

Monday 6 July 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 research.cerebralpalsy.org.au

Professor Nadia Badawi AM

Macquarie Group Foundation Chair of Cerebral Palsy

[Subscribe to CP Research News](#)

Interventions and Management

1. Rehabil Res Pract. 2015;2015:861617. doi: 10.1155/2015/861617. Epub 2015 Jun 1.

Sensory Feedback Training for Improvement of Finger Perception in Cerebral Palsy.

Blumenstein T, Alves-Pinto A, Turova V, Aschmann S, Lützwow I, Lampe R.

Purpose. To develop and to test a feedback training system for improvement of tactile perception and coordination of fingers in children and youth with cerebral palsy. **Methods.** The fingers of 7 probands with cerebral palsy of different types and severity were stimulated using small vibration motors integrated in the fingers of a hand glove. The vibration motors were connected through a microcontroller to a computer and to a response 5-button keyboard. By pressing an appropriate keyboard button, the proband must indicate in which finger the vibration was felt. The number of incorrect responses and the reaction time were measured for every finger. The perception and coordination of fingers were estimated before and after two-week training using both clinical tests and the measurements. **Results.** Proper functioning of the developed system in persons with cerebral palsy was confirmed. The tactile sensation of fingers was improved in five of seven subjects after two weeks of training. There was no clear tendency towards improvement of selective use of fingers. **Conclusion.** The designed feedback system could be used to train tactile perception of fingers in children and youth with cerebral palsy. An extensive study is required to confirm these findings.

[PMID: 26124965](#) [PubMed] [PMCID: PMC4466477](#) Free PMC Article

2. Clin Rehabil. 2015 Jun 30. pii: 0269215515593612. [Epub ahead of print]

Psychometric evaluation of the Posture and Postural Ability Scale for children with cerebral palsy.

Rodby-Bousquet E, Persson-Bunke M, Czuba T.

OBJECTIVE: To evaluate construct validity, internal consistency and inter-rater reliability of the Posture and Postural Ability Scale for children with cerebral palsy. **DESIGN:** Evaluation of psychometric properties. **SETTING:** Five child rehabilitation centres in the south of Sweden, in November 2013 to March 2014. **SUBJECTS:** A total of 29 children with cerebral palsy (15 boys, 14 girls), 6-16 years old, classified at Gross Motor Function Classification System (GMFCS) levels II (n = 10), III (n = 7), IV (n = 6) and V (n = 6). **MAIN MEASURES:** Three independent raters (two physiotherapists and one orthopaedic surgeon) assessed posture and postural ability of all children in supine, prone, sitting and standing positions, according to the Posture and Postural Ability Scale. Construct validity was evaluated based on averaged values for the raters relative to known-groups in terms of GMFCS levels. Internal consistency was analysed with Cronbach's alpha and corrected Item-Total correlation. Inter-rater reliability

was calculated using weighted kappa scores. RESULTS: The Posture and Postural Ability Scale showed construct validity and median values differed between GMFCS levels ($p < 0.01$). There was a good internal consistency ($\alpha = 0.95-0.96$; item-total correlation = 0.55-0.91), and an excellent inter-rater reliability (kappa score = 0.77-0.99). CONCLUSION: The Posture and Postural Ability Scale shows high psychometric properties for children with cerebral palsy, as previously seen when evaluated for adults. It enables detection of postural deficits and asymmetries indicating potential need for support and where it needs to be applied.

© The Author(s) 2015.

[PMID: 26130659](#) [PubMed - as supplied by publisher]

3. PLoS One. 2015 Jul 2;10(7):e0131011. doi: 10.1371/journal.pone.0131011.

The Intra- and Inter-Rater Reliability of an Instrumented Spasticity Assessment in Children with Cerebral Palsy.

Schless SH, Desloovere K, Aertbeliën E, Molenaers G, Huenaerts C, Bar-On L.

