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## Interventions and Management

1. *Dev Med Child Neurol.* 2015 Jan 30. doi: 10.1111/dmcn.12704. [Epub ahead of print]

**Evaluating developmental motor plasticity with paired afferent stimulation.**

Damji O1, Keess J, Kirton A.

**AIM:** Brain plasticity mechanisms are probably different in children but remain poorly understood. Paired afferent stimulation (PAS) combines peripheral sensory stimulation with transcranial magnetic stimulation (TMS) of primary motor cortex to induce rapid, reversible, topographically specific increases in primary motor cortex excitability suggestive of long-term potentiation in adults. Our aim was to determine frequency, characteristics, age effects, and reproducibility of PAS in school-age children. **METHOD:** Typically developing right-handed children (6-18y) were recruited. Median nerve stimulation was delivered 25ms before suprathreshold primary motor cortex stimulation (0.2Hz, 7.5min). Primary outcome was change in the amplitude of motor evoked potentials (MEPs) at five time points after PAS (0, 15, 30, 45, 75min) expressed as area under the curve. Reproducibility was evaluated. Secondary outcomes included stimulus response curves and safety/tolerability. **RESULTS:** Of 28 children (20 males, mean age 12y), 64% demonstrated PAS effects (11 definite, seven probable). PAS effects were sustained across all time points to 75min ( $p=0.004$ ). Stimulus response curve scores increased after PAS ( $n=9$ ,  $p=0.02$ ). PAS effect and age were not correlated. PAS was highly reproducible ( $p=0.925$ ,  $r=0.283$ ). Tolerability was favorable without adverse events. **INTERPRETATION:** PAS effects are present and reproducible in children. Pediatric PAS paradigms appear safe and tolerable. PAS may provide insight into endogenous developmental plasticity, informing future studies in children with cerebral palsy and other motor disorders.

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2. *J Phys Ther Sci.* 2015 Jan;27(1):243-6. doi: 10.1589/jpts.27.243. Epub 2015 Jan 9.

**A comparison of functioning, activity, and participation in school-aged children with cerebral palsy using the manual ability classification system.**

Lee JW1, Chung E2, Lee BH1.

**Purpose:** The purpose of this study was to evaluate the functioning, extent of activity, and participation of school-aged children with cerebral palsy (CP) using the Manual Ability Classification System (MACS). **Subjects and Methods:** The Subjects were 57 school-aged children (7-12 years old) with CP. The MACS, Gross Motor Function Measure (GMFM), International Classification of Functioning, Disability and Health for Children and Youth (ICF-

CY) Checklist, and a questionnaire were used to measure children's functioning, activity, and participation. Results: GMFM scores differed significantly across the MACS levels. The following differed significantly according to MACS level when assessed with the ICF-CY function section: mental functions; sensory function and pain; voice and speech functions; functions of the digestive, metabolic, and endocrine systems; genitourinary and reproductive function; and neuromusculoskeletal and movement related function. The data from the activities and participation section of the ICF-CY also showed statistically significant differences across MACS levels. Conclusion: These results suggest that the functioning, activity, and participation of school-aged children with CP depend on their MACS level and that the functioning of children with CP affects their activities and participation.

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### 3. Braz J Phys Ther. 2015 Feb 3;0:0. [Epub ahead of print]

#### **Manual Ability Classification System (MACS): reliability between therapists and parents in Brazil.**

Silva DB1, Funayama CA2, Pfeifer LI1.

