

Monday 20 June 2016

**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](http://research.cerebralpalsy.org.au)

**Professor Nadia Badawi AM**

Macquarie Group Foundation Chair of Cerebral Palsy

[Subscribe to CP Research News](#)

*Please note: This research bulletin represents only the search results for cerebral palsy and related neurological research as provided by the PubCrawler service. The articles listed below do not represent the views of Cerebral Palsy Alliance.*

## Interventions and Management

### 1. Arch Phys Med Rehabil. 2016 Jun 8. pii: S0003-9993(16)30239-8. doi: 10.1016/j.apmr.2016.05.012. [Epub ahead of print]

Exercise Intensity during Power Wheelchair Soccer.

Barfield JP, Newsome L, Malone LA.

**OBJECTIVE:** The purpose of this study was to determine exercise intensity during power wheelchair soccer (PWS) among a sample of persons with mobility impairments. **DESIGN:** Cross-sectional descriptive. **SETTING:** On-site training facilities of multiple PWS teams. **PARTICIPANTS:** Thirty participants with severe mobility impairments (MAge = 29.40 ± 15.51 yrs, MBMI = 24.11 ± 6.47, MPower Soccer Experience = 7.91 ± 3.93 yrs, MDisability Sport Experience = 12.44 ± 9.73 yrs) were recruited from multiple PWS teams. **INTERVENTIONS:** Portable metabolic carts were used to collect oxygen consumption data during resting (REST) and gameplay (GAME) conditions. **MAIN OUTCOME MEASURE(S):** Average VO<sub>2</sub> (expressed in METs) for REST and GAME and rate of perceived exertion (RPE) for GAME. **RESULTS:** VO<sub>2</sub> increased from 1.35 ± 0.47 METs at REST to 1.81 ± 0.65 METs during GAME. This 34% increase in exercise intensity was significant (p < .01) and supported by a mean perceived exertion score of approximately 13 (Somewhat Hard). **CONCLUSIONS:** Although not able to sustain an intensity associated with reduced secondary disease risk (i.e., 3 METs), the documented light-intensity exercise in the current study surpassed an intensity threshold associated with improved functional capacity and performance of daily living activities (i.e., 1.5 METs).

[PMID: 27288710](#)

### 2. Dev Med Child Neurol. 2016 Jun 17. doi: 10.1111/dmcn.13171. [Epub ahead of print]

Hip health at skeletal maturity: a population-based study of young adults with cerebral palsy.

Wawrzuta J, Willoughby KL, Molesworth C, Ang SG, Shore BJ, Thomason P, Graham HK.

**AIM:** We studied 'hip health' in a population-based cohort of adolescents and young adults with cerebral palsy to investigate associations between hip morphology, pain, and gross motor function. **METHOD:** Ninety-eight young adults (65 males, 33 females) from the birth cohort were identified as having developed hip displacement (migration percentage >30) and were reviewed at a mean age of 18 years 10 months (range 15-24y). Hip morphology was classified using the Melbourne Cerebral Palsy Hip Classification Scale (MCPHCS). Severity and frequency of pain were recorded using Likert scales. Gross motor function was classified by the Gross Motor Function Classification System (GMFCS). **RESULTS:** Hip pain was reported in 72% of participants. Associations were found between pain scores and both hip morphology and GMFCS. Median pain severity score for MCPHCS grades 1 to 4 was 2 (interquartile range [IQR] 1.0-3.0) compared to 7 (IQR 6.0-8.0) for grades 5 and 6 (severe subluxation or dislocation). Hip surveillance and access to surgery were associated with improved hip

morphology and less pain. INTERPRETATION: Poor hip morphology at skeletal maturity was associated with high levels of pain. Limited hip surveillance and access to surgery, rather than GMFCS, was associated with poor hip morphology. The majority of young adults who had access to hip surveillance, and preventive and reconstructive surgery, had satisfactory hip morphology at skeletal maturity and less pain.

[PMID: 27312016](#)

**3. Disabil Health J. 2016 Jul;9(3):375-84. doi: 10.1016/j.dhjo.2016.04.005. Epub 2016 Apr 26.**

Effects of strength training on mobility in adults with cerebral palsy: A systematic review.

Ross SM, MacDonald M, Bigouette JP.

