Cerebral palsy research news

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CP Alliance Chair of Cerebral Palsy Research

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Interventions and Management

1. Correlation between scapular alignment and upper extremity function in children with hemiparetic cerebral palsy
Mahmoud Mohammed Metwaly, Elham Elsayed Salem, Mai Elsayed Abbass

Physiother Theory Pract. 2022 Apr 17;1-8. doi: 10.1080/09593985.2022.2066587. Online ahead of print.

Objectives: To investigate the relationship between scapular alignment and upper extremity function. Methods: Eighty-five children (63 boys and 22 girls) with spastic hemiplegic cerebral palsy aged 3 to 6 years were included in the study. Scapular upward rotation was assessed using Postural Zone software, and upper extremity function was assessed using the Pediatric Arm Function Test. Results: There was a significant difference ($p = .0001$) in the degree of upward scapular rotation between less affected and affected sides (-41.78 ± 4.87 and -26.42 ± 6.34, respectively). There was a significant difference ($p = .0001$) between the function of the upper extremity of the affected side and the less affected sides (48.15 ± 14.37, 62.1 ± 6.62, respectively). Pearson Correlation Coefficient (r) was calculated, and there was a strong negative significant correlation between the degree of scapular upward rotation of the affected side, a unilateral score of the affected side, and the total score of the Pediatric Arm Function Test ($r = -0.976$, $p = .0001$ and $r = -0.973$, $p = .0001$, respectively). The correlation between symmetry index and total score of the Pediatric Arm Function Test was a strong positive significant correlation ($r = 0.946$, $p = .0001$). Conclusion: The degree of upward scapular rotation was less on the affected side. Scapular alignment and symmetry may contribute to upper extremity function in children with hemiplegic cerebral palsy. Clinically, correction of scapular deviations may be considered in the rehabilitation program for children with hemiplegic cerebral palsy. This study suggests further experimental studies to find the cause and effect.

PMID: 35430957

2. Treatment of upper extremity palsies, gunshot wounds and scaphoid nonunion: my preferred approaches
Shai Luria

J Hand Surg Eur Vol. 2022 Apr 17;17531934221092569. doi: 10.1177/17531934221092569. Online ahead of print.

The article reviews key considerations and our preferred methods in treating upper extremity palsies, gunshot wounds and scaphoid nonunion. For these three difficult conditions, I highlight the importance of a team approach when treating upper extremity neuromuscular disease, flexibility and creativity when treating gunshot wounds, and my personal protocol for dealing with scaphoid fracture nonunions. Level of evidence: V.

PMID: 35435025

3. Proximal Femoral Screw Hemiepiphysiodesis in Children With Cerebral Palsy Improves the Radiographic

Measures of Hip Subluxation
Allyson M Zakrzewski, Jacob R Carl, James J McCarthy

J Pediatr Orthop. 2022 Apr 25. doi: 10.1097/BPO.0000000000002152. Online ahead of print.

Background: Proximal femoral screw hemiepiphysiodesis (PFSH) is a promising technique for treatment of hip subluxation in children with cerebral palsy (CP). The aim of this study is to report radiographic outcomes of PFSH and to evaluate its role in changing the natural history of hip displacement in children with CP. Methods: This is a single center retrospective chart review of children with CP that underwent PFSH with at least 2 years of radiographic follow-up. Demographic information, surgical details, complications, additional surgical procedures, and need for screw exchange were recorded. Radiographs were assessed for migration percentage (MP), neck shaft angle (NSA), head shaft angle (HSA), and articular trochanter distance preoperatively as well as at 6 months, 1 year, 2 year, and latest follow-up postoperatively. Hips were divided into group 1 (no previous hip surgery) and group 2 (PFSH performed after hip reconstruction). Hips with 2 years of preoperative radiographic data were included in the natural history cohort. Results: Twenty-three patients (44 hips) met inclusion criteria with an average age of 7.3±1.7 years and a mean follow-up of 33.5 months. Group 1 and group 2 had 32 and 12 hips, respectively. Group 1 had significant improvement in all parameters (ΔMP=5%, ΔNSA=13 degrees, ΔHSA=15 degrees) group 2 showed improvements in NSA and HSA (ΔNSA=4 degrees ΔHSA=8 degrees) with only HSA reaching significance and MP remaining unchanged. All radiographic measurements worsened in the 2 years before surgery (N=25, natural history group) and improved after PFSH. Screw exchange occurred in 12 hips (27.2%) at an average of 33 months (range 27 to 42 mo) with 2 hips also undergoing pelvic osteotomy at that time. Three hips had a MP >50% at follow-up with 2 hips in group 1 undergoing hip reconstruction. No complications were noted. Conclusion: PFSH effectively alters proximal femoral growth and can improve hip subluxation in children with CP. Screws often need to be exchanged and hips should be carefully monitored.