**BACKGROUND:** The Manual Ability Classification System (MACS) has been widely used to describe the manual ability of children with cerebral palsy (CP); however its reliability has not been verified in Brazil. **OBJECTIVE:** To establish the inter- and intra-rater reliability of the Portuguese-Brazil version of the MACS by comparing the classifications given by therapists and parents of children with CP. **METHOD:** Data were obtained from 90 children with CP between the ages of 4 and 18 years, who were treated at the neurology and rehabilitation clinics of a Brazilian hospital. Therapists (an occupational therapist and a student) classified manual ability (MACS) through direct observation and information provided by parents. Therapists and parents used the Portuguese-Brazil version of the MACS. Intra- and inter-rater reliability was obtained using unweighted Kappa coefficient (k) and intra-class correlation coefficient (ICC). The Chi-square test was used to identify the predominance of disagreements in the classification of parents and therapists. **RESULTS:** An almost perfect agreement resulted among therapists [K=0.90 (95% CI 0.83-0.97); ICC=0.97 (95%CI 0.96-0.98)], as well as with intra-rater (therapists), with Kappa ranging between 0.83 and 0.95 and ICC between 0.96 and 0.99 for the evaluator with more and less experience in rehabilitation, respectively. The agreement between therapists and parents was fair [K=0.36 (95% CI 0.22-0.50); ICC=0.79 (95% CI 0.70-0.86)]. **CONCLUSIONS:** The Portuguese version of the MACS is a reliable instrument to be used jointly by parents and therapists.

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### 4. Eur J Phys Rehabil Med. 2015 Feb 5. [Epub ahead of print]

#### **Video-game based therapy performed by children with cerebral palsy: a cross-over randomized controlled trial and a cross-sectional quantitative measure of physical activity.**

Zoccolillo L1, Morelli D, Cincotti F, Muzzioli L, Gobbetti T, Paolucci S, Iosa M.

**BACKGROUND:** Previous studies reported controversial results about the efficacy of video--game based therapy (VGT) in improving neurorehabilitation outcomes in children with cerebral palsy (CP). **AIM:** Primary aim was to investigate the effectiveness of VGT with respect to conventional therapy (CT) in improving upper limb motor outcomes in a group of children with CP. Secondary aim was to quantify if VGT leads children to perform a higher number of movements. **DESIGN:** A cross--over randomized controlled trial (RCT) for investigating the primary aim and a cross--sectional study for investigating the secondary aim of this study. **SETTINGS:** Outpatients. **POPULATION:** Inclusion criteria: clinical diagnosis of CP, age between 4 and 14 years, level of GMFC between I and IV. Exclusion criteria: QI<35, severe comorbidities, incapacity to stand even with an external support. **METHODS:** Twenty--two children with CP (6.89±1.91 years old) were enrolled in a cross--over RCT with 16 sessions of VGT (using Xbox with Kinect device) and then 16 of CT or vice versa. Upper limb functioning was assessed using the Quality of Upper Extremities Skills Test (QUEST) and hand abilities using Abilhand--kids score. According to the secondary aim of this study a secondary cross--sectional study has been performed. Eight children with CP (6.50±1.60 years old) were enrolled into a trial in which five wireless triaxial accelerometers were positioned on their forearms, legs and trunk for quantifying the physical activity during VGT vs. CT. **RESULTS:** QUEST scores significantly improved only after VGT (p=0.003), and not after CT (p=0.056). The reverse occurred for Abilhand--kids scores (p=0.165 vs. p=0.013, respectively). Quantity of performed movements

was three times higher in VGT than in CT (+198%,  $p=0.027$ ). CONCLUSION: VGT resulted effective in improving the motor functions of upper limb extremities in children with CP, conceivably for the increased quantity of limb movements, but failed in improving the manual abilities for performing activities of daily living which benefited more from CT. CLINICAL REHABILITATION IMPACT: VGT performed using the X-Box with Kinect device could enhance the number of upper limb movements in children with CP during rehabilitation and in turn improving upper limb motor skills, but CT remained superior for improving performances in manual activities of daily living.

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**5. Arch Phys Med Rehabil. 2015 Feb 2. pii: S0003-9993(15)00092-1. doi: 10.1016/j.apmr.2015.01.016. [Epub ahead of print]**

**Segmental contributions to trunk control in children with moderate-to-severe cerebral palsy.**

Saavedra SL1, Woollacott MH2.

