon's decision about removing implants to prevent implant-related fractures.

LEVEL OF EVIDENCE: Prognostic Level III.

PMID: 22706474 [PubMed - in process]

26. Dev Med Child Neurol. 2012 Jun 19. doi: 10.1111/j.1469-8749.2012.04346.x. [Epub ahead of print]

Cerebral palsy: the central nervous system informs the visual system.

Good WV.

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PMID: 22713160 [PubMed - as supplied by publisher]

27. Dev Med Child Neurol. 2012 Jun 19. doi: 10.1111/j.1469-8749.2012.04324.x. [Epub ahead of print]

Neuro-ophthalmological disorders in cerebral palsy: ophthalmological, oculomotor, and visual aspects.

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Aim: Cerebral visual impairment (CVI) is a disorder caused by damage to the retrogeniculate visual pathways. Cerebral palsy (CP) and CVI share a common origin: 60 to 70% of children with CP also have CVI. We set out to describe visual dysfunction in children with CP. A further aim was to establish whether different types of CP are associated with different patterns of visual involvement. Methods: A total of 129 patients (54 females, 75 males; mean age 4y 6mo, SD 3y 5mo; range 3mo-15y) with CP (51 with diplegia, 61 with tetraplegia, and 17 with hemiplegia; 62 [48%] of participants were able to walk) and CVI enrolled at the Centre of Child Neuro-ophthalmology (at the Department of Child Neurology and Psychiatry, IRCCS 'C. Mondino Institute of Neurology', University of Pavia) underwent an assessment protocol including neurological examination, developmental and/or cognitive assessment, neuro-ophthalmological evaluation including ophthalmological assessment, evaluation of visual acuity, contrast sensitivity, optokinetic nystagmus, visual field and stereopsis, and neuroradiological investigations. Results: Visual dysfunction in diplegia was characterized mainly by refractive errors (75% of patients), strabismus (90%), abnormal saccadic movements (86%), and reduced visual acuity (82%). The participants with hemiplegia showed strabismus (71%) and refractive errors (88%); oculomotor involvement was less frequent (59%). This group had the largest percentage of patients with altered visual field (64%). Children with tetraplegia showed a severe neuro-ophthalmological profile, characterized by ocular abnormalities (98%), oculomotor dysfunction (100%), and reduced visual acuity (98%). Interpretation: Neuro-ophthalmological disorders are one of the main symptoms in CP. Each clinical type of CP is associated with a distinct neuro-ophthalmological profile. Early and careful neuro-ophthalmological assessment of children with CP is essential for an accurate diagnosis and for personalized rehabilitation.

PMID: 22712803 [PubMed - as supplied by publisher]

28. Pediatr Neurol. 2012 Jul;47(1):65-7.

Levetiracetam-induced reversible autistic regression.

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Levetiracetam is a commonly prescribed antiepileptic drug, and is generally well tolerated, but can eventually cause behavioral disturbances. These disturbances seem more frequent in children and in patients with a previous psychiatric history. We report on reversible autistic regression induced by levetiracetam in a 6-year-old girl with spastic cerebral palsy, mild cognitive deficiency, and focal epilepsy. She was diagnosed with pervasive developmental disorder, and demonstrated mild to moderate impairment in pragmatic language and interactions with peers. After the introduction of levetiracetam, she developed stereotypies, and her social and communicative skills deteriorated severely. She also exhibited mood lability. When the medication was discontinued, a dramatic response occurred, with a complete resolution of new abnormal findings. Levetiracetam can provoke unusual behavioral adverse effects in certain patients who are biologically more vulnerable.

PMID: 22704022 [PubMed - in process]

29. Health Care Women Int. 2012 Jul;33(7):646-65.

Life decisions of Taiwanese women who care for a sibling with cerebral palsy.

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We used a phenomenological method to examine how the caregiving experiences of Taiwanese women who care for a sibling with cerebral palsy (CP) influence their life decisions. In-depth qualitative interviews were conducted with six adult women, each of whom self-identified as being the sister most involved in caring for a sibling with CP. Themes emerging from caregivers' experiences were caring through interpretation, caring through protection, and caring through sacrifice. These ways of caring created unique considerations and tensions that appeared to have a profound effect on the women's major life decisions.