PMID: 35452015

4. Interrelationships of Touch and Proprioception with Motor Impairments in Individuals with Cerebral Palsy: A Systematic Review
Camila A S Santana, Mariana M Dos Santos, Ana Carolina de Campos

Percept Mot Skills. 2022 Apr 22;315125221093904. doi: 10.1177/00315125221093904. Online ahead of print.

Considering that somatosensory impairments may impact motor performance in individuals with cerebral palsy (CP), a better understanding of these relations is relevant to planning interventions. To synthesize research evidence to date on the interrelationships between the somatosensory functions of touch and proprioception with motor functions in persons with CP, we systematically searched Embase, CINAHL, PsycINFO, and Medline databases for studies relating these variables that were published in English from the inception of these databases to November 2020. We targeted the following content categories in our literature search: (a) cerebral palsy; (b) sensory functions; (c) tactile functions; (d) proprioception functions; and (e) motor functions. The selection, data extraction, and methodological quality assessment of these studies were performed in duplicate. We retrieved and analyzed information regarding the studies' methodological approaches and synthesized results. The 11 studies that met our inclusion criteria showed that, in individuals with CP, impairments in tactile discrimination, proprioception, and stereognosis are related to motor functions in terms of overall manual ability, grip strength, postural control and locomotion. Thus, clinical practitioners should attend to somatosensory aspects of motor impairment in individuals with CP. More research is needed to clarify the direction of these associations.

PMID: 35452588

5. Asymmetry in sleep spindles and motor outcome in infants with unilateral brain injury
Viviana Marchi, Riccardo Rizzi, Päivi Nevalainen, Federico Melani, Silvia Lori, Camilla Antonelli, Sampsa Vanhatalo, Andrea Guzzetta

Dev Med Child Neurol. 2022 Apr 20. doi: 10.1111/dmcn.15244. Online ahead of print.

Aim: To determine whether interhemispheric difference in sleep spindles in infants with perinatal unilateral brain injury could link to a pathological network reorganization that underpins the development of unilateral cerebral palsy (CP). Method: This was a multicentre retrospective study of 40 infants (19 females, 21 males) with unilateral brain injury. Sleep spindles were detected and quantified with an automated algorithm from electroencephalograph records performed at 2 months to 5 months of age. The clinical outcomes after 18 months were compared to spindle power asymmetry (SPA) between hemispheres in

different brain regions. Results: We found a significantly increased SPA in infants who later developed unilateral CP (n=13, with the most robust interhemispheric difference seen in the central spindles. The best individual-level prediction of unilateral CP was seen in the centro-occipital spindles with an overall accuracy of 93%. An empiric cut-off level for SPA at 0.65 gave a positive predictive value of 100% and a negative predictive value of 93% for later development of unilateral CP. Interpretation: Our data suggest that automated analysis of interhemispheric SPA provides a potential biomarker of unilateral CP at a very early age. This holds promise for guiding the early diagnostic process in infants with a perinatally identified brain injury.

PMID: 35445398

6. Assessment of the relationship between Val66Met BDNF polymorphism and the effectiveness of gait rehabilitation in children and adolescents with cerebral palsy
Bartosz Bagrowski, Marta Czapracka, Joanna Kraśny, Michał Prendecki, Jolanta Dorszewska, Marek Jóźwiak

Acta Neurobiol Exp (Wars). 2022;82(1):1-11. doi: 10.55782/ane-2022-001.

Cerebral palsy (CP) is associated with the non-progressive damage of upper motor neurons, which is manifested by a variety of symptoms, particularly motor and functional deficits. During the rehabilitation of patients with CP, attention is paid to improving mobility which can have a significant impact on the child's development. The effectiveness of rehabilitation depends on the plasticity of the nervous system, which may be genetically determined. Of importance are the various polymorphisms of the brain derived neurotrophic factor (BDNF) gene. It has been shown that the Val/Val genotype may predispose children to greater improvements in function and its maintenance. However, subjects with the Met allele showed a reduced tendency to improve their motor functions but had significantly better results on indirect tests assessing gait function. Fifty subjects with CP participated in this study. They were divided into two groups by genotype and examined on their rehabilitation progress in terms of improved gait function. The results correlated with other studies describing the relationship between the BDNF genotype and learning motor functions in CP, and with numerous studies on the relationship between BDNF genotype and neuroplasticity in stroke patients. This research provides a basis for the identification of genetic biomarkers in patients with CP which can be used to predict the effects of rehabilitation therapy and help with the development of personalized treatments.