OBJECTIVE: To examine postural constraints in children with moderate-to-severe cerebral palsy using a segmental approach. DESIGN: quasi-experimental repeated measure study; case series SETTING: Motor control research laboratory PARTICIPANTS: Fifteen children (4-16 years) with moderate (Gross Motor Function Classification System [GMFCS] IV;  $n=8$ ; 4 males) or severe (GMFCS V;  $n=7$ ; 4 males) cerebral palsy. INTERVENTIONS: Each child participated in three data collection sessions. During each session, we evaluated postural control for sitting using kinematics and clinical assessments. MAIN OUTCOME MEASURES: Kinematic data were used to document head alignment and stabilization with external support at four levels (axillae, mid-rib, waist, and hip). Two clinical assessments, the Segmental Assessment of Trunk Control (SATCo) and behavioral assessment for stage of trunk control were also used to compare results for children with cerebral palsy to previous longitudinal data from typically developing (TD) infants (3-9 months of age). RESULTS: Children with GMFCS V had difficulty aligning and stabilizing their head along the medial-lateral and anterior-posterior axes. External support improved postural control for GMFCS V but not for children with GMFCS IV, who had opposite responses to support compared to TD infants. CONCLUSIONS: Children with GMFCS V have limited trunk control but respond to support similarly to young typically developing infants suggesting delayed postural control. Response to external support for children with GMFCS IV suggests a unique strategy for trunk control not observed in typical infants. Overall a segmental approach offers new insights into development of trunk control in children with moderate-to-severe CP. conclusion.

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**6. Braz J Phys Ther. 2015 Feb 3;0:0. [Epub ahead of print]**

**Postural control during sit-to-stand movement and its relationship with upright position in children with hemiplegic spastic cerebral palsy and in typically developing children.**

Pavão SL1, Santos AN1, Oliveira AB1, Rocha NA1.

OBJECTIVE: The purpose of this study was to compare postural control in typically developing (TD) children and children with cerebral palsy (CP) during the sit-to-stand (STS) movement and to assess the relationship between static (during static standing position) and dynamic postural control (during STS movement) in both groups. METHOD: The center of pressure (CoP) behavior of 23 TD children and 6 children with spastic hemiplegic CP (Gross Motor Function Classification System [GMFCS] I and II) was assessed during STS movement performance and during static standing conditions with the use of a force plate. The data obtained from the force plate were used to calculate CoP variables: anteroposterior (AP) and mediolateral (ML) amplitudes of CoP displacement and the area and velocity of CoP oscillation. RESULTS: According to the Mann-Whitney test, children with CP exhibited higher CoP values in all of the analyzed variables during the beginning of STS movement. Pearson's correlation verified a positive correlation between the CoP variables during both static conditions and the performance of STS movement. CONCLUSIONS: Children with spastic hemiplegic CP present major postural oscillations during the beginning of STS movement compared with typical children. Moreover, the observed relationship between postural control in static and dynamic conditions reveals the importance of body control in the static position for the performance of functional activities that put the body in motion, such as STS movement.

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### 7. Braz J Phys Ther. 2015 Feb 3;0:0. [Epub ahead of print]

#### **Effect of postural insoles on static and functional balance in children with cerebral palsy: A randomized controlled study.**

Christovão TC1, Pasini H1, Grecco LA1, Ferreira LA1, Duarte NA1, Oliveira CS1.

**BACKGROUND:** Improved gait efficiency is one of the goals of therapy for children with cerebral palsy (CP). Postural insoles can allow more efficient gait by improving biomechanical alignment. **OBJECTIVE:** The aim of the present study was to determine the effect of the combination of postural insoles and ankle-foot orthoses on static and functional balance in children with CP. **METHOD:** A randomized, controlled, double-blind, clinical trial. After meeting legal requirements and the eligibility criteria, 20 children between four and 12 years of age were randomly allocated either to the control group (CG) (n=10) or the experimental group (EG) (n=10). The CG used placebo insoles and the EG used postural insoles. The Berg Balance Scale, Timed Up-and-Go Test, Six-Minute Walk Test, and Gross Motor Function Measure-88 were used to assess balance as well as the determination of oscillations from the center of pressure in the anteroposterior and mediolateral directions with eyes open and closed. Three evaluations were carried out: 1) immediately following placement of the insoles; 2) after three months of insole use; and 3) one month after suspending insole use. **RESULTS:** The EG achieved significantly better results in comparison to the CG on the Timed Up-and-Go Test as well as body sway in the anteroposterior and mediolateral directions. **CONCLUSION:** Postural insoles led to an improvement in static balance among children with cerebral palsy, as demonstrated by the reduction in body sway in the anteroposterior and mediolateral directions. Postural insole use also led to a better performance on the Timed Up-and-Go Test.