BACKGROUND: Many adults with cerebral palsy report experiencing early-onset decline in mobility and independence. The role of strength training to combat this is not well understood. OBJECTIVE/HYPOTHESIS: To examine the effects of strength-training interventions on muscle strength and functional outcomes for adults with CP using the ICF framework. METHODS: A systematic review was conducted following standardized guidelines and using key words including: adults, cerebral palsy in combination with resistance or strength training, and ambulation and function related key words. Selection criteria included: (a) adults (mean age 18+ years) with CP, (b) strength training intervention, and (c) at least one activity or participation outcome measure. 26 retrieved articles were retained for full review. Data on strength training protocols were extracted and compared to national guidelines. Outcome measures were classified within ICF domains. RESULTS: Six articles met the inclusion criteria. These articles were of high research quality and consistent with recommended training protocols for adults with CP. Positive gains in muscle strength were reported across studies. Changes within the activity ICF dimension were inconsistent, with 2 of the 6 studies observing increases in self-selected walking speed. CONCLUSIONS: Findings indicate training benefits for adults with CP. However, a small sample (n = 111 across all included studies) and the absence of extended training regimens and follow-up hindered conclusive results. High consistency in training protocols and outcome measures allowed for critical discussion on key research questions regarding the impact of strength training and subsequent gains in function within ICF domains.

[PMID: 27286912](#)

**4. J Phys Ther Sci. 2016 May;28(5):1569-73. doi: 10.1589/jpts.28.1569. Epub 2016 May 31.**

The effects of forward and backward walking according to treadmill inclination in children with cerebral palsy.

Kim WH, Kim WB, Yun CK.

[Purpose] This study investigated the effects of forward and backward walking using different treadmill incline positions on lower muscle activity in children with cerebral palsy, to provide baseline data for gait training intensity. [Subjects and Methods] Nineteen subjects with cerebral palsy walked forward and backward at a self-selected pace on a treadmill with inclines of 0%, 5%, 10%, and 15%. Activation of the rectus femoris, biceps femoris, tibialis anterior, and lateral gastrocnemius was measured using surface electromyography during the stance phase. [Results] As treadmill incline increased during forward walking, muscle activation of the paralyzed lower limbs did not significantly change. However, as treadmill incline increased during backward walking, rectus femoris activation significantly increased and a significant difference was found between treadmill inclines of 0% and 10%. A comparison of backward and forward walking showed a significant difference in rectus femoris activation at treadmill inclines of 0%, 5%, and 10%. Activation of the tibialis anterior was only significantly higher for backward walking at the 10% gradient. [Conclusion] Backward walking may strengthen the rectus femoris and tibialis anterior in walking training for cerebral palsy. Gradient adjustment of the treadmill can be used to select the intensity of walking training.

[PMID: 27313373](#)

**5. J Phys Ther Sci. 2016 May;28(5):1398-402. doi: 10.1589/jpts.28.1398. Epub 2016 May 31.**

Evaluation of postural stability in children with hemiplegic cerebral palsy.

Kenis-Coskun O, Giray E, Eren B, Ozkok O, Karadag-Saygi E.

[Purpose] Postural stability is the ability of to maintain the position of the body within the support area. This function is affected in cerebral palsy. The aim of the present study was to compare static and dynamic postural stability between children with hemiplegic cerebral palsy and healthy controls. [Subjects and Methods] Thirty-seven children between the ages of 5 and 14 diagnosed with hemiplegic cerebral palsy (19 right, 18 left) and 23 healthy gender- and age-matched controls were included in the study. Postural stability was evaluated in both of the groups using a Neurocom Balance. Sway velocity was measured both with the eyes open and closed. Sit to stand and turning abilities were also assessed. [Results] The sway velocities with the eyes open and closed were significantly different between the groups. The weight transfer time in the Sit to Stand test was also significantly slower in children with cerebral palsy. Children with cerebral palsy also showed slower turning times and greater sway velocities during the Step and Quick Turn test on a force plate compared with their healthy counterparts. [Conclusion] Both static and dynamic postural stability parameters are affected in hemiplegic cerebral palsy. Further research is needed to define rehabilitation interventions to improve these parameters in patients.

[PMID: 27313338](#)

**6. Dev Med Child Neurol. 2016 Jun 13. doi: 10.1111/dmcn.13168. [Epub ahead of print]**

Development of the Assisting Hand Assessment for adolescents (Ad-AHA) and validation of the AHA from 18 months to 18 years.

Louwers A, Beelen A, Holmefur M, Krumlinde-Sundholm L.