PMID: 22681748 [PubMed - in process]

30. Res Dev Disabil. 2012 Jun 12;33(6):1732-1740. [Epub ahead of print]

Predicting mental health among mothers of school-aged children with developmental disabilities: The relative contribution of child, maternal and environmental factors.

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AIM: Many mothers of children with developmental disabilities are known to experience high levels of stress, and compromised mental health. Research is crucial to better understand and assist mothers with compromised mental health, and ultimately better service families raising and supporting a child with a disability. METHOD: Data were collected using cross sectional mail-out survey with follow up phone call. Instruments included the Short Form 36 version 2 (SF-36v2) and instruments that measured maternal, child and environmental factors. Descriptive statistics examined characteristics of participants. Correlation, t-tests, and multiple regression analyses were used to identify factors associated with mothers' mental health. RESULTS: Mothers (N=152) cared for a school-aged child (aged 5-18 years) with high care needs and developmental disabilities including autism spectrum disorder (n=94); cerebral

palsy (n=29); attention deficit hyperactivity disorder (n=19). Factors associated with maternal mental health included the child's psychosocial health (r=.36) and challenging behaviour (r=-.33); maternal empowerment (r=.40); maternal participation in health promoting activities (r=.43); and the child's unmet service needs (r=-.29). The strongest predictors of maternal mental health in this cross sectional study were maternal participation in healthy activity and empowerment, the child's emotional functioning and unmet service needs. CONCLUSION: This study identified maternal factors as the most important influence on self reported mental health among this sample of mothers. Findings suggest that service changes that provide mothers with information about their own health and need for health enhancing activities, as well as education that empowers mothers to manage and master their child's disability and needs, may contribute to maternal mental health and well being.

PMID: 22699247 [PubMed - as supplied by publisher]

31. Disabil Rehabil. 2012 Jun 12. [Epub ahead of print]

Employment outcomes of adults with cerebral palsy in Taiwan.

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Purpose: To examine the employment status and determinants of employability for adults with cerebral palsy (CP) in Taiwan. Method: A cross-sectional survey was conducted. Participants were recruited from five main branches of the Cerebral Palsy Association. Two hundred and seventy-nine persons over the age of 18 (M = 26.4, SD = 7.7) with a diagnosis of cerebral palsy participated in the current study. Results: Sixty-four of the 279 participants were employed with an employment rate of 22.9%. Of the 64 employed individuals, 67% worked in an integrated setting, 14% in supported employment, and 19% in sheltered employment. Hierarchical logistic regression analyses indicated that having an older age (odds ratio [OR] = 1.05; 95% confidence intervals [CI]: 1.01-1.10), a diagnosis of ataxia (OR = 3.44; 95% CI: 1.29-9.13), a higher educational attainment (OR = 1.86; 95% CI: 1.09-3.18), a higher mobility function in the community (OR = 1.48; 95% CI: 1.04-2.10), and a higher level of independence in daily activities (OR = 1.60; 95% CI: 1.23-2.09) were associated with an increased odds for employment. Conclusions: The employment rate for adults with CP in Taiwan is low. Age, CP diagnosis, educational attainment, and functional performance are important determinants related to employment outcomes for this group. Further research to validate effective medical and vocational rehabilitation interventions to improve the employability of people with CP in Taiwan is warranted.

PMID: 22691128 [PubMed - as supplied by publisher]

Prevention and Cure

32. J Neuropathol Exp Neurol. 2012 Jul;71(7):640-53.

Delayed myelination in an intrauterine growth retardation model is mediated by oxidative stress upregulating bone morphogenetic protein 4.

Reid MV, Murray KA, Marsh ED, Golden JA, Simmons RA, Grinspan JB.