AIM: Despite the impact of spasticity, there is a lack of objective, clinically reliable and valid tools for its assessment. This study aims to evaluate the reliability of various performance- and spasticity-related parameters collected with a manually controlled instrumented spasticity assessment in four lower limb muscles in children with cerebral palsy (CP). METHOD: The lateral gastrocnemius, medial hamstrings, rectus femoris and hip adductors of 12 children with spastic CP (12.8 years, ± 4.13 years, bilateral/unilateral involvement $n=7/5$) were passively stretched in the sagittal plane at incremental velocities. Muscle activity, joint motion, and torque were synchronously recorded using electromyography, inertial sensors, and a force/torque load-cell. Reliability was assessed on three levels: (1) intra- and (2) inter-rater within session, and (3) intra-rater between session. RESULTS: Parameters were found to be reliable in all three analyses, with 90% containing intra-class correlation coefficients >0.6 , and 70% of standard error of measurement values $<20\%$ of the mean values. The most reliable analysis was intra-rater within session, followed by intra-rater between session, and then inter-rater within session. The Adds evaluation had a slightly lower level of reliability than that of the other muscles. CONCLUSIONS: Limited intrinsic/extrinsic errors were introduced by repeated stretch repetitions. The parameters were more reliable when the same rater, rather than different raters performed the evaluation. Standardisation and training should be further improved to reduce extrinsic error when different raters perform the measurement. Errors were also muscle specific, or related to the measurement set-up. They need to be accounted for, in particular when assessing pre-post interventions or longitudinal follow-up. The parameters of the instrumented spasticity assessment demonstrate a wide range of applications for both research and clinical environments in the quantification of spasticity.

[PMID: 26134673](#) [PubMed - as supplied by publisher] Free full text

4. Arch Phys Med Rehabil. 2015 Jun 25. pii: S0003-9993(15)00483-9. doi: 10.1016/j.apmr.2015.05.024. [Epub ahead of print]

Gait Deviation Index Correlates with Daily Step Activity in Children with Cerebral Palsy.

Wilson NC, Signal N, Naude Y, Taylor D, Stott NS.

OBJECTIVES: To examine the relationship between Gait Deviation Index (GDI), a multivariate measure of overall gait pathology, and measures of both community walking performance and walking capacity within the clinic setting in ambulatory children with cerebral palsy (CP). DESIGN: Cross-sectional study SETTING: Gait analysis, six minute walk test (6MWT) and self selected walk speed (WS) were conducted in laboratory and clinic settings. Activity monitoring was conducted in the participants community environment. PARTICIPANTS: Children with CP ($n = 55$, age range 6 - 18y) with Gross Motor Function Classification System levels I - III. INTERVENTIONS: Not applicable MAIN OUTCOME MEASURES: The GDI was used to measure overall gait pathology, an activity monitor was used to capture community walking performance whilst the 6MWT and WS were the clinic based measures of walking capacity. RESULTS: The 55 children had a median GDI of 78.86 (53.07 - 105.34). A moderate strength of association was found between GDI and daily step count (Spearman $\rho = 0.58$, 95% CI 0.37 - 0.74, $p < 0.0001$).

Lower associations were found between GDI and 6MWT (Spearman rho = 0.4718, 95% CI = 0.2283 - 0.6597, $p < 0.0003$) and GDI and WS (Spearman rho = 0.3949, 95% CI 0.1368 - 0.6028, $p < 0.0028$). CONCLUSION: The GDI has a moderate relationship with daily step count suggesting that interventions that positively change gait kinematics may also impact on community walking performance. Whilst the GDI's deviation from normal provides valuable information, other measures are required to provide a full picture of a child's walking ability and participation.

Copyright © 2015 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

[PMID: 26119466](#) [PubMed - as supplied by publisher]

5. Med Hypotheses. 2015 Jun 24. pii: S0306-9877(15)00229-7. doi: 10.1016/j.mehy.2015.06.010. [Epub ahead of print]

Relative fascicle excursion effects on dynamic strength generation during gait in children with cerebral palsy.

Martín Lorenzo T, Lerma Lara S, Martínez-Caballero I, Rocon E.

Evaluation of muscle structure gives us a better understanding of how muscles contribute to force generation which is significantly altered in children with cerebral palsy (CP). While most muscle structure parameters have shown to be significantly correlated to different expressions of strength development in children with CP and typically developing (TD) children, conflicting results are found for muscle fascicle length. Muscle fascicle length determines muscle excursion and velocity, and contrary to what might be expected, correlations of fascicle length to rate of force development have not been found for children with CP. The lack of correlation between muscle fascicle length and rate of force development in children with CP could be due, on the one hand, to the non-optimal joint position adopted for force generation on the isometric strength tests as compared to the position of TD children. On the other hand, the lack of correlation could be due to the erroneous assumption that muscle fascicle length is representative of sarcomere length. Thus, the relationship between muscle architecture parameters reflecting sarcomere length, such as relative fascicle excursions and dynamic power generation, should be assessed. Understanding of the underlying mechanisms of weakness in children with CP is key for individualized prescription and assessment of muscle-targeted interventions. Findings could imply the detection of children operating on the descending limb of the sarcomere length-tension curve, which in turn might be at greater risk of developing crouch gait. Furthermore, relative muscle fascicle excursions could be used as a predictive variable of outcomes related to crouch gait prevention treatments such as strength training.