AIM: To develop and evaluate a test activity from which bimanual performance in adolescents with unilateral cerebral palsy (CP) can be observed and scored with the Assisting Hand Assessment (AHA), and to evaluate the construct validity of the AHA test items for the extended age range 18 months to 18 years. METHOD: A new test activity was developed and evaluated for its ability to elicit bimanual actions in adolescents with (n=20) and without (n=10) unilateral CP. The AHA scores of 126 adolescents (mean age 14y 3mo, SD 2y 6mo; 71 males, 55 females) and 157 children with unilateral CP (mean age 6y 1mo, SD 2y 10mo; 102 males, 55 females) were analysed using the Rasch measurement model. RESULTS: The test activity elicited bimanual actions in 100% of typically developing adolescents and in 96.8% and 57.9% of adolescents with unilateral CP (moderately and severely limited hand function respectively). The scale demonstrated good construct validity; thus the same scoring criteria can be used for the age range studied. INTERPRETATION: The new Assisting Hand Assessment for adolescents (Ad-AHA) activity is valid for use with 13- to 18-year-olds to elicit bimanual performance in adolescents with unilateral CP. The same AHA scoring criteria can be used both for children and for adolescents within the age range 18 months to 18 years.

[PMID: 27291981](#)

**7. Phys Occup Ther Pediatr. 2016 Jun 17:1-12. [Epub ahead of print]**

Reliability and Construct Validity of the 6-Minute Racetracer Test in Children and Youth with Cerebral Palsy, GMFCS Levels III and IV.

Bolster EA, Dallmeijer AJ, de Wolf GS, Versteegt M, Schie PE.

AIM: To determine the test-retest reliability and construct validity of a novel 6-Minute Racetracer Test (6MRT) in children and youth with cerebral palsy (CP) classified as Gross Motor Function Classification System (GMFCS) levels III and IV. The racetracer is a step-propelled tricycle. METHODS: The participants were 38 children and youth with CP (mean age 11 y 2 m, SD 3 y 7 m; GMFCS III, n = 19; IV, n = 19). Racetracer capability was determined as the distance covered during the 6MRT on three occasions. The intraclass correlation coefficient (ICC), standard error of measurement (SEM), and smallest detectable differences (SDD) were calculated to assess test-retest reliability. RESULTS: The ICC for tests 2 and 3 were 0.89 (SDD 37%; 147 m) for children in level III and 0.91 for children in level IV (SDD 52%; 118 m). When the average of two separate test occasions was used, the SDDs were reduced to 26% (104 m; level III) and 37% (118 m; level IV). For tests 1 to 3, the mean distance covered increased from 345 m (SD 148 m) to 413 m (SD 137 m) for children in level III, and from 193 m (SD 100 m) to 239 m (SD 148 m) for children in level IV. CONCLUSIONS: Results suggest high test-retest reliability. However, large

SDDs indicate that a single 6MRT measurement is only useful for individual evaluation when large improvements are expected, or when taking the average of two tests. The 6MRT discriminated the distance covered between children and youth in levels III and IV, supporting construct validity.

[PMID: 27314415](#)

### **8. Phys Ther. 2016 Jun 16. [Epub ahead of print]**

Effectiveness of Rehabilitation Interventions to Improve Gait Speed in Children With Cerebral Palsy: Systematic Review and Meta-analysis.

Moreau NG, Bodkin AW, Bjornson K, Hobbs A, Soileau M, Lahasky K.

**BACKGROUND:** Children with cerebral palsy (CP) have decreased gait speeds, which can negatively impact participation and quality of life. However, evidence for effective rehabilitation interventions to improve gait speed remains unclear. **PURPOSE:** To determine the effectiveness of interventions for improving gait speed in ambulatory children with CP. **DATA SOURCES:** MEDLINE, CINAHL, ERIC, and PEDro were searched from inception through April 2014. **STUDY SELECTION:** Randomized controlled trials (RCTs) or experimental designs with a comparison group; included a physical therapy or rehabilitation intervention for children with CP; and reported gait speed as an outcome measure. **DATA EXTRACTION:** Methodological quality was assessed by PEDro scores. Means, standard deviations, and change scores for gait speed were extracted. General study information and dosing parameters of the intervention were recorded (frequency, duration, intensity, and volume). **DATA SYNTHESIS:** 24 studies were included. Three categories of interventions were identified: gait training (n=8), resistance training (n=9), and miscellaneous (n=7). Meta-analysis showed that gait training was effective in increasing gait speed with a standardized effect size of 0.92 (95% CI: 0.19 to 1.66; p = 0.01) while resistance training was shown to have a negligible effect (effect size = 0.06; 95% CI: -0.12 to 0.25; p = 0.51). Effect sizes from negative to large were reported for studies in the miscellaneous category. **LIMITATIONS:** Gait speed was the only outcome measure analyzed. **CONCLUSIONS:** Gait training was the most effective intervention in improving gait speed for ambulatory children with CP. Strength training, even if properly dosed, was not shown to be effective in improving gait speed. Velocity training, EMG biofeedback training, and whole-body vibration were effective in improving gait speed in individual studies and warrant further investigation.