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Intrauterine growth retardation (IUGR) is associated with neurological deficits including cerebral palsy and cognitive and behavioral disabilities. The pathogenesis involves oxidative stress that leads to periventricular white matter injury with a paucity of mature oligodendrocytes and hypomyelination. The molecular mechanisms underlying this damage remain poorly understood. We used a rat model of IUGR created by bilateral ligation of the uterine artery at embryonic Day 19 that results in fetal growth retardation and oxidative stress in the developing brain. The IUGR rat pups showed significant delays in oligodendrocyte differentiation and myelination that resolved by 8 weeks. Bone morphogenetic protein 4 (BMP4), which inhibits oligodendrocyte maturation, was elevated in IUGR brains at postnatal time points and returned to near normal by adulthood. Despite the apparent recovery, behavioral deficiencies were found in 8-week-old female animals, suggesting that the early transient myelination defects have permanent effects. In support of these in vivo data, oligodendrocyte precursor cells cultured from postnatal IUGR rats retained increased BMP4 expression and impaired differentiation that was reversed with the BMP inhibitor noggin. Oxidants in oligodendrocyte cultures increased BMP expression, which decreased differentiation; however, abrogating BMP signaling with noggin in vitro and in BMP-deficient mice prevented these effects. Together, these findings suggest that IUGR results in delayed myelination through the generation of oxidative stress that leads to BMP4 upregulation.

PMID: 22710965 [PubMed - in process]

33. J Neurosci. 2012 Jun 20;32(25):8491-500.

Neuronal hypoxia induces hsp40-mediated nuclear import of type 3 deiodinase as an adaptive mechanism to reduce cellular metabolism.

Jo S, Kalló I, Bardóczi Z, Arrojo E Drigo R, Zeöld A, Liposits Z, Oliva A, Lemmon VP, Bixby JL, Gereben B, Bianco AC.

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In neurons, the type 3 deiodinase (D3) inactivates thyroid hormone and reduces oxygen consumption, thus creating a state of cell-specific hypothyroidism. Here we show that hypoxia leads to nuclear import of D3 in neurons, without which thyroid hormone signaling and metabolism cannot be reduced. After unilateral hypoxia in the rat brain, D3 protein level is increased predominantly in the nucleus of the neurons in the pyramidal and granular ipsilateral layers, as well as in the hilus of the dentate gyrus of the hippocampal formation. In hippocampal neurons in culture as well as in a human neuroblastoma cell line (SK-N-AS), a 24 h hypoxia period redirects active D3 from the endoplasmic reticulum to the nucleus via the cochaperone Hsp40 pathway. Preventing nuclear D3 import by Hsp40 knockdown resulted an almost doubling in the thyroid hormone-dependent glycolytic rate and quadrupling the transcription of thyroid hormone target gene ENPP2. In contrast, Hsp40 overexpression increased nuclear import of D3 and minimized thyroid hormone effects in cell metabolism. In conclusion, ischemia/hypoxia induces an Hsp40-mediated translocation of D3 to the nucleus, facilitating thyroid hormone inactivation proximal to the thyroid

hormone receptors. This adaptation decreases thyroid hormone signaling and may function to reduce ischemia-induced hypoxic brain damage.

PMID: 22723689 [PubMed - in process]

34. No To Hattatsu. 2012 May;44(3):239-43.

Peculiar involuntary movements in premature babies with specific cerebellar injuries [Article in Japanese]

Yoshinaga H, Kobayashi K, Endoh F, Ishizaki Y, Shibata T, Ohtsuka Y.

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We observed characteristic involuntary movements in premature babies during early infancy. These movements consisted of asymmetrical irregular banging of the extremities, similar to chorea, ballisms, or jitteriness. We investigated the clinical characteristics and neuroimaging findings of the patients with these peculiar involuntary movements to clarify their pathophysiological mechanisms and to find a treatment. In our sequential follow-up study on 90 premature infants with various pre-and perinatal brain insults, we found various types of cerebellar injuries in 28 patients. In 19 of these, the prominent injuries were observed in the inferior cerebellar hemispheres. These cerebellar injuries were often observed in patients born before the gestational age of 27 weeks. Fourteen of the 28 patients with cerebellar injuries displayed the above-mentioned characteristic involuntary movements. Twelve of these 14 patients with both cerebellar injury and involuntary movements were born before the gestational age of 27 weeks. On the contrary, 10 patients with cerebellar injury born after the gestational age of 27 weeks did not display these peculiar involuntary movements. It is noteworthy that cerebral injuries were not associated with the occurrence of these involuntary movements. Two patients with asymmetrical cerebellar deformity caused by compression due to a cystic lesion did not show these involuntary movements. The movements appeared around the corrected age of 3 months, and they disturbed the patients' acquisition of sitting ability. Nine patients with these involuntary movements developed severe athetotic cerebral palsy. These movements showed drug resistance, however, benzodiazepines had a partial effect in some patients. Recently, cerebellar injury in premature infants has received a lot of attention. We believe that the peculiar involuntary movements we observed in the present patient group may be caused by a particular type of cerebellar damage specific to premature infants born before 27 weeks of gestational age.