Copyright © 2015 Elsevier Ltd. All rights reserved.

[PMID: 26138625](#) [PubMed - as supplied by publisher]

6. J Child Orthop. 2015 Jun 28. [Epub ahead of print]

Proximal femoral excision with interposition myoplasty for cerebral palsy patients with painful chronic hip dislocation.

Patel NK, Sabharwal S, Gooding CR, Hashemi-Nejad A, Eastwood DM.

PURPOSE: Proximal femoral excision is a salvage procedure for painful chronic hip dislocation in cerebral palsy (CP) patients. The primary objective of this article is to describe our experience of an amplified interposition myoplasty, with appropriate peri-operative pain and tone management strategies, in a cohort of non-ambulatory CP patients with painful chronic hip dislocation. Our secondary objective is to present the clinical outcomes of these patients. **METHODS:** We describe our experience in 20 CP patients (25 procedures) at mean 54-month (range 27-169) follow-up with a surgical technique that includes an augmented interposition myoplasty and tone management. The indications for surgery were pain (21 hips), poor sitting tolerance (11) and difficulty with perineal care (8).

RESULTS:

The mean age was 22 years (range 10-40) with 11 patients Gross Motor Function Classification Scale (GMFCS) IV and 9 patients GMFCS V. Mean length of stay was 13 days (3-35). One procedure required revision at 12 months.

Mean pain score improved from 7.8 (5-10) pre-operatively to 2.8 (1-5) post-operatively ($p < 0.001$). Sitting tolerance improved in all patients and in 75 % (15) perineal care was easier. **CONCLUSIONS:** Our interposition myoplasty technique with individualised pain/tone management has good outcomes in this cohort of patients with multiple comorbidities.

[PMID: 26123871](#) [PubMed - as supplied by publisher]

7. *J Phys Act Health*. 2015 Apr;12(4):540-5. doi: 10.1123/jpah.2013-0294.

Energy Expenditure in Adolescents With Cerebral Palsy: Comparison of the SenseWear Armband and Indirect Calorimetry.

Koehler K, Abel T, Wallmann-Sperlich B, Dreuscher A, Anneken V.

BACKGROUND: Inactivity and overweight are major health concerns in children and adolescents with disabilities. Methods for the assessment of activity and energy expenditure may be affected negatively by the underlying disability, especially when motor function is impaired. The purpose of this study was to assess the validity of the SenseWear Armband in adolescents with cerebral palsy and hemiparesis. **METHODS:** Ten volunteers (age: 13.4 ± 1.6 years) were equipped with SenseWear Armbands on the hemiparetic and nonhemiparetic side of the body. Energy expenditure was measured at rest and during treadmill exercise (speed range: 0.85 to 2.35 m/s). Indirect calorimetry served as independent reference method. **RESULTS:** The mean error was between -0.6 and 0.8 kcal/min and there were no significant differences between SenseWear and indirect calorimetry at any speed. Differences between body sides in expenditure (mean: -0.2 to 0.0 kcal/min) and step count (mean: -3.4 to 9.7 steps/min) were not significant. **CONCLUSIONS:** The validity of the SenseWear Armband does not appear to be negatively affected by cerebral palsy during laboratory treadmill exercise. Future field studies are necessary to assess the validity and practicability energy expenditure and physical activity in children and adolescents with physical disabilities.

[PMID: 26125638](#) [PubMed - in process]

8. *Toxins (Basel)*. 2015 Jun 30;7(7):2481-2493.

Onabotulinumtoxin A Treatment of Drooling in Children with Cerebral Palsy: A Prospective, Longitudinal Open-Label Study.

Møller E, Pedersen SA, Vinicoff PG, Bardow A, Lykkeaa J, Svendsen P, Bakke M.