[PMID: 27313240](#)

### **9. Dev Med Child Neurol. 2016 Jul;58(7):780-1. doi: 10.1111/dmcn.13016.**

Prevalence of symptoms associated with respiratory illness in children and young people with cerebral palsy.

Blackmore AM, Bear N, Blair E, Gibson N, Jalla C, Langdon K, Moshovis L, Steer K, Wilson AC.

[PMID: 27307196](#)

### **10. Dev Neurorehabil. 2016 Jun 17:1-6. [Epub ahead of print]**

Construction and validation of the fatigue impact and severity self-assessment for youth and young adults with cerebral palsy.

Brunton LK, Bartlett DJ.

**PURPOSE:** The Fatigue Impact and Severity Self-Assessment (FISSA) was created to assess the impact, severity, and self-management of fatigue for individuals with cerebral palsy (CP) aged 14-31 years. **METHODS:** Items were generated from a review of measures and interviews with individuals with CP. Focus groups with health-care professionals were used for item reduction. A mailed survey was conducted (n=163/367) to assess the factor structure, known-groups validity, and test-retest reliability. **RESULTS:** The final measure contained 31 items in two factors and discriminated between individuals expected to have different levels of fatigue. Individuals with more functional abilities reported less fatigue (p < 0.002) and those with higher pain reported higher fatigue (p < 0.001). The FISSA was shown to have adequate test-retest reliability, intraclass correlation coefficient (ICC)(3,1)=0.74 (95% confidence interval [CI] 0.53-0.87). **CONCLUSIONS:** The FISSA valid and reliable for individuals with CP. It allows for identification of the activities that may be compromised by fatigue to enhance collaborative goal setting and intervention planning.

[PMID: 27315589](#)

**11. Disabil Health J. 2016 May 3. pii: S1936-6574(16)30045-0. doi: 10.1016/j.dhjo.2016.04.006. [Epub ahead of print]**

Quality of life in young adults with cerebral palsy.

Jiang B, Walstab J, Reid SM, Davis E, Reddihough D.

**BACKGROUND:** Little is known about the quality of life (QOL) of young adults with cerebral palsy. **OBJECTIVE/HYPOTHESIS:** This cross-sectional analysis compares the QOL of a cohort of young Australian adults with CP with a cohort of able-bodied peers to explore the relationship between QOL and impairments, functioning, and social participation. **METHODS:** Young adults identified from the Victorian Cerebral Palsy Register were invited to complete a survey about QOL, gross motor function, independence in self-care, and social participation. QOL was assessed with the Quality of Life Instrument for Young Adults (YAQOL). A general population sample of young North American adults, who had completed the YAQOL was selected for comparison. **RESULTS:** Surveys and consent forms were completed by 335 young adults or their proxies, an overall participation rate of 63% of those located. The mean age of the study participants was 24.7 [s.d = 2.8] years; 51% were male and 49% female. Two hundred and seven (62%) of the 335 participants self-reported their QOL. When compared with the general population sample, self-reporting participants had similar QOL scores for the social relationship and environmental context domains ( $p > 0.05$ ), while QOL scores were lower for the physical health, psychological well-being, and role function domains ( $p < 0.001$ ). There was no association between psychological well-being and variables related to body structure and gross motor function in young adults with CP. **CONCLUSIONS:** Contrary to the assumption that young adults with severe CP have low psychosocial well-being, it is apparent that these individuals can have good psychosocial well-being regardless of their disability.

[PMID: 27302534](#)

**12. Disabil Rehabil. 2016 Jun 13:1-8. [Epub ahead of print]**

Defining mild, moderate, and severe pain in young people with physical disabilities.

Miró J, de la Vega R, Solé E, Racine M, Jensen MP, Gálan S, Engel JM.