PMID: 22712228 [PubMed - in process]

35. Pediatr Neurol. 2012 Jul;47(1):35-9.

Periventricular Leukomalacia is Decreasing in Japan.

Sugiura T, Goto T, Ueda H, Ito K, Kakita H, Nagasaki R, Mizuno K, Suzuki S, Kato I, Togari H.

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Periventricular leukomalacia is recognized as the leading cause of cerebral palsy in preterm infants. To clarify the prevalence of periventricular leukomalacia and cerebral palsy in Japan, a nationwide survey was performed. The prevalence of periventricular leukomalacia in the group of surviving preterm infants of gestational ages less than 33 weeks born in 2007 was 2.7% (78/2883) on ultrasound diagnosis, and 3.3% (92/2824) on magnetic resonance imaging. The prevalence of cerebral palsy was 4.3% (125/2883) on clinical diagnosis. In our previous study, the prevalences of periventricular leukomalacia in 1990-1991, 1993-1994, 1996, and 1999 were 4.8%, 4.9%, 4.9%, and 5.3% on ultrasound, and 7.9%, 7.7%, 6.9%, and 7.3% on magnetic resonance imaging, respectively. The prevalence of periventricular leukomalacia has decreased significantly in Japan.

PMID: 22704014 [PubMed - in process]

36. Pediatrics. 2012 Jun 18. [Epub ahead of print]

Autism Spectrum Disorder, ADHD, Epilepsy, and Cerebral Palsy in Norwegian Children.

Surén P, Bakken IJ, Aase H, Chin R, Gunnes N, Lie KK, Magnus P, Reichborn-Kjennerud T, Schjølberg S, Oyen AS, Stoltenberg C.

Centre for Paediatric Epidemiology and Biostatistics, and.

BACKGROUND: Numerous studies have investigated the prevalence of neurologic and neurodevelopmental disorders individually, but few have examined them collectively, and there is uncertainty as to what extent they overlap. METHODS: The study has determined the proportions of children aged 0 to 11 years with diagnoses of autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), epilepsy, and cerebral palsy (CP) in Norway. The data were obtained from the Norwegian Patient Register, which is nationwide and contains diagnoses assigned by Norwegian specialist health services (hospitals and outpatient clinics). The Norwegian Patient Register started collecting individual-level data in 2008, and the follow-up period for the study is years 2008 through 2010. RESULTS: For ASD, ADHD, and epilepsy, the proportions were highest in the oldest children. At age 11 years, the incidence was 0.7% for ASD, 2.9% for ADHD, and 0.9% for epilepsy. The cumulative incidence is likely to be higher because some cases diagnosed before 2008 were probably missed. For CP, the proportions were ~0.3% for age =5 years. There was considerable overlap between diagnoses. For all disorders, boys had a significantly increased risk. In school-age children (aged 6-11 years) the male/female ratio was 4.3 for ASD, 2.9 for ADHD, 1.2 for epilepsy, and 1.3 for CP. CONCLUSIONS: The findings demonstrate the significant burden of disease associated with neurologic and neurodevelopmental disorders in children and that this burden is disproportionately skewed toward boys.

PMID: 22711729 [PubMed - as supplied by publisher]

37. PLoS One. 2012;7(6):e38504. Epub 2012 Jun 13.

Implementation and Conduct of Therapeutic Hypothermia for Perinatal Asphyxial Encephalopathy in the UK - Analysis of National Data.

Azzopardi D, Strohm B, Linsell L, Hobson A, Juszczak E, Kurinczuk JJ, Brocklehurst P, Edwards AD; on behalf of the UK TOBY Cooling Register.