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### 8. J Neuroeng Rehabil. 2015 Feb 6;12(1):11. [Epub ahead of print]

#### **Validation of an activity monitor for children who are partly or completely wheelchair-dependent.**

Nooijen C, de Groot JF, Stam HJ, van den Berg-Emons R, Bussmann H.

**Background:** Children who are wheelchair-dependent are at risk for developing unfavorable physical behavior; therefore, assessment, monitoring and efforts to improve physical behavior should start early in life. VitaMove is an accelerometer-based activity monitor and can be used to detect and distinguish different categories of physical behavior, including activities performed in a wheelchair and activities using the legs. The purpose of this study was to assess the validity of the VitaMove activity monitor to quantify physical behavior in children who are partly or completely wheelchair-dependent. **Methods** Twelve children with spina bifida (SB) or cerebral palsy (CP) (mean age, 14.2±1.4 years) performed a series of wheelchair activities (wheelchair protocol) and, if possible, activities using their legs (n=5, leg protocol). Activities were performed at their own home or school. In children who were completely wheelchair-dependent, VitaMove monitoring consisted of one accelerometer-based recorder attached to the sternum and one to each wrist. For children who were partly ambulatory, an additional recorder was attached to each thigh. Using video-recordings as a reference, primary the total duration of active behavior, including wheeled activity and leg activity, and secondary agreement, sensitivity and specificity scores were determined. **Results:** Detection of active behaviour with the VitaMove activity monitor showed absolute percentage errors of 6% for the wheelchair protocol and 10% for the leg protocol. For the wheelchair protocol, the mean agreement was 84%, sensitivity was 80% and specificity was 85%. For the leg protocol, the mean agreement was 83%, sensitivity was 78% and specificity was 90%. Validity scores were lower in severely affected children with CP. **Conclusions:** The VitaMove activity monitor is a valid device to quantify physical behavior in children who are partly or completely wheelchair-dependent, except for severely affected children and for bicycling.

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**9. Phys Ther. 2015 Feb 5. [Epub ahead of print]****Longitudinal Relationship Among Physical Fitness, Walking-Related Physical Activity, and Fatigue in Children With Cerebral Palsy.**

Balemans AC1, van Wely L2, Becher JG3, Dallmeijer AJ4.

**BACKGROUND:** A vicious circle of decreased physical fitness, early fatigue and low physical activity levels (PAL) is thought to affect children with cerebral palsy (CP). However, the relationship of changes in physical fitness to changes in PAL and fatigue is unclear. **OBJECTIVE:** The objective of this study was to investigate the associations between changes in physical fitness, walking-related PAL and fatigue in children with CP. **DESIGN:** A secondary analysis of a randomized controlled trial with measurements at baseline, 6 months (after the intervention period) and 12 months. **METHODS:** 24 children with bilateral and 22 with unilateral spastic CP, aged 7-13, all walking, participated in this study. Physical fitness was measured by aerobic capacity (VO<sub>2</sub>peak), anaerobic threshold, anaerobic capacity and, isometric and functional muscle strength. Walking-related PAL was measured using an ankle-worn StepWatch™ activity monitor for 1 week. Fatigue was determined with the PedsQL multidimensional fatigue scale. Longitudinal associations were analyzed by random coefficient regression analysis (p<0.05). **RESULTS:** In children with bilateral CP, all fitness parameters showed a positive, significant association with walking-related PAL, whereas no associations between physical fitness and walking-related PAL were seen in children with unilateral CP. No clinically relevant association between physical fitness and fatigue was found. **LIMITATIONS:** Although random coefficient regression analysis can be used to investigate longitudinal associations between parameters, a causal relationship cannot be determined. The actual direction of the relation between physical fitness and walking-related PAL therefore remains inconclusive. **CONCLUSIONS:** Children with bilateral spastic CP might benefit from an improved physical fitness to increase their PAL or vice versa, while this is not the case in children with unilateral CP. There seems no relationship between physical fitness and self-reported fatigue in all children with CP. Interventions aimed at improving PAL may be differently targeted in children with either bilateral or unilateral CP.