**PURPOSE:** The purpose of this study is to identify the cutoffs that are most suitable for classifying average and worst pain intensity as being mild, moderate, or severe in young people with physical disabilities. **METHOD:** Survey study using a convenience sample of 113 young people (mean age = 14.19; SD = 2.9; age range: 8-20) with physical disabilities (namely, spinal cord injury, cerebral palsy, spina bifida, limb deficiency (acquired or congenital), or neuromuscular disease). **RESULTS:** The findings support a non-linear association between pain intensity and pain interference. In addition, the optimal cutoffs for classifying average and worst pain as mild, moderate, or severe differed. For average pain, the best cutoffs were the following: 0-3 for mild, 4-6 for moderate, and 7-10 for severe pain, whereas the optimal classification for worst pain was 0-4 for mild, 5-6 for moderate, and 7-10 for severe pain. **CONCLUSIONS:** The findings provide important information that may be used to help make decisions regarding pain treatment in young people with disabilities and also highlight the need to use different cutoffs for classifying pain intensity in young people with disabilities than those that have been suggested for adults with chronic pain. **Implications for rehabilitation** Most clinical guidelines make treatment recommendations based on classifications of pain intensity as being mild, moderate, and severe that do not have a clear cut association with pain intensity ratings. Cutoffs that are deemed to be the most appropriate for classifying pain intensity as mild, moderate, and severe appear to depend, at least in part, on the pain population that is being studied and pain domain that is being used. This work helps to advance our knowledge regarding the meaning of pain intensity ratings in young people with physical disabilities. Clinicians can use this information to make empirically guided decisions regarding when to intervene in young people with disabilities and chronic pain.

[PMID: 27291566](#)

**13. Eur J Paediatr Neurol. 2016 May 27. pii: S1090-3798(16)30069-1. doi: 10.1016/j.ejpn.2016.05.015. [Epub ahead of print]**

Deep brain stimulation in cerebral palsy: Challenges and opportunities.

Koy A, Timmermann L.

Cerebral palsy (CP) is the most common cause for acquired dystonia in childhood. Pharmacological treatment is often unsatisfactory and side effects are frequently dose-limiting. Data on outcome of DBS in paediatric patients with dyskinetic CP is very limited and heterogeneous. Reasons for the variability in responses are not entirely known yet. Interestingly, some CP-

patients seem to improve subjectively on pallidal stimulation but without measurable changes in impairment scales. Besides dystonia scales, the use of sensitive age-dependent assessments tools is therefore reasonable to capture the full effect. As the course of disease duration as well as the age at operation seem to correlate with DBS outcome in patients with dystonia, DBS at an early stage of development might be beneficial for some of these patients. For the future, well-conducted trials as well as data collection in the international registry is of major importance to increase knowledge about DBS in CP patients, especially those implanted at a young age. Furthermore, selection criteria and guidelines or treatment standards are needed to improve the service for children with dyskinetic CP - especially in light of unsatisfactory medical treatment options.

[PMID: 27289260](#)

**14. J Med Case Rep. 2016 Jun 15;10:157. doi: 10.1186/s13256-016-0920-9.**

Clinical motion analyses over eight consecutive years in a child with crouch gait: a case report.

Butler EE, Steele KM, Torburn L, Gamble JG, Rose J.

**BACKGROUND:** This case report provides a unique look at the progression of crouch gait in a child with cerebral palsy over an 8-year time period, through annual physical examinations, three-dimensional gait analyses, and evaluation of postural balance. Our patient received regular botulinum toxin-A injections, casting, and physical therapy but no surgical interventions. **CASE PRESENTATION:** A white American boy with spastic diplegic cerebral palsy was evaluated annually by clinical motion analyses, including physical examination, joint kinematics, electromyography, energy expenditure, and standing postural balance tests, from 6 to 13 years of age. These analyses revealed that the biomechanical factors contributing to our patient's crouch gait were weak plantar flexors, short and spastic hamstrings, moderately short hip flexors, and external rotation of the tibiae. Despite annual recommendations for surgical lengthening of the hamstrings, the family opted for non-surgical treatment through botulinum toxin-A injections, casting, and exercise. Our patient's crouch gait improved between ages 6 and 9, then worsened at age 10, concurrent with his greatest body mass index, increased plantar flexor weakness, increased standing postural sway, slowest normalized walking speed, and greatest walking energy expenditure. Although our patient's maximum knee extension in stance improved by 14 degrees at 13 years of age compared to 6 years of age, peak knee flexion in swing declined, his ankles became more dorsiflexed, his hips became more internally rotated, and his tibiae became more externally rotated. From 6 to 9 years of age, our patient's minimum stance-phase knee flexion varied in an inverse relationship with his body mass index; from 10 to 13 years of age, changes in his minimum stance-phase knee flexion paralleled changes in his body mass index. **CONCLUSIONS:** The motor deficits of weakness, spasticity, shortened muscle-tendon lengths, and impaired selective motor control were highlighted by our patient's clinical motion analyses. Overall, our patient's crouch gait improved mildly with aggressive non-operative management and a supportive family dedicated to regular home exercise. The annual clinical motion analyses identified changes in motor deficits that were associated with changes in the child's walking pattern, suggesting that these analyses can serve to track the progression of children with spastic cerebral palsy.