Centre for the Developing Brain, Imperial College London, London, United Kingdom.

BACKGROUND: Delay in implementing new treatments into clinical practice results in considerable health and economic opportunity costs. Data from the UK TOBY Cooling Register provides the opportunity to examine how one new effective therapy for newborn infants suspected of suffering asphyxial encephalopathy - therapeutic hypothermia- was implemented in the UK. METHODOLOGY/PRINCIPAL FINDINGS: We analysed returned data forms from inception of the Register in December 2006 to the end of July 2011. Data forms were received for 1384 (67%) of the 2069 infants registered. The monthly rate of notifications increased from median {IQR} 18 {15-31} to 33 {30-39} after the announcement of the results of the recent TOBY trial, and to 50 {36-55} after their publication. This rate further increased to 70 {64-83} following official endorsement of the therapy, and is now close to the expected numbers of eligible infants. Cooling was started at 3.3 {1.5-5.5} hours after birth and the time taken to achieve the target 33-34°C rectal temperature was 1 {0-3} hours. The rectal temperature was in the target range in 83% of measurements. From 2006 to 2011 there was evidence of extension of treatment to slightly less severely affected infants. 278 of 1362 (20%) infants died at 2.9 {1.4-4.1} days of age. The rates of death fell slightly over the period of the Register and, at two years of age cerebral palsy was diagnosed in 22% of infants; half of these were spastic bilateral. Factors independently associated with adverse outcome were clinical seizures prior to cooling ($p<0.001$) and severely abnormal amplitude integrated EEG ($p<0.001$). CONCLUSIONS/SIGNIFICANCE: Therapeutic hypothermia was implemented appropriately within the UK, with significant benefit to patients and the health economy. This may be due in part to participation by neonatal units in clinical trials, the establishment of the national Register, and its endorsement by advisory bodies.

PMID: 22719897 [PubMed - as supplied by publisher]

38. Arch Dis Child Fetal Neonatal Ed. 2012 Jun 9. [Epub ahead of print]

Postnatal corticosteroids and neurodevelopmental outcomes in extremely low birthweight or extremely preterm infants: 15-year experience in Victoria, Australia.

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Objective: Postnatal corticosteroids (PCS) are used to prevent or treat bronchopulmonary dysplasia (BPD) in extremely low birthweight (ELBW; <1000 g) or extremely preterm (EPT; <28 weeks) infants. In the early 2000s, concerns were raised about increased risks of cerebral palsy (CP) in association with PCS, which may have affected prescribing of PCS, and influenced rates of BPD, mortality or long-term neurosensory morbidity. Our aim was to determine the changes over time in the rates of PCS use and 2-year outcomes in ELBW/EPT infants in Victoria, Australia. Design: All ELBW or EPT infants born in Victoria, Australia in three distinct eras (1991-92, 1997 and 2005) who were alive at 7 days were included. Rates of PCS use, rates of BPD (oxygen dependency at 36 weeks' corrected age), death before 2 years of age, CP and major disability (any of moderate/severe CP, developmental quotient <-2 SD, blindness or deafness) were contrasted between cohorts. Results: The rate of PCS use and the dose prescribed diminished significantly in 2005 compared with earlier eras, but the rate of BPD rose. Non-significant changes in the rates of mortality over time were mirrored by non-significant changes in the rates of CP or major disability. Combined outcomes of mortality with either major disability or CP were similar over the three eras. Conclusions: PCS use decreased in 2005 compared with earlier eras, and was accompanied by a rise in BPD, with no significant changes in mortality or neurological morbidity.

PMID: 22684163 [PubMed - as supplied by publisher]

39. BMC Pediatr. 2012 Jun 14;12(1):72. [Epub ahead of print]

Predicting neurodevelopmental outcomes for at-risk infants: reliability and predictive validity using a Chinese version of the INFANIB at 3, 7 and 10 months.

Liao W, Wen EY, Li C, Chang Q, Lv KL, Yang W, He ZM, Zhao CM.