The aim of this prospective open-label study was to treat disabling drooling in children with cerebral palsy (CP) with onabotulinumtoxin A (A/Ona, Botox®) into submandibular and parotid glands and find the lowest effective dosage and least invasive method. A/Ona was injected in 14 children, Mean age 9 years, SD 3 years, under ultrasonic guidance in six successive Series, with at least six months between injections. Doses and gland involvement increased from Series A to F (units (U) per submandibular/parotid gland: A, 10/0; B, 15/0; C, 20/0; D, 20/20; E, 30/20; and F, 30/30). The effect was assessed 2, 4, 8, 12, and 20 weeks after A/Ona (drooling problems (VAS), impact (0-7), treatment effect (0-5), unstimulated whole saliva (UWS) flow and composition)) and analyzed by two-way ANOVA. The effect was unchanged-moderate in A to moderate-marked in F. Changes in all parameters were significant in E and F, but with swallowing problems ≤ 5 weeks in 3 of 28 treatments. F had largest VAS and UWS reduction (64% and 49%). We recommend: Start with dose D A/Ona (both submandibular and parotid glands and a total of 80 U) and increase to E and eventually F (total 120 U) without sufficient response.

[PMID: 26134257](#) [PubMed - as supplied by publisher] Free full text

9. Dev Med Child Neurol. 2015 Jul 1. doi: 10.1111/dmcn.12839. [Epub ahead of print]

Reliability of the Dutch-language version of the Communication Function Classification System and its association with language comprehension and method of communication.

Vander Zwart KE, Geytenbeek JJ, de Kleijn M, Oostrom KJ, Gorter JW, Hidecker MJ, Vermeulen RJ.

AIM: The aims of this study were to determine the intra- and interrater reliability of the Dutch-language version of the Communication Function Classification System (CFCS-NL) and to investigate the association between the CFCS level and (1) spoken language comprehension and (2) preferred method of communication in children with cerebral palsy (CP). **METHOD:** Participants were 93 children with CP (50 males, 43 females; mean age 7y, SD 2y 6mo, range 2y 9mo-12y 10mo; unilateral spastic [n=22], bilateral spastic [n=51], dyskinetic [n=15], ataxic [n=3], not specified [n=2]; Gross Motor Function Classification System level I [n=16], II [n=14], III, [n=7], IV [n=24], V [n=31], unknown [n=1]), recruited from rehabilitation centres throughout the Netherlands. Because some centres only contributed to part of the study, different numbers of participants are presented for different aspects of the study. Parents and speech and language therapists (SLTs) classified the communication level using the CFCS. Kappa was used to determine the intra- and interrater reliability. Spearman's correlation coefficient was used to determine the association between CFCS level and spoken language comprehension, and Fisher's exact test was used to examine the association between the CFCS level and method of communication. **RESULTS:** Interrater reliability of the CFCS-NL between parents and SLTs was fair ($r=0.54$), between SLTs good ($r=0.78$), and the intrarater (SLT) reliability very good ($r=0.85$). The association between the CFCS and spoken language comprehension was strong for SLTs ($r=0.63$) and moderate for parents ($r=0.51$). There was a statistically significant difference between the CFCS level and the preferred method of communication of the child ($p<0.01$). Also, CFCS level classification showed a statistically significant difference between parents and SLTs ($p<0.01$). **INTERPRETATION:** These data suggest that the CFCS-NL is a valid and reliable clinical tool to classify everyday communication in children with CP. Preferably, professionals should classify the child's CFCS level in collaboration with the parents to acquire the most comprehensive information about the everyday communication of the child in various situations both with familiar and with unfamiliar partners.

© 2015 Mac Keith Press.

[PMID: 26136153](#) [PubMed - as supplied by publisher]

10. Assist Technol. 2015 Spring;27(1):52-58.

Improving Target Acquisition for Computer Users With Athetosis.

Ding D, Rodriguez SP, Cooper RA, Riviere CN.

Prior work has highlighted the challenges faced by people with athetosis when trying to acquire on-screen targets using a mouse or trackball. The difficulty of positioning the mouse cursor within a confined area has been identified as a challenging task. We have developed a target acquisition assistance algorithm that features transition assistance via directional gain variation based on target prediction, settling assistance via gain reduction in the vicinity of a predicted target, and expansion of the predicted target as the cursor approaches it. We evaluated the algorithm on improving target acquisition efficiency among seven participants with athetoid cerebral palsy. Our results showed that the algorithm significantly reduced the overall movement time by about 20%. Considering the target acquisition occurs countless times in the course of regular computer use, the accumulative effect of such improvements can be significant for improving the efficiency of computer interaction among people with athetosis. **KEYWORDS:** athetosis; cerebral palsy; computer access; target acquisition

[PMID: 26132226](#) [PubMed - as supplied by publisher]

11. Anc Sci Life. 2015 Jan-Mar;34(3):167-70. doi: 10.4103/0257-7941.157163.

A case study on the Ayurvedic management of cerebral palsy.