[PMID: 27301473](#)

**15. J Phys Ther Sci. 2016 May;28(5):1611-3. doi: 10.1589/jpts.28.1611. Epub 2016 May 31.**

Partial correlation between lower muscle thickness, 10-meter walk test, and the timed up & go test in children with spastic cerebral palsy.

Yun CK, Kim WH, Kim SG.

[Purpose] The purpose of this study was to examine the correlation between lower extremity muscle thickness and gait ability through the 10-meter walk and timed up and go tests. [Subjects and Methods] A total of 28 children (20 males and 8 females) with spastic cerebral palsy undergoing physical therapy at D hospital in D city, South Korea participated in this study. Partial correlation analysis was performed to analyze the correlation between lower extremity muscle thickness and gait ability (10-meter walk test and timed up and go test). [Results] There was a positive correlation between muscle thickness and the 10-meter walk test (RF=0.41 and VL=0.52). Correlation between the muscle thickness and the timed up and go had a negative correlation (VL=-0.45, MG=-0.51, and LG=-0.39). [Conclusion] In children with cerebral palsy, knee extensor muscles that are more developed increased gait ability and calf muscles that are more developed increased sit to stand ability.

[PMID: 27313383](#)

**16. J Physiother. 2016 Jun 9, pii: S1836-9553(16)30004-2. doi: 10.1016/j.jphys.2016.05.002. [Epub ahead of print]**

Creating early opportunities to learn and move for infants with cerebral palsy.

Spittle A, Kwong A.

[PMID: 27292611](#)

## Prevention and Cure

### 17. *Stem Cell Rev.* 2016 Jun 10. [Epub ahead of print]

A Dichotomy of Information-Seeking and Information-Trusting: Stem Cell Interventions and Children with Neurodevelopmental Disorders.

Sharpe K, Di Pietro N, Jacob KJ, Illes J.

Parents and primary caregivers of children with Cerebral Palsy (CP) and Autism Spectrum Disorder (ASD) are faced with difficult treatment choices and management options for their children. The potential of stem cell technologies as an interventional strategy for CP and ASD has gained attention in the last decade. Information about these interventions varies in quality, resulting in a complex landscape for parent decision making for a child's care. Further complicating this landscape are clinics that advertise these interventions as a legitimate treatment for a fee. In this study, we surveyed individuals who considered taking their child with ASD or CP abroad for stem cell interventions on their use of different sources of stem cell related health information and their level of trust in these sources. Participants reported that while the Internet was their most frequent source of information, it was not well-trusted. Rather, information sources trusted most were researchers and the science journals in which they publish, other parents of children with CP and ASD, and healthcare providers. These findings highlight a dichotomy between information-seeking preferences and information-trusted sources. We discuss the challenges of health science communication and present innovative opportunities to increase communication with trusted and reliable sources as part of an integrated multi-pronged approach.

[PMID: 27286955](#)

### 18. *Exp Neurol.* 2016 Jun 15. pii: S0014-4886(16)30182-0. doi: 10.1016/j.expneurol.2016.06.017. [Epub ahead of print]

Preterm white matter brain injury is prevented by early administration of umbilical cord blood cells.

Li J, Yawno T, Sutherland A, Loose J, Nitsos I, Bischof R, Castillo-Melendez M, McDonald CA, Wong FY, Jenkin G, Miller SL.

