

Monday 5 January 2015

Cerebral Palsy Alliance is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy. Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. Find out more at www.cpresearch.org.au

Professor Nadia Badawi AM

Macquarie Group Foundation Chair of Cerebral Palsy

Subscribe at www.cpresearch.org/subscribe/researchnews

Unsubscribe at www.cpresearch.org/unsubscribe

Interventions and Management

1. Dev Neurorehabil. 2014 Dec 30:1-9. [Epub ahead of print]

Remind to move - A novel treatment on hemiplegic arm functions in children with unilateral cerebral palsy: A randomized cross-over study.

Dong AV1, Fong NK.

Objective: To investigate the effects of 'remind to move' treatment on hemiplegic arm function in children with unilateral cerebral palsy (CP). **Methodology:** Twelve students with unilateral CP aged 6-18 were recruited from a special school and randomly assigned into two groups. Participants in the experimental group underwent a 3-week sensory cueing treatment followed by a 3-week sham treatment. Participants in the waitlist group completed the sham treatment first followed by the sensory-cueing treatment. There was a 4-week washout period between treatments. **Results:** Both functional hand use and arm impairment level significantly improved after the 3-week sensory cueing treatment for the combined sample between groups. However, no significant carryover effects were found for either treatment. **Conclusion:** Three weeks of 'remind to move' treatment is useful in improving hemiplegic arm function and quantity of hand use in children with unilateral CP but the long-term carryover effect requires further investigation.

[PMID: 25548861](https://pubmed.ncbi.nlm.nih.gov/25548861/) [PubMed - as supplied by publisher]

2. J Med Assoc Thai. 2014 Sep;97(9):954-62.

Reduction of spasticity in cerebral palsy by anodal transcranial direct current stimulation.

Aree-uea B, Auvichayapat N, Janyacharoen T, Siritaratiwat W, Amatachaya A, Prasertnoo J, Tunkamnerdthai O, Thinkhamrop B, Jensen MP, Auvichayapat P.

OBJECTIVE: To evaluate the anti-spasticity effects of anodal transcranial direct current stimulation (tDCS) in individuals with spastic cerebral palsy (CP). **MATERIAL AND METHOD:** Forty-six children and adolescents with cerebral palsy were randomly assigned to either active (1 mA anodal) or sham (placebo) tDCS over the left primary motor cortex (MI) on five consecutive days. Both group also received routine physical therapy. Measures of spasticity and passive range of motion (PROM) were administered before treatment, immediately after treatment, and at 24- and 48-hours follow-up. **RESULTS:** Participants assigned to active tDCS treatment evidenced significantly more pre- to immediately post-treatment reductions in spasticity than participants assigned to the sham ($p = 0.004$, $p < 0.001$, and $p = 0.004$ for shoulder wrist, and fingers respectively) and these

improvement in spasticity maintained for at least 48 hours for wrist joints ($p = 0.023$). There was only one participant in the active tDCS condition developed erythematous rash. However, all participants tolerated the tDCS well without any serious adverse events. **CONCLUSION:** Anodal tDCS appeared to reduce CP-related spasticity (but not PROM) in the short term. Researches examine the long term benefits of this intervention on spasticity are warranted.

[PMID: 25536713](#) [PubMed - in process]

3. *J Vis Exp.* 2014 Dec 5;(94). doi: 10.3791/52391.

Functional Near Infrared Spectroscopy of the Sensory and Motor Brain Regions with Simultaneous Kinematic and EMG Monitoring During Motor Tasks.

Sukal-Moulton T1, de Campos AC1, Stanley CJ1, Damiano DL2.