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**10. J Phys Ther Sci. 2015 Jan;27(1):273-7. doi: 10.1589/jpts.27.273. Epub 2015 Jan 9.****Effect of horseback riding versus a dynamic and static horse riding simulator on sitting ability of children with cerebral palsy: a randomized controlled trial.**

Temcharoensuk P1, Lekskulchai R1, Akamanon C1, Ritruetchai P2, Sutcharitpongsa S3.

**Purpose:** A randomized controlled trial was conducted to investigate the immediate effects of horseback riding (HR) and a dynamic (DHS) and static (SHS) horse riding simulator (OSIM uGallop, Taiwan) on sitting ability of children with cerebral palsy. **Subjects and Methods:** Thirty children with cerebral palsy were recruited and randomly assigned into three groups. Children received 30 minutes of exercise according to their assigned group. The Segmental Assessment of Trunk Control (SATCo) and Gross Motor Function Measure-66 (GMFM-66) sitting dimension were used to assess children in all groups both before and after the interventions. **Results:** Sitting abilities were significantly improved after all interventions. Horseback riding showed the most improvement, followed by the dynamic and static horse riding simulator groups. Horseback riding also showed a significant improvement in the GMFM sitting dimension. **Conclusion:** Horseback riding was the best intervention for promoting sitting ability of children with spastic cerebral palsy. However, a dynamic horse riding simulator can be a good surrogate for horseback riding when horseback riding is not available.

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**11. Int J Lang Commun Disord. 2015 Feb 4. doi: 10.1111/1460-6984.12138. [Epub ahead of print]****Assessment and management of the communication difficulties of children with cerebral palsy: a UK survey of SLT practice.**

Mary Watson R1, Pennington L.

**BACKGROUND:** Communication difficulties are common in cerebral palsy (CP) and are frequently associated with motor, intellectual and sensory impairments. Speech and language therapy research comprises single-case experimental design and small group studies, limiting evidence-based intervention and possibly exacerbating variation in practice. **AIMS:** To describe the assessment and intervention practices of speech-language therapist (SLTs) in the UK in their management of communication difficulties associated with CP in childhood. **METHODS & PROCEDURES:** An online survey of the assessments and interventions employed by UK SLTs working with children and young people with CP was conducted. The survey was publicized via NHS trusts, the Royal College of Speech and Language Therapists (RCSLT) and private practice associations using a variety of social media. The survey was open from 5 December 2011 to 30 January 2012. **OUTCOMES & RESULTS:** Two hundred and sixty-five UK SLTs who worked with children and young people with CP in England (n = 199), Wales (n = 13), Scotland (n = 36) and Northern Ireland (n = 17) completed the survey. SLTs reported using a wide variety of published, standardized tests, but most commonly reported assessing oromotor function, speech, receptive and expressive language, and communication skills by observation or using assessment schedules they had developed themselves. The most highly prioritized areas for intervention were: dysphagia, alternative and augmentative (AAC)/interaction and receptive language. SLTs reported using a wide variety of techniques to address difficulties in speech, language and communication. Some interventions used have no supporting evidence. Many SLTs felt unable to estimate the hours of therapy per year children and young people with CP and communication disorders received from their service. **CONCLUSIONS & IMPLICATIONS:** The assessment and management of communication difficulties associated with CP in childhood varies widely in the UK. Lack of standard assessment practices prevents comparisons across time or services. The adoption of a standard set of agreed clinical measures would enable benchmarking of service provision, permit the development of large-scale research studies using routine clinical data and facilitate the identification of potential participants for research studies in the UK. Some interventions provided lack evidence. Recent systematic reviews could guide intervention, but robust evidence is needed in most areas addressed in clinical practice.