Infants born very preterm are at high risk for neurological deficits including cerebral palsy. In this study we assessed the neuroprotective effects of umbilical cord blood cells (UCBCs) and optimal administration timing in a fetal sheep model of preterm brain injury. 50 million allogeneic UCBCs were intravenously administered to fetal sheep (0.7 gestation) at 12h or 5d after acute hypoxia-ischemia (HI) induced by umbilical cord occlusion. The fetal brains were collected at 10d after HI. HI (n=7) was associated with reduced number of oligodendrocytes (Olig2+) and myelin density (CNPase+), and increased density of activated microglia (Iba-1+) in cerebral white matter compared to control fetuses (P<0.05). UCBCs administered at 12h, but not 5d after HI, significantly protected white matter structures and suppressed cerebral inflammation. Activated microglial density showed a correlation with decreasing oligodendrocyte number (P<0.001). HI caused cell death (TUNEL+) in the internal capsule and cell proliferation (Ki-67+) in the subventricular zone compared to control (P<0.05), while UCBCs at 12h or 5d ameliorated these effects. Additionally, UCBCs at 12h induced a significant systemic increase in interleukin-10 at 10d, and reduced oxidative stress (malondialdehyde) following HI (P<0.05). UCBC administration at 12h after HI reduces preterm white matter injury, via anti-inflammatory and antioxidant actions.

[PMID: 27317990](#)

### 19. *Dev Med Child Neurol.* 2016 Jul;58(7):721-7. doi: 10.1111/dmcn.13030. Epub 2016 Jan 27.

Prediction of neuromotor outcome in infants born preterm at 11 years of age using volumetric neonatal magnetic resonance imaging and neurological examinations.

Setänen S, Lehtonen L, Parkkola R, Aho K, Haataja L; PIPARI Study Group.

AIM: To study the prognostic value of volumetric brain magnetic resonance imaging (MRI) at term equivalent age (TEA) and neurological examinations at TEA and at 2 years of corrected age for long-term neuromotor outcome in infants born very preterm. METHOD: A total of 98 infants born very preterm were included. Structural and volumetric brain MRI and the Dubowitz

neurologic examination were done at TEA. The Hammersmith Infant Neurological Examination (HINE) was performed at 2 years of corrected age. The Touwen examination was used for the assessment of minor neurological dysfunction (MND) at the age of 11 years. RESULTS: Of all children (median birthweight 1083g [quartiles 820, 1300]; gestational age 28 5/7wks [26 4/7, 30 2/7]), 41 had simple MND, 11 had complex MND (cMND), and eight had cerebral palsy (CP). The negative and positive predictive value of structural brain MRI for cMND or CP was 88% and 50% respectively. Reduced volumes of total brain tissue, frontal lobes, basal ganglia and thalami, and cerebellum associated with cMND or CP. The results of the Dubowitz neurologic examination and the HINE correlated with the Touwen examination. INTERPRETATION: Structural and volumetric MRI at TEA and structured neurological examinations predict long-term neuromotor outcome in infants born preterm.

[PMID: 27307195](#)

## 20. Curr Drug Targets. 2016 Jun 14. [Epub ahead of print]

Aligning animal models of clinical germinal matrix hemorrhage, from basic correlation to therapeutic approach.

Lekic T, Klebe DW, Pichon P, Brankov K, Sultan S, McBride DW, Casel D, Al-Bayati A, Ding Y, Tang J, Zhang JH.

Germinal matrix hemorrhage is a leading cause of mortality and morbidity from prematurity. This brain region is vulnerable to bleeding and re-bleeding within the first 72 hours of preterm life. Cerebroventricular expansion of blood products contributes to the mechanisms of brain injury. Consequences include lifelong hydrocephalus, cerebral palsy, and intellectual disability. Unfortunately little is known about the therapeutic needs of this patient population. Potential therapeutic approaches identified in pre-clinical investigations include corticosteroid therapy, iron chelator administration, and transforming growth factor- $\beta$  pathway modulation, which all warrant further investigation. Thus, effective preclinical modeling is essential for elucidating and evaluating novel therapeutic approaches, ahead of clinical consideration.

[PMID: 27307149](#)

## 21. Ann Agric Environ Med. 2016 Jun 2;23(2):259-63. doi: 10.5604/12321966.1203887.

Epidemiological analysis of diseases of children and adolescents requiring neurological and mobility rehabilitation in the Świętokrzyskie Rehabilitation Center in Czarniecka Góra, Poland.

Grabowski ML, Kosińska B, Knap JP, Lewandowski Z.