There are several advantages that functional near-infrared spectroscopy (fNIRS) presents in the study of the neural control of human movement. It is relatively flexible with respect to participant positioning and allows for some head movements during tasks. Additionally, it is inexpensive, light weight, and portable, with very few contraindications to its use. This presents a unique opportunity to study functional brain activity during motor tasks in individuals who are typically developing, as well as those with movement disorders, such as cerebral palsy. An additional consideration when studying movement disorders, however, is the quality of actual movements performed and the potential for additional, unintended movements. Therefore, concurrent monitoring of both blood flow changes in the brain and actual movements of the body during testing is required for appropriate interpretation of fNIRS results. Here, we show a protocol for the combination of fNIRS with muscle and kinematic monitoring during motor tasks. We explore gait, a unilateral multi-joint movement (cycling), and two unilateral single-joint movements (isolated ankle dorsiflexion, and isolated hand squeezing). The techniques presented can be useful in studying both typical and atypical motor control, and can be modified to investigate a broad range of tasks and scientific questions.

[PMID: 25548919](#) [PubMed - in process]

4. *J Electromyogr Kinesiol.* 2014 Dec 9. pii: S1050-6411(14)00232-6. doi: 10.1016/j.jelekin.2014.10.015. [Epub ahead of print]

Decrease in ankle-foot dorsiflexion range of motion is related to increased knee flexion during gait in children with spastic cerebral palsy.

Maas JC1, Huijij PA2, Dallmeijer AJ1, Harlaar J3, Jaspers RT2, Becher JG4.

Purpose: To determine the effects of decreased ankle-foot dorsiflexion (A-Fdf) range of motion (ROM) on gait kinematics in children with spastic cerebral palsy (SCP). **Methods:** All participants were children with spastic cerebral palsy ($n=10$) who walked with knee flexion in midstance. Data were collected over 2-5 sessions, at 3-monthly intervals. A-Fdf ROM was quantified using a custom-designed hand-held ankle dynamometer that exerted 4Nm at the ankle. Ankle-foot and knee angles during gait were quantified on sagittal video recordings. Linear regression (cross-sectional analysis) and General Estimation Equation analysis (longitudinal analysis) were performed to assess relationships between (change in) A-Fdf ROM and (change in) ankle-foot and knee angle during gait. **Results:** Cross-sectional analysis showed a positive relationship between A-Fdf ROM and both ankle-foot angle in midstance and terminal swing. Longitudinal analysis showed a positive relationship between individual decreases in A-Fdf ROM and increases of knee flexion during gait (lowest knee angle in terminal stance and angle in terminal swing). **Conclusion:** For this subgroup of SCP children, our results indicate that while changes in ankle angles during gait are unrelated to changes in A-Fdf ROM, changes in knee angles are related to changes in A-Fdf ROM.

Copyright © 2014. Published by Elsevier Ltd.

[PMID: 25553965](#) [PubMed - as supplied by publisher]

5. J Neurosurg Pediatr. 2015 Jan 2:1-10. [Epub ahead of print]

The feasibility and safety of using sublaminar polyester bands in hybrid spinal constructs in children and transitional adults for neuromuscular scoliosis.

Desai SK1, Sayama C, Vener D, Brayton A, Briceño V, Luerssen TG, Jea A.