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**12. Front Hum Neurosci. 2015 Jan 22;8:1077. doi: 10.3389/fnhum.2014.01077. eCollection 2014.****Vowel generation for children with cerebral palsy using myocontrol of a speech synthesizer.**

Niu CM1, Lee K2, Houde JF3, Sanger TD4.

For children with severe cerebral palsy (CP), social and emotional interactions can be significantly limited due to impaired speech motor function. However, if it is possible to extract continuous voluntary control signals from the electromyograph (EMG) of limb muscles, then EMG may be used to drive the synthesis of intelligible speech with controllable speed, intonation and articulation. We report an important first step: the feasibility of controlling a vowel synthesizer using non-speech muscles. A classic formant-based speech synthesizer is adapted to allow the lowest two formants to be controlled by surface EMG from skeletal muscles. EMG signals are filtered using a non-linear Bayesian filtering algorithm that provides the high bandwidth and accuracy required for speech tasks. The frequencies of the first two formants determine points in a 2D plane, and vowels are targets on this plane. We focus on testing the overall feasibility of producing intelligible English vowels with myocontrol using two straightforward EMG-formant mappings. More mappings can be tested in the future to optimize the intelligibility. Vowel generation was tested on 10 healthy adults and 4 patients with dyskinetic CP. Five English vowels were generated by subjects in pseudo-random order, after only 10 min of device familiarization. The fraction of vowels correctly identified by 4 naive listeners exceeded 80% for the vowels generated by healthy adults and 57% for vowels generated by patients with CP. Our goal is a continuous "virtual voice" with personalized intonation and articulation that will restore not only the intellectual content but also the social and emotional content of speech for children and adults with severe movement disorders.

[PMID: 25657622](#) [PubMed]

**13. Indian Pediatr. 2015 Jan 8;52(1):67-8.**

**Hereditary folate malabsorption with extensive intracranial calcification.**

Ahmad I1, Mukhtar G, Iqbal J, Ali SW.

**BACKGROUND:** Anemia is a common accompaniment of cerebral palsy, mental retardation and neurodegenerative disorders. **CLINICAL CHARACTERISTICS:** A 4-year-old boy with chronic megaloblastic anemia, global developmental delay, seizures, intracranial calcification and new onset neuro-regression. **OBSERVATION:** A diagnosis of hereditary folate malabsorption was made, and he was put on oral and injectable folic acid. **OUTCOME:** Marked improvement at 6 month follow up. **MESSAGE:** Hereditary folate malabsorption should be suspected in any child having megaloblastic anemia and neuro degeneration disorder.

[PMID: 25638192](#) [PubMed - in process]

**14. Med Health Care Philos. 2015 Feb 5. [Epub ahead of print]**

**How to develop a phenomenological model of disability.**

Martiny KM1.

During recent decades various researchers from health and social sciences have been debating what it means for a person to be disabled. A rather overlooked approach has developed alongside this debate, primarily inspired by the philosophical tradition called phenomenology. This paper develops a phenomenological model of disability by arguing for a different methodological and conceptual framework from that used by the existing phenomenological approach. The existing approach is developed from the phenomenology of illness, but the paper illustrates how the case of congenital disabilities, looking at the congenital disorder called cerebral palsy (CP), presents a fundamental problem for the approach. In order to understand such congenital cases as CP, the experience of disability is described as being gradually different from, rather than a disruption of, the experience of being abled, and it is argued that the experience of disability is complex and dynamically influenced by both intrinsic and extrinsic factors. Different experiential aspects of disability- pre-reflective, attuned and reflective aspects-are described, demonstrating that the experience of disability comes in different degrees. Overall, this paper contributes to the debates about disability by further describing the personal aspects and experience of persons living with disabilities.

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## Prevention and Cure

**15. Int J Dev Neurosci. 2015 Jan 29. pii: S0736-5748(15)00006-4. doi: 10.1016/j.ijdevneu.2015.01.004. [Epub ahead of print]**

**Cerebrovascular adaptations to chronic hypoxia in the growth restricted lamb.**

Castillo-Melendez M1, Yawno T2, Allison BJ2, Jenkin G3, Wallace EM3, Miller SL3.