Bhinde SM.

Cerebral palsy (CP) is the leading cause of childhood disability affecting function and development. CP is defined as a nonprogressive neuromotor disorder of cerebral origin. It cannot be correlated with any single disease or condition in Ayurveda, as it is a multi-factorial disease with clinical features of a wide variation. According to Vāgbhāṭa, it is classified in the disease categories of saḥaja (hereditary) and garbhaja (congenital) and jātaja (psychosomatic) type of diseases. Of the many types and subtypes of CP, none has any known "cure." Here, an effort was made to treat a 3-year-old male child with spastic type of CP using multiple Ayurveda treatment modalities. At the end of 94 days of treatment, Pañcakarma procedures along with internal medication resulted in 10-15% improvement in the overall effect of therapy.

[PMID: 26120232](#) [PubMed] [PMCID: PMC4458908](#) Free PMC Article

12. Disabil Rehabil. 2015 Jun 29:1-6. [Epub ahead of print]

Quality of life of Finnish children with cerebral palsy.

Böling S, Varho T, Kiviranta T, Haataja L.

PURPOSE: The aim of this study was to examine the quality of life (QOL) of Finnish children with cerebral palsy (CP) in different parts of Finland from the children's and caregivers' perspectives. The acceptability of the Finnish version of the CP QOL-Child questionnaire for clinical use is also evaluated. **METHOD:** This study was conducted in 2010-2013 as a part of the national CP-project. It is based on validated CP QOL-Child questionnaires. Children between 9 and 12 years were asked to fill in the child-self-report version. Caregivers who had a 4- to 12-year-old child with CP filled in parent-proxy reports. **RESULTS:** Responses were obtained from 63 children and 161 caregivers. The response rates were 63 and 60%, respectively. Overall QOL was reported to be fairly good with no significant regional differences within Finland. Children reported significantly higher QOL in all QOL-domains except "social wellbeing and acceptance" than their caregivers did. The results showed acceptable levels of internal consistency of the Finnish version of the CP QOL-Child. **CONCLUSIONS:** QOL of children with CP is quite good in Finland. However, barriers to participation and the impact of disability and pain impair QOL. The Finnish version of the CP QOL-Child questionnaire is an appropriate clinical tool to assess QOL. **Implications for Rehabilitation** The used questionnaire provides an effective tool to identify areas for targeting support actions and to set goals for rehabilitation plans. The study brings forward the voices of children. It was found that pain has a great role in QOL, which should be taken into account when making rehabilitation plans. The participation of children with CP should be strengthened in every possible ways.

[PMID: 26119576](#) [PubMed - as supplied by publisher]

13. Neurosci Lett. 2015 Jun 29. pii: S0304-3940(15)30002-1. doi: 10.1016/j.neulet.2015.06.043. [Epub ahead of print]

Cognitive and motor aspects of a coincidence-timing task in Cerebral Palsy children.

Olivier I, Baker C, Cordier J, Thomann G, Nougier V.

Cerebral Palsy (CP) is a clinical syndrome involving postural and motor deficits. CP children are less accurate than healthy ones when trying to reach a target. Thus, it is difficult for CP children to perform anticipation-coincidence tasks requiring temporal and/or spatial accuracy to reach the target at the good place in the right time. The purpose of the present experiment was to further investigate CP children's ability to perform anticipation-coincidence tasks, by dissociating the cognitive from the motor aspects of the task. 11 CP children aged 6 to 14 years, 51 healthy children aged 6 to 13 years, and 13 healthy adults performed, as accurately as possible, a coincidence-timing in response to a specific sound of a musical sequence. Two experimental conditions were manipulated: In the verbal

condition, temporal estimation occurred through a simple verbal response whereas in the motor condition, temporal estimation was performed by reaching a target at a self-paced velocity. In the verbal condition, CP children made similar temporal errors than their healthy counterpart. However, even though all participants underestimated stimulus occurrence, CP children also exhibited greater and more variable temporal errors when they provided a motor response for estimating stimulus occurrence. These data suggested that CP children were able to anticipate stimulus occurrence and to partially take into account their sensory-motor deficits to reach the target at this time occurrence.

Copyright © 2015. Published by Elsevier Ireland Ltd.

[PMID: 26135546](#) [PubMed - as supplied by publisher]

Prevention and Cure

14. Clin Pediatr (Phila). 2015 Jun 29. pii: 0009922815592878. [Epub ahead of print]

The Study of Effect for General Movements Assessment in the Diagnosis of Neurological Development Disorders: A Meta-Analysis.