OBJECT The authors have previously reported on their early experience with sublaminar polyester bands in spine surgery. In this paper, the authors describe the use of sublaminar polyester bands in long-segment posterior instrumented spinal fusions from the upper thoracic spine to the ilium in 21 children and transitional adults with progressive neuromuscular scoliosis. Transitional adults were patients older than 18 years of age with a spinal disorder of pediatric onset, such as spina bifida. This dedicated study represents the first reported use of polyester bands in spine surgery for neuromuscular scoliosis in this patient population in the US. **METHODS** The authors retrospectively reviewed the demographics and procedural data of patients who underwent posterior instrumented fusion using sublaminar polyester bands for neuromuscular scoliosis. **RESULTS** Twenty-one pediatric and adult transitional patients, ranging in age from 10 to 20 years (mean 14 years), underwent posterior instrumented fusion for progressive neuromuscular scoliosis. The average coronal Cobb angle measured 66° before surgery (range 37°-125°). Immediately after surgery, the mean coronal Cobb angle was 40° (range 13°-85°). At last follow-up, the average coronal Cobb angle was maintained at 42° (range 5°-112°). Regarding sagittal parameters, thoracic kyphosis was restored by 8%, and lumbar lordosis improved by 20% after surgery. Mean follow-up duration was 17 months (range 2-54 months). One patient with an aborted procedure due to loss of intraoperative evoked potentials was excluded from the analysis of radiographic outcomes. Mean surgical time was 7 hours 43 minutes (range 3 hours 59 minutes to 10 hours 23 minutes). All patients received either a 12- or 24-mg dose of recombinant human bone morphogenetic protein-2. Average estimated blood loss was 976 ml (range 300-2700 ml). Complications directly related to the use of sublaminar instrumentation included transient proprioceptive deficit (1 patient) and prolonged paraparesis (1 patient). Other complications noted in this series included disengagement of the rod from an iliac screw (1 patient), proximal junctional kyphosis (1 patient), noninfected wound drainage (2 patients), and perioperative death (1 patient). The lessons learned from these complications are discussed. **CONCLUSIONS** Pedicle screws, laminar/pedicle/transverse process hooks, and sublaminar metal wires have been incorporated into posterior spinal constructs and widely reported and used in the thoracic and lumbar spines and sacrum with varying success. This report demonstrates the satisfactory radiological outcomes of hybrid posterior spinal constructs in pediatric and adult neuromuscular scoliosis that include sublaminar polyester bands that promise the technical ease of passing sublaminar instrumentation with the immediate biomechanical rigidity of pedicle screws and hooks. However, the high neurological complication rate associated with this technique (2/21, or 10%) tempers the acceptable radiographic outcomes.

[PMID: 25555118](#) [PubMed - as supplied by publisher]

6. Physiother Theory Pract. 2014 Dec 30:1-8. [Epub ahead of print]

Effect of Adeli suit treatment on gait in a child with cerebral palsy: a single-subject report.

Ko M1, Lee J, Kang S, Jeon H.

The purpose of this case report is to investigate the long-term effect of Adeli suit treatment (AST) in a child with cerebral palsy (CP) on spatial-temporal gait parameters, 10-meter walking speed, gross motor functional measure (GMFM) and performance on the pediatric balance scale (PBS). An eight-year-old girl with spastic diplegia classified as level III on the Gross Motor Function Classification System participated in this single-subject A-B design study, with a baseline and an intervention phase. The baseline phase was collected at one-week intervals for six weeks and then the AST intervention phase was carried out with 18 AST sessions, 50 min per session, once a week for an 18-week period. Spatial-temporal gait parameters significantly improved after the completion of 18 sessions. Furthermore, 10-meter walking speed, GMFM and PBS changed significantly from the baseline measurement ($p < 0.05$). In conclusion, the AST was effective in improving gait, gross motor function and balance in a child with diplegic CP. Clinically, neuro-rehabilitation with AST provided a complementary and alternative treatment for lower extremity rehabilitation in this child with CP. These findings provide preliminary evidence supporting the effectiveness of AST in children with spastic CP, and thus underscore the need for additional research in this area.

[PMID: 25547409](#) [PubMed - as supplied by publisher]

7. J Altern Complement Med. 2014 Dec 31. [Epub ahead of print]**Effect of Hippotherapy on Gross Motor Function in Children with Cerebral Palsy: A Randomized Controlled Trial.**

Kwon J1, Chang HJ, Yi S, Lee JY, Shin H, Kim Y.