INTRODUCTION AND OBJECTIVE: Epidemiological analysis of the dynamics of admissions and patient characteristics is presented concerning 5,955 children and adolescents (3-18 years of age) hospitalized in 2007-2013 with neurological and mobility diseases in Świętokrzyskie Rehabilitation Centre (ŚRC) in southern Poland. MATERIALS AND METHOD: Within the period of 7 years, 18,647 patients were admitted to the ŚRC, of whom 9,546 were admitted to the daily ward and 9,109 to the stationary wards. 5,955 were children and adolescents aged 3-18, 1,499 were children aged 3-13 and almost three times more were patients aged 14-18. The correlation between the number of admissions in each year and the number of those hospitalized depending on the age and diagnosis was examined. RESULTS: In the discussed period, in both age ranges, the group of deforming dorsopathies dominated, while cerebral palsy was the second most common cause of hospitalization, and the and post-traumatic disorder the smallest number. In the diagnoses of cerebral palsy and post-traumatic disease, boys constituted most of the hospitalized. In contrast, girls dominated in the group of deforming dorsopathies. DISCUSSION: Analysis of the material of 5,955 patients revealed a number of quantitative data which assisted in the analysis of the epidemiological situation of this group of diseases - necessary for the planning of highly specialized treatment and rehabilitation. The greatest needs in terms of admissions to the ŚRC concerned the group of adolescents aged 14-18. The results of combined rehabilitation indicated the full use of places in the Świętokrzyskie Rehabilitation Center and also indicated the need for similar provincial and even regional centres.

[PMID: 27294629](#)

**22. Eur J Paediatr Neurol. 2016 Jun 2. pii: S1090-3798(16)30075-7. doi: 10.1016/j.ejpn.2016.05.018. [Epub ahead of print]**

The association between antioxidant enzyme polymorphisms and cerebral palsy after perinatal hypoxic-ischaemic encephalopathy.

Esih K, Goričar K, Dolžan V, Renner-Primec Z.

**BACKGROUND:** Hypoxic-ischaemic perinatal brain injury leads to the formation of reactive oxygen species (ROS) and the resultant cell and tissue damage may cause neurological sequelae such as cerebral palsy and/or epilepsy. A decrease in the capacity for defending against ROS may increase the susceptibility to cerebral palsy. The aim of this study was to investigate the impact of common functional polymorphisms in the antioxidant genes SOD2, GPX1 and CAT, associated with a decreased capacity for defending against ROS, in patients with perinatal hypoxic-ischaemic encephalopathy (HIE). **METHODS:** 80 patients previously diagnosed with perinatal HIE were included. Genomic DNA was isolated from buccal swabs and genotyped for SOD2 rs4880, GPX1 rs1050450 and CAT rs1001179 using real-time PCR-based methods. **RESULTS:** Among patients with neonatal HIE, carriers of at least one polymorphic CAT rs1001179 T allele were significantly associated with development of cerebral palsy compared to non-carriers (univariate logistic regression,  $p = 0.026$ ; OR = 3.36; 95% CI = 1.16-9.76). This difference remained statistically significant after accounting for prematurity. The investigated SOD2 and GPX1 polymorphisms were not associated with cerebral palsy after perinatal HIE. **CONCLUSION:** CAT rs1001179 polymorphism could be used to identify children that have a higher susceptibility to cerebral palsy after perinatal HIE.

[PMID: 27302388](#)

**23. Neurobiol Dis. 2016 Jun 15. pii: S0969-9961(16)30140-1. doi: 10.1016/j.nbd.2016.06.007. [Epub ahead of print]**

EphB3 signaling propagates synaptic dysfunction in the traumatic injured brain.

Perez EJ, Cepero ML, Perez SU, Coyle JT, Sick TJ, Liebl DJ.

Traumatic brain injury (TBI), ranging from mild concussion to severe penetrating wounds, can involve brain regions that contain damaged or lost synapses in the absence of neuronal death. These affected regions significantly contribute to sensory, motor and/or cognitive deficits. Thus, studying the mechanisms responsible for synaptic instability and dysfunction is important for protecting the nervous system from the consequences of progressive TBI. Our controlled cortical impact (CCI) injury produces ~20% loss of synapses and mild changes in synaptic protein levels in the CA3-CA1 hippocampus without neuronal losses. These synaptic changes are associated with functional deficits, indicated by >50% loss in synaptic plasticity and impaired learning behavior. We show that the receptor tyrosine kinase EphB3 participates in CCI injury-induced synaptic damage, where EphB3<sup>-/-</sup> mice show preserved long-term potentiation and hippocampal-dependent learning behavior as compared with wild type (WT) injured mice. Reduced synaptic dysfunction in the absence of EphB3 results from attenuation in CCI injury-induced synaptic losses and reduced d-serine levels compared with WT injured mice. Together, these findings suggest that EphB3 signaling plays a deleterious role in disrupting synaptic stability and plasticity after TBI.

[PMID: 27317833](#)