PMID: 35451419

7. A Mobile Cable-Tensioning Platform to Improve Crouch Gait in Children with Cerebral Palsy
Seongyun Cho, Kun-Do Lee, Hyung-Soon Park

IEEE Trans Neural Syst Rehabil Eng. 2022 Apr 20;PP. doi: 10.1109/TNSRE.2022.3167472. Online ahead of print.

Gait impairment represented by crouch gait is the main cause of decreases in the quality of lives of children with cerebral palsy. Various robotic rehabilitation interventions have been used to improve gait abnormalities in the sagittal plane of children with cerebral palsy, such as excessive flexion in the hip and knee joints, yet in few studies have postural improvements in the coronal plane been observed. The aim of this study was to design and validate a gait rehabilitation system using a new cable-driven mechanism applying assist in the coronal plane. We developed a mobile cable-tensioning platform that can control the magnitude and direction of the tension vector applied at the knee joints during treadmill walking, while minimizing the inertia of the worn part of the device for less obstructing the natural movement of the lower limbs. To validate the effectiveness of the proposed system, three different treadmill walking conditions were performed by four children with cerebral palsy. The experimental results showed that the system reduced hip adduction angle by an average of $4.57 \pm 1.79°$ compared to unassisted walking. Importantly, we also observed improvements of hip joint kinematics in the sagittal plane, indicating that crouch gait can be improved by postural correction in the coronal plane. The device also improved anterior and lateral pelvic tilts during treadmill walking. The proposed cable-tensioning platform can be used as a rehabilitation system for crouch gait, and more specifically, for correcting gait posture with minimal disturbance to the voluntary movement.

PMID: 35442888

8. Application of the Gait Deviation Index to Study Gait Impairment in Adult Population With Spinal Cord Injury: Comparison With the Walking Index for Spinal Cord Injury Levels
Isabel Sinovas-Alonso, Diana Herrera-Valenzuela, Roberto Cano-de-la-Cuerda, Ana de Los Reyes-Guzmán, Antonio J Del-Ama, Ángel Gil-Agudo

Front Hum Neurosci. 2022 Apr 4;16:826333. doi: 10.3389/fnhum.2022.826333. eCollection 2022.

The Gait Deviation Index (GDI) is a multivariate measure of overall gait pathology based on 15 gait features derived from three-dimensional (3D) kinematic data. GDI aims at providing a comprehensive, easy to interpret, and clinically meaningful metric of overall gait function. It has been used as an outcome measure to study gait in several conditions: cerebral palsy (CP), post-stroke hemiparetic gait, Duchenne muscular dystrophy, and Parkinson's disease, among others. Nevertheless, its use in population with Spinal Cord Injury (SCI) has not been studied yet. The aim of the present study was to investigate the applicability of the GDI to SCI through the assessment of the relationship of the GDI with the Walking Index for Spinal Cord Injury (WISCI) II. 3D gait kinematics of 34 patients with incomplete SCI (iSCI) was obtained. Besides, 3D gait kinematics of a sample of 50 healthy volunteers (HV) was also gathered with Codamotion motion capture system. A total of 302 (iSCI) and 446 (HV) strides were collected. GDI was calculated for each stride and grouped for each WISCI II level. HV data were analyzed as an additional set. Normal distribution for each group was assessed with Kolmogorov-Smirnov tests. Afterward, ANOVA tests were performed between each pair of WISCI II levels to identify differences among groups ($p < 0.05$). The results showed that the GDI was normally distributed across all WISCI II levels in both iSCI and HV groups. Furthermore, our results showed an increasing relationship between the GDI values and WISCI II levels in subjects with iSCI, but only discriminative in WISCI II levels 13, 19, and 20. The index successfully distinguished HV group from all the individuals with iSCI. Findings of this study indicated that the GDI is not an appropriate multivariate walking metric to represent the deviation of gait pattern in adult population with iSCI from a normal gait profile when it is compared with the levels of walking impairment described by the WISCI II. Future work should aim at defining and validating an overall gait index derived from 3D kinematic gait