Objective: To examine whether hippotherapy has a clinically significant effect on gross motor function in children with cerebral palsy (CP). Design: Randomized controlled trial. Setting: Outpatient therapy center. Participants: Ninety-two children with CP, aged 4-10 years, presenting variable function (Gross Motor Function Classification System [GMFCS] levels I-IV). Intervention: Hippotherapy (30 minutes twice weekly for 8 consecutive weeks). Outcome measures: Gross Motor Function Measure (GMFM)-88, GMFM-66, and Pediatric Balance Scale. Results: Pre- and post-treatment measures were completed by 91 children (45 in the intervention group and 46 in the control group). Differences in improvement on all three measures significantly differed between groups after the 8-week study period. Dimensions of GMFM-88 improved significantly after hippotherapy varied by GMFCS level: dimension E in level I, dimensions D and E in level II, dimensions C and D in level III, and dimensions B and C in level IV. Conclusion: Hippotherapy positively affects gross motor function and balance in children with CP of various functional levels.

[PMID: 25551626](#) [PubMed - as supplied by publisher] Free full text

8. J Appl Gerontol. 2015 Feb;34(1):118-26. doi: 10.1177/0733464812467398. Epub 2012 Nov 28.**The effect of therapeutic horseback riding on balance in community-dwelling older adults: a pilot study.**

Homnick TD1, Henning KM2, Swain CV2, Homnick DN3.

Equine assisted activities (hippotherapy and therapeutic riding) improve balance in patients with disabilities such as cerebral palsy, but have not been systematically studied in older adults, at risk of falls due to balance deficits. We conducted a 10-week, single blind, controlled trial of the effect of a therapeutic horseback riding course on measures of balance in community-dwelling adults 65 years and older. Nine riders and six controls completed the trial. Controls were age matched to riders and all participants were recruited from the local community. Both groups showed improvements in balance during the trial, but did not reach statistical significance. Sample size was small, participants had relatively high initial balance scores, and controls tended to increase their physical activities, likely influencing outcomes. No adverse events occurred and the supervised therapeutic riding program appeared to be a safe and effective form of exercise to improve balance in older adults. A power analysis was performed to estimate numbers of participants needed for a larger study.

© The Author(s) 2012.

[PMID: 25548091](#) [PubMed - in process]

9. Int J Environ Res Public Health. 2014 Dec 29;12(1):335-53. doi: 10.3390/ijerph120100335.**Dental caries and periodontal disease in Brazilian children and adolescents with cerebral palsy.**

Cardoso AM1, Gomes LN2, Silva CR3, Soares Rde S4, de Abreu MH5, Padiha WW6, Cavalcanti AL7.

The aim of the present study was determine the prevalence and factors associated with dental caries and periodontal disease in Brazilian children and adolescents with cerebral palsy (CP). This is a cross-sectional study conducted with 80 patients ranging in age from 2 to 18 years old. Oral exams were conducted by an examiner with records of DMFT, dmft, Gingival Bleeding Index (GBI) and Community Periodontal Index (CPI). The statistical analysis used Poisson Regression with robust variance estimation ($\alpha = 0.05$). The prevalence of dental caries was 59.3%, with DMFT and mean dmft of 1.71 ± 2.42 and 2.22 ± 3.23 , respectively. The mean GBI was 22.44%, and in the CPI, the prevalence of gingival bleeding, calculus, shallow and deep pockets were 94.73%, 79.62%, 12.90% and 3.22%, respectively. The caregiver's educational level of less than eight years were associated with the dental caries experience (PR = 1.439; 95%CI = 1.09-1.89). The periodontal alterations were associated with female sex (PR = 0.82; 95%CI = 0.69-0.97), caregiver's educational level of less than eight years (PR = 1.15; 95%CI = 1.03-

1.29), poor oral perception (PR = 0.89; 95%CI = 0.80-0.98), serious communication problem (PR = 0.87; 95%CI = 0.76-0.99) and athetoid type of CP (PR = 0.85; 95%CI = 0.75-0.97). The patients with CP presented high dental caries experience and periodontal alterations, which were associated with their demographic, socioeconomic, oral health perception and systemic information.