Chronic moderate hypoxia induces angiogenic adaptation in the brain, reflecting a modulatory role for oxygen in determining cerebrovascular development. Chronic intrauterine fetal hypoxia, such as occurs in intrauterine growth restriction (IUGR) is likely to lead to a reduction in oxygen delivery to the brain and long-term neurological abnormalities. Thus we investigated whether vascular remodeling and vascular abnormalities were evident in the brain of IUGR newborn lambs that were chronically hypoxic in utero. Single uterine artery ligation (SUAL) surgery was performed in fetuses at □105 days gestation (term □145 days) to induce placental insufficiency and IUGR.

Ewes delivered naturally at term and lambs were euthanased 24h later. IUGR brains (n=9) demonstrated a significant reduction in positive staining for the number of blood vessels (laminin immunohistochemistry) compared with control (n=8): from 1650±284 to 416±47cells/mm<sup>2</sup> in subcortical white matter (SCWM) 1793±298 to 385±20cells/mm<sup>2</sup> in periventricular white matter (PVWM), and 1717±161 to 405±84cells/mm<sup>2</sup> in the subventricular zone (SVZ). The decrease in vascular density was associated with a significant decrease in VEGF immunoreactivity. The percentage of blood vessels exhibiting endothelial cell proliferation (Ki67 positive) varied regionally between 14 to 22% in white matter of control lambs, while only 1-3% of blood vessels in IUGR brains showed proliferation. A 66% reduction in pericyte coverage ( $\alpha$ -SMA and desmin) of blood vessels was observed in SCWM, 71% in PVWM, and 73% in SVZ of IUGR lambs, compared to controls. A reduction in peri-vascular astrocytes (GFAP and laminin) was also observed throughout the white matter of IUGR lambs, and extravasation of albumin into the brain parenchyma was present, indicative of increased permeability of the blood brain barrier. Chronic hypoxia associated with IUGR results in a reduction in vascular density in the white matter of IUGR newborn brains. Vascular pericyte coverage and peri-vascular astrocytes, both of which are essential for stabilisation of blood vessels and the maintenance of vascular permeability, were also decreased in the white matter of IUGR lambs. In turn, these vascular changes could lead to inadequate oxygen supply and contribute to under-perfusion and increased vulnerability of white matter in IUGR infants.

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## 16. Neuropediatrics. 2015 Feb 2. [Epub ahead of print]

### **Pediatric Neurocysticercosis: Three Cases Presented in the Netherlands with Divergent Clinical Presentations.**

van de Pol LA1, van Doeveren TE1, van der Kuip M2, Wolf NI1, Vermeulen RJ1.

**Background:** Neurocysticercosis is a helminthic disease that affects the central nervous system by the larvae of the *Taenia solium*, the pork tapeworm. Because of the growing number of immigrants from endemic areas, its incidence is increasing in Western Europe. **Cases:** We describe three children, aged between 2 and 13 years, two of whom have a definite and one a probable diagnosis of neurocysticercosis based on the "Del Brutto criteria." They presented with different symptoms and signs: symptomatic epilepsy, asymmetric cerebral palsy, and headache. Serological evaluation was negative in two of the three cases. All cases showed comparable abnormalities on magnetic resonance imaging of the brain: solitary or multiple, cystic lesions, with surrounding edema. In one of them, the "scolex" (part of the larvae) could be visualized. One case was treated with albendazole, the other two cases did not receive medication. **Conclusion:** A prompt diagnosis of neurocysticercosis by recognition of its typical brain lesions is important to prevent unnecessary diagnostic tests and treatment.

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## 17. *Pediatr Neonatol.* 2014 Dec 27. pii: S1875-9572(14)00200-9. doi: 10.1016/j.pedneo.2014.11.006. [Epub ahead of print]

### **Delayed Dexamethasone Therapy and Neurodevelopmental Outcomes in Preterm Infants with Bronchopulmonary Dysplasia.**

Lim G1, Lee BS2, Choi YS3, Park HW4, Chung ML5, Choi HJ6, Kim EA7, Kim KS7.