BACKGROUND: Chinese primary care settings have a heavy patient load, shortage of physicians, limited medical resources and low medical literacy, making it difficult to screen for developmental disorders in infants. The Infant Neurological International Battery (INFANIB) for the assessment of neuromotor developmental disorders in infants aged 0~18 months is widely applied in community health service centers because of its simplicity, time-saving advantages and short learning curve. We aimed too develop and assess a Chinese version of the INFANIB. METHODS: A Chinese version of the INFANIB was developed. Fifty-five preterm and 49 full-term infants with high risk of neurodevelopmental delays were assessed using the Chinese version of the INFANIB at 3, 7 and 10 months after birth. The Peabody Developmental Motor Scale (PDMS) was simultaneously used to assess the children with abnormalities and diagnose cerebral palsy. The sensitivity, specificity, positive predictive value and negative predictive value of the scale were calculated. RESULTS: At birth, a higher proportion of full-term infants had asphyxia ($p<0.001$), brain damage ($p=0.003$) and hyperbilirubinemia ($p=0.022$). The interclass correlation coefficient and intraclass correlation coefficient values for the INFANIB at 3, 7 and 10 months were >0.8, indicating excellent reliability with regard to inter- and intraobserver differences. The specificity, sensitivity, positive predictive value and negative predictive value were high for both high-risk premature infants and full-term infants at the age of 10 months. For premature infants at the age of 7 months or below, INFANIB had low validity for detecting abnormalities. CONCLUSION: The Chinese version of the INFANIB can be useful for screening infants with high-risk for neuromotor abnormality in Chinese primary care settings.

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40. Eur J Obstet Gynecol Reprod Biol. 2012 Jun 7. [Epub ahead of print]

Histological chorioamnionitis is associated with cerebral palsy in preterm neonates.

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OBJECTIVE: To determine the interaction between histological chorioamnionitis and unexplained neonatal cerebral palsy among low birth weight infants. STUDY DESIGN: We studied 141 preterm infants below 1500g delivered between 2000 and 2010. Clinical data, neonatal neuroimaging, laboratory results, the histopathological features of the placenta and gastric smear within the first hour of delivery, were evaluated. RESULTS: Cerebral palsy was detected in 11 out of 141 preterm newborns (7.8%). The incidence of silent histological chorioamnionitis was 33.6% (43 of 128 cases). Chorioamniontis was significantly associated with the risk of unexplained cerebral palsy (p=0.024). There were also significant correlations between maternal genital infections and chorioamnionitis (p=0.005), and between maternal infections and a positive smear of neonatal gastric aspirates (p=0.000). The rate of cesarean section was 67.4% (95 out of 141 deliveries), and elective cesarean section was performed in 68 cases. CONCLUSION: Intrauterine exposure to maternal infection was associated with a marked increase in the risk of cerebral palsy in preterm infants.

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41. Front Psychiatry. 2012;3:50. Epub 2012 Jun 12.

The Long and the Short of it: Gene and Environment Interactions During Early Cortical Development and Consequences for Long-Term Neurological Disease.

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Cortical development is a complex amalgamation of proliferation, migration, differentiation, and circuit formation. These processes follow defined timescales and are controlled by a combination of intrinsic and extrinsic factors. It is currently unclear how robust and flexible these processes are and whether the developing brain has the capacity to recover from disruptions. What is clear is that there are a number of cognitive disorders or conditions that are elicited as a result of disrupted cortical development, although it may take a long time for the full pathophysiology of the conditions to be realized clinically. The critical window for the manifestation of a neurodevelopmental disorder is prolonged, and there is the potential for a complex interplay between genes and environment. While there have been extended investigations into the genetic basis of a number of neurological and mental disorders, limited definitive associations have been discovered. Many environmental factors, including inflammation and stress, have been linked to neurodevelopmental disorders, and it may be that a better understanding of the interplay between genes and environment will speed progress in this field. In particular, the development of the brain needs to be considered in the context of the whole materno-fetal unit as the degree of the metabolic, endocrine, or inflammatory responses, for example, will greatly influence the environment in which the brain develops. This review will emphasize the importance of extending neurodevelopmental studies to the contribution of the placenta, vasculature, cerebrospinal fluid, and to maternal and fetal immune response. These combined investigations are more likely to reveal genetic and environmental factors that influence the different stages of neuronal development and potentially lead to the better understanding of the etiology of neurological and mental disorders such as autism, epilepsy, cerebral palsy, and schizophrenia.