[PMID: 25551517](#) [PubMed - in process] Free full text

10. J Dev Behav Pediatr. 2015 Jan;36(1):14-23. doi: 10.1097/DBP.000000000000118.

A comparison of observers' and self-report pain ratings for children with cerebral palsy.

Hadden KL1, LeFort S, O'Brien M, Coyte PC, Guerriere DN.

OBJECTIVES: This study aimed to examine (1) the relationship between children's self-reports of pain and their different care providers' pain ratings, (2) the relationship between different care providers' ratings of pain in children with cerebral palsy (CP), and (3) whether the child's level of disability influences care providers' pain ratings. **METHODS:** Sixty-three children with CP were separated into 2 groups according to whether they were able to pass a self-report training task. Pain was rated using a Numerical Rating Scale and the Non-Communicating Children's Pain Checklist-Postoperative Version (NCCPC-PV). Children were observed during their regular physiotherapy sessions at 3 separate time segments (Baseline, Stretch Procedure, and Recovery). **RESULTS:** As anticipated, results showed that all observers reported significantly higher pain scores during a physiotherapy stretching procedure than the baseline and recovery segments. Observers' NCCPC-PV scores were significantly higher during the stretch procedure for the children who did not pass the self-report training task. Findings also indicated that parents tended to report significantly lower pain scores compared with both their children and other observers. **CONCLUSIONS:** The findings bring into question the accuracy of single-observer pain ratings for children with CP and possess implications for the management of pain in children with CP.

[PMID: 25539089](#) [PubMed - in process]

11. J Dev Behav Pediatr. 2015 Jan;36(1):53-5. doi: 10.1097/DBP.000000000000120.

Autism associated with early institutionalization, high intelligence, and naturalistic behavior therapy in a 7-year-old boy.

Stein DS1, Welchons LW, Corley KB, Dickinson H, Levin AR, Nelson CA, Stein MT.

CASE: Paul is a 7-year-old boy with a history of cerebral palsy and left-side weakness secondary to perinatal injury. He was adopted to the United States at 19 months from a baby home in Eastern Europe, where the caregiver to child ratio was 7:1. Paul spent most of his early developmental period in a crib. On adoption, he was nonverbal and nonambulatory, but these skills developed within 1 year. Paul was noted at 4 years of age to be struggling socially and also to exhibit restricted interests (e.g., memorizing maps and world leaders). He was referred for neuropsychological testing at age 5 and was found to have cognitive skills in the gifted range (verbal intelligence quotient, IQ =143; 99.8%) but exhibited markedly reduced social reciprocity with high levels of restricted interests and repetitive behaviors, leading to a diagnosis of autism spectrum disorder (ASD) in the context of early institutionalization. Given his cooperative and attentive presentation, high IQ, and ability to imitate, Floortime, a more naturalistic behavioral therapy for ASD, was recommended rather than traditional applied behavior analysis, which is more commonly available in the region. In addition, Paul was provided with group speech and language therapy with a social/pragmatic focus. After 1 year, Paul's socialization improved but he struggled to initiate interactions and maintain friendships. He focused instead on his restricted interests and played alone. After 2 years of intervention, Paul presents as highly sociable with well-sustained eye gaze, interactive play, and successful friendships. Still, without direction and structure, Paul will happily draw maps for hours at a time. He is hyperlexic and working far above grade level across subjects. His mother now questions-is this still truly institutional autism or is he simply too intelligent to relate to same-age peers?

[PMID: 25539091](#) [PubMed - in process]

12. Medicina (Kaunas). 2014;50(6):323-8. doi: 10.1016/j.medic.2014.11.005. Epub 2014 Nov 27.

The family needs of parents of preschool children with cerebral palsy: The impact of child's gross motor and communications functions.

Bertule D1, Vetra A2.