Xie K, Zheng H, Li H, Zhang C, Li H, Jin H, Ma B.

OBJECTIVE: To discuss the value of general movements assessment in predicting the neurological disorders. **METHODS:** Using PubMed as the search engine, we searched to identify relevant studies in English and Chinese language published up to November 2014 and 19 studies were selected. Standard methods in meta-analyses were used to provide diagnostic accuracy by Meta-DiSc 1.4. **RESULTS:** For non-cerebral palsy (non-CP) as outcome for writhing period, the results suggested a good sensitivity and a specificity of 0.74, the Q-value was 0.80. The area under the curve (AUC) was 0.87. For non-CP as outcome for fidgety period, the results suggested both high level for sensitivity and specificity. And the Q-value was 0.914, the AUC was 0.9664. For CP as outcome for writhing and fidgety periods, good sensitivity and specificity were found in the analysis, and the Q-value was 0.9034 while the AUC was 0.9592. **CONCLUSION:** General movements assessment is a good predictor for diagnosing neurological disorders.

© The Author(s) 2015.

[PMID: 26130397](#) [PubMed - as supplied by publisher]

15. Indian J Biochem Biophys. 2015 Apr;52(2):140-6.

Umbilical cord mesenchymal stem cells in neurological disorders: A clinical study.

Miao X, Wu X, Shi W.

We investigated the intrathecally administrated umbilical cord mesenchymal stem cells (UC-MSCs) by lumbar puncture and assessed the technical difficulties and effects in various neurological conditions. One hundred patients underwent subarachnoid placement of UC-MSCs between December 2006 and May 2010 in the Affiliated Hospital of Medicine. Technical difficulties in patients in the form of localization of subarachnoid space, number of attempts, and post-procedural complications were evaluated. Functional evaluation was done using Hauser Ambulation Index (HAI) by the stem cell transplant team on a regular basis. All patients were followed-up for more than 1 yr after the treatment. Clinical symptoms, related biochemical index and photographic examinations were observed regularly. We encountered technical difficulties in 31 patients (31%) in the form of general anesthesia supplementation and difficulty localizing the lumbar space. Side effects (headache, low-grade fever, low back pain and lower limb pain) were observed in 22 (22%) patients, which were treated with symptomatic therapy within 48 h. One year after the treatment, functional indices improved in 47 patients (47%): 12 patients with spinal cord injury, 11 patients with cerebral palsy, 9 patients with post-traumatic brain syndrome, 9 patients with post-brain infarction

syndrome, 3 patients with spinocerebellar ataxias, and 3 patients with motor neuron disease. In conclusion, intrathecal administration of UC-MSCs is a safe and effective way to treat neurological disorders. Our encouraging results of intrathecal administration of UC-MSCs indicate the potential of restoration of lost tissue and improvement of function in patients with profound neurological defects and inefficient conventional cure. These data support expanded double-blind, placebo-controlled studies for this treatment modality.

[PMID: 26118125](#) [PubMed - in process]

16. J Pediatr. 2015 Jul;167(1):1-3. doi: 10.1016/j.jpeds.2015.05.021.

Cerebral palsy and brain cooling.

Jobe AH.

[PMID: 26117633](#) [PubMed - in process]

17. Neuropediatrics. 2015 Jun 29. [Epub ahead of print]

Progress in Neonatal Neurology with a Focus on Neuroimaging in the Preterm Infant.

de Vries LS, Benders MJ, Groenendaal F.

There have been tremendous changes in the methods used to evaluate brain injury in the preterm infant in the past 30 years. In particular, major improvements have been made in how we use neuroimaging techniques and now magnetic resonance imaging (MRI) is used more often and considered complimentary to routine and sequential cranial ultrasound. The focus has shifted from severe lesions such as large intraventricular and parenchymal hemorrhages and cystic periventricular leukomalacia to assessing and understanding the etiology of more subtle noncystic white matter injury, punctate hemorrhage, and cerebellar lesions. The more severe lesions that dominated the early period of preterm neonatal brain imaging occur less frequently but are still associated with major disabilities, such as, cerebral palsy, while subtle white matter injury and cerebellar lesions are more often associated with cognitive and behavioral problems, which have become the most prevalent issues among the survivors of extremely preterm birth.

Georg Thieme Verlag KG Stuttgart · New York.

[PMID: 26121069](#) [PubMed - as supplied by publisher]