**BACKGROUND:** It remains unclear whether the benefit of postnatal corticosteroid as a respiratory rescue therapy outweighs the potential harm of neurodevelopmental impairment (NDI) in very-low-birth-weight infants at risk of bronchopulmonary dysplasia (BPD). **METHODS:** We reviewed the charts of very-low-birth-weight infants with oxygen dependency for 28 days or more and who survived until 18-22 months' corrected age. Patients were divided into the delayed ( $\geq 21$  days after birth) dexamethasone therapy (DDT, n=71) and the control (n=60) groups. NDI was defined by the presence of cerebral palsy, Bayley Mental or Psychomotor Developmental Index less than 70, deafness, or blindness. **RESULTS:** The DDT group was more premature and had worse respiratory morbidities



before (ventilator-dependent at 21 days, 69% vs. 17%) and after the DDT (moderate/severe BPD, 41% vs. 15%) than the control group. The risk of NDI did not differ between the DDT and the control groups in the entire cohort (odds ratio and 95% confidence interval, 1.309 [0.530-3.237]) or in the propensity-score-matched cohort (n=62; odds ratio and 95% confidence interval, 1.344 [0.455-3.976]). However, in the subgroup of infants exposed to DDT, the cumulative dexamethasone dose greater than 5.0 mg/kg was significantly associated with NDI. **CONCLUSION:** Among the very-low-birth-weight infants with BPD, there was no definitely harmful effect of DDT on the neurodevelopmental outcome in the short term. However, considering the potential harm of high cumulative doses of dexamethasone on the developing brain, further studies are needed to determine the optimal dosage of DDT to be administered for the prevention of BPD.

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**18. PLoS One. 2015 Feb 6;10(2):e0114567. doi: 10.1371/journal.pone.0114567.**

**Comparison in Outcomes at Two-Years of Age of Very Preterm Infants Born in 2000, 2005 and 2010.**

Abily-Donval L1, Pinto-Cardoso G2, Chadie A2, Guerrot AM2, Torre S2, Rondeau S2, Marret S1; on behalf of the Perinatal Network of Haute—Normandie.

**OBJECTIVE:** To investigate alteration in 2-year neurological/ behavioral outcomes of very preterm infants born in a French level three neonatal intensive care unit. **METHODS:** We conducted a prospective, comparative study of very preterm infants born before 33 weeks' gestation at 5-year intervals in 2000, 2005 and 2010 at Rouen University Hospital. Neonatal mortality/morbidities, ante- and neonatal treatments, and at age 2 years motor, cognitive and behavioral data were collected by standardized questionnaires. **RESULTS:** We included 536 very preterm infants. Follow-up rates at two years old were 78% in 2000, 93% in 2005 and 92% in 2010 respectively. No difference in gestational age, birthweight, neonatal mortality/ morbidities was observed except a decrease in low grade subependymal/ intraventricular hemorrhages. Care modifications concerned use of antenatal magnesium sulfate, breast-feeding and post-natal corticosteroid therapy. Significant improvement in motor outcome and dramatic decrease in cerebral palsy rates (12% in 2000, 6% in 2005, 1% in 2010,  $p < 0.001$ ) were observed, as were improvements in feeding behavior. Although a non significant difference to better psychosocial behavior was reported, there was no difference in cognitive outcome. **CONCLUSIONS:** Improvement in neuromotor outcome and behavior was reported. This could be due to multiple modifications in care: including administration of magnesium sulfate to women at risk of preterm birth, increase in breast-feeding, decrease in low grade subependymal/ intraventricular hemorrhages, and decrease in post-natal corticosteroid therapy, all of which require further investigation in other studies. Extended follow-up until school age is mandatory for better detection of cognitive, learning and behavioral disorders.

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**Classification and risk factors for cerebral palsy in the korle bu teaching hospital, accra: a case-control study.**

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