BACKGROUND AND OBJECTIVE: An understanding of the needs of families of preschool children with cerebral palsy (CP) is of essential importance if efficient and cost-effective services are to be provided to them. The aims of this study were to identify the most frequently expressed needs of families with preschool children with CP; differences in the amount and types of family needs based on the child's gross motor function and communication function level; and the impact of the child's gross motor function and communication function level on the type and amount of family needs. **MATERIALS AND METHODS:** A total of 227 parents of preschool children with CP completed a modified version of the Family Needs Survey and a demographic questionnaire. Children's gross motor function level and communication function level was classified using the Gross Motor Function Classification System (GMFCS) and the Communication Function Classification System (CFCS), respectively. **RESULTS:** The total number of family needs differed based on GMFCS and CFCS levels. Children's GMFCS and CFCS level were not significant predictors of overall family needs (adjusted $R(2)=0.163$). In this model the GMFCS level of children did not account for the total number of family needs, while the CFCS level did. **CONCLUSIONS:** Child's limitations in terms of communication and gross motor functions must be taken into consideration when planning services for families with preschool children with CP.

Copyright © 2014 Lithuanian University of Health Sciences. Production and hosting by Elsevier Urban & Partner Sp. z o.o. All rights reserved.

[PMID: 25541264](#) [PubMed - in process] Free full text

13. NeuroRehabilitation. 2014 Dec 29. [Epub ahead of print]

Pediatric neurorehabilitation and the ICF.

Martinuzzi A1, De Polo G1, Bortolot S1, Pradal M1.

INTRODUCTION: One of the major intended uses of the International Classification of Functioning, Disability and Health (ICF) is the clinical world of rehabilitation. The intrinsic qualities of ICF, especially in its children and youth version (ICF-CY) seem to perfectly match the needs for the complex process of pediatric neurorehabilitation. **OBJECTIVES:** We here report on the effect that the implementation of ICF-CY had on team members and families when it was used as a guiding structure in framing the rehabilitation project in a pediatric outpatient clinic dealing with adolescents with cerebral palsy and complex needs. The two-year experience was positive and an ad-hoc questionnaire delivered to team members and families returned very positive remarks. **CONCLUSION:** The main messages coming from this experience is on the feasibility of the introduction of ICF-CY language and the bio-psycho-social model in the described setting and on the positive response by the stakeholders.

[PMID: 25547762](#) [PubMed - as supplied by publisher]

Prevention and Cure

14. Arch Pediatr. 2014 Dec 29. pii: S0929-693X(14)00547-8. doi: 10.1016/j.arcped.2014.11.018. [Epub ahead of print]

Very preterm births in French Polynesia: Update and proposal for follow-up. [Article in French]

Besnard M1, Kuo P2, Pawlotsky F2, Guyot D2, Elie V3, Papouin-Rauzy M2.

INTRODUCTION: The care of premature infants in French Polynesia is complicated by this country's geographic isolation. We undertook an evaluation of the medical care of very premature infants (VPIs) to find local solutions to this problem. **OBJECTIVES:** The objectives were to determine the incidence, mortality, and the short- and long-term outcome of very preterm infants in French Polynesia. **METHODS:** We retrospectively reviewed the medical charts of all infants born alive at <32 gestational age (GA) and >24 GA from January 2007 to December 2011. Perinatal characteristics and outcomes were examined by univariate and multivariate analysis. **RESULTS:** In total, 204 VPIs were born during the 5-year study period, comprising 0.9% of all births. Infants less than 28 GA comprised 0.1% of all births. Sixty-two percent of mothers were of extreme age including 43% less than 25 years old. Prematurity was attributed to spontaneous preterm labor in 63% of cases and preeclampsia in 29%. Spontaneous multiple pregnancies comprised 15% of the cases. Alcohol and tobacco consumption were frequently noted (>8% and 26% mothers, respectively). Seventy-eight percent of VPIs had received prenatal steroids. Intrauterine growth was normal in 89%. Mortality occurred in 9.3% (19 patients). Mortality was higher with lower gestational age ($P<0.05$) and absence of prenatal steroids ($P<0.05$) in univariate and multivariate analysis. The primary cause of death was sepsis. Hyaline membrane disease occurred in 44% of patients, 80% of whom received surfactant therapy. In total, 16.2% newborns developed bronchodysplasia, 3.4% necrotizing enterocolitis, 3% cerebral hemorrhage, and 1.5% leukomalacia. Long-term outcome was marked by 52% of the patients lost to follow-up by 2 years of age, mostly because of geographic isolation. For the 72 patients followed-up, four developed asthma and three cerebral palsy; 70% were attending school by 3 years of age. **CONCLUSIONS:** The incidence, mortality, and morbidity of very preterm birth in French Polynesia are comparable to reports from metropolitan centers in France. Conversely, nearly one-half of the patients were lost to follow-up, precluding meaningful information on intellectual development and other outcomes. We recommend organizing a long-term follow-up network to detect cognitive sequelae and adapting such a system to the geographical residence of French Polynesian families.