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42. J Neurosci. 2012 Jun 13;32(24):8317-30.

Targeted ablation of oligodendrocytes induces axonal pathology independent of overt demyelination.

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The critical role of oligodendrocytes in producing and maintaining myelin that supports rapid axonal conduction in CNS neurons is well established. More recently, additional roles for oligodendrocytes have been posited, including provision of trophic factors and metabolic support for neurons. To investigate the functional consequences of oligodendrocyte loss, we have generated a transgenic mouse model of conditional oligodendrocyte ablation. In this model, oligodendrocytes are rendered selectively sensitive to exogenously administered diphtheria toxin (DT) by targeted expression of the diphtheria toxin receptor in oligodendrocytes. Administration of DT resulted in severe clinical dysfunction with an ascending spastic paralysis ultimately resulting in fatal respiratory impairment within 22 d of DT challenge. Pathologically, at this time point, mice exhibited a loss of ~26% of oligodendrocyte cell bodies throughout the CNS. Oligodendrocyte cell-body loss was associated with moderate microglial activation, but no widespread myelin degradation. These changes were accompanied with acute axonal injury as characterized by structural and biochemical alterations at nodes of Ranvier and reduced somatosensory-evoked potentials. In summary, we have shown that a death signal initiated within oligodendrocytes results in subcellular changes and loss of key symbiotic interactions between the oligodendrocyte and the axons it ensheaths. This produces profound functional consequences that occur before the removal of the myelin membrane, i.e., in the absence of demyelination. These findings have clear implications for the understanding of the pathogenesis of diseases of the CNS such as multiple sclerosis in which the oligodendrocyte is potentially targeted.

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43. J Pediatr. 2012 Jun 7. [Epub ahead of print]

White Matter and Cortical Injury in Hypoxic-Ischemic Encephalopathy: Antecedent Factors and 2-Year Outcome.

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OBJECTIVE: To examine the spectrum of isolated white matter (WM)/cortical injury and its relation to outcomes in infants with hypoxic-ischemic encephalopathy (HIE) and normal appearing basal ganglia and thalami. STUDY DESIGN: From 1992-2007, 84 term infants with HIE and normal basal ganglia and thalami on neonatal magnetic resonance imaging were studied; WM/cortical lesions were classified by site and severity. Neurodevelopmental outcomes and head growth were documented at a median age of 2 years. RESULTS: The WM was normal or mildly abnormal in 33.5%, moderate in 40.5%, and severely abnormal in 26% of infants. Cortical involvement was not seen or was only mild in 75.5%, moderate in 13%, and severe in 12% of infants. WM and cortical injury severity were highly correlated (Spearman ? = 0.74; P < .001). Infants with severe WM injury had more severe neonatal courses and a higher incidence of hypoglycemia. No infant died. Five infants (6%) developed cerebral palsy but all could walk independently. Cognitive, visual, language, behavioral, and seizure problems were highly prevalent and correlated significantly with the severity of WM injury and poor postnatal head growth. CONCLUSION: Infants with HIE and selective WM/cortical injury have a low prevalence of cerebral palsy but have a wide range of other problems, which occur more often with severe WM/cortical lesions.

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44. Pediatr Neonatol. 2012 Feb;53(1):45-8. Epub 2012 Jan 17.

Three-dimensional brain images in preterm children with periventricular leukomalacia.

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BACKGROUND: To investigate the use of three-dimensional (3D) brain magnetic resonance imaging (MRI) to evaluate in preterm children with periventricular leukomalacia. MATERIALS AND METHODS: Semiautomated 3D classification of the gray and white tissues was used to reconstruct brain images of patients with confirmed periventricular leukomalacia from 2D MRI. RESULTS: We studied 14 preterm patients. The gestational age ranged from 25-37 weeks. The corrected age ranged from 5-49 months. We reconstructed the gray matter, white matter, and ventricles in order to analyze the brain volume. CONCLUSION: Three-dimensional MRI is a good tool that can be used to demonstrate brain lesions in stereo and differentiate the gray matter, white matter, and ventricles. Brain volume can also be accurately evaluated.

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