Copyright © 2014 Elsevier Masson SAS. All rights reserved.

[PMID: 25554672](#) [PubMed - as supplied by publisher]

15. Arch Pediatr. 2014 Dec 22. pii: S0929-693X(14)00542-9. doi: 10.1016/j.arcped.2014.11.016. [Epub ahead of print]

Course and neurological/behavioral development of preterm children [Article in French]

Marret S1, Chollat C2, de Quelen R2, Pinto Cardoso G2, Abily-Donval L2, Chadie A2, Torre S2, Vanhulle C3, Mellier D4, Charollais A2, Ancel P5; Réseau de périnatalité en Haute-Normandie.

Preterm birth remains a public health priority given that one child out of ten is born before 37 weeks of gestation. Survival without major neonatal morbidity has increased in high-income countries, in particular in France and in cases of extreme preterm birth before 27 weeks of gestation. Rate of severe handicaps, such as cerebral palsy, is probably decreasing, but specific cognitive disabilities in a variety of domains remain frequent, interfering with normal learning abilities at school and explaining the high rate of special education needs. Prevalence of sequelae increases when gestational age at birth decreases. However, because there are more moderate to late preterm children compared to very preterm children, the absolute number of children with specific cognitive or neurological disabilities is equivalent in these two groups. Better characterization of the development in a recent cohort of very preterm children is necessary to improve the early detection of variations in normal neurodevelopment and to propose trials with remediation actions targeting working memory and language for example. These protocols could decrease the rates of learning disabilities at school.

Copyright © 2014 Elsevier Masson SAS. All rights reserved.

[PMID: 25541510](#) [PubMed - as supplied by publisher]

16. Front Neurol. 2014 Dec 4;5:258. doi: 10.3389/fneur.2014.00258. eCollection 2014.

What are the Best Animal Models for Testing Early Intervention in Cerebral Palsy?

Clowry GJ1, Basuodan R1, Chan F1.

Interventions to treat cerebral palsy should be initiated as soon as possible in order to restore the nervous system to the correct developmental trajectory. One drawback to this approach is that interventions have to undergo exceptionally rigorous assessment for both safety and efficacy prior to use in infants. Part of this process should involve research using animals but how good are our animal models? Part of the problem is that cerebral palsy is an umbrella term that covers a number of conditions. There are also many causal pathways to cerebral palsy, such as periventricular white matter injury in premature babies, perinatal infarcts of the middle cerebral artery, or generalized anoxia at the time of birth, indeed multiple causes, including intra-uterine infection or a genetic predisposition to infarction, may need to interact to produce a clinically significant injury. In this review, we consider which animal models best reproduce certain aspects of the condition, and the extent to which the multifactorial nature of cerebral palsy has been modeled. The degree to which the corticospinal system of various animal models human corticospinal system function and development is also explored. Where attempts have already been made to test early intervention in animal models, the outcomes are evaluated in light of the suitability of the model.

[PMID: 25538677](#) [PubMed] PMCID: PMC4255621 Free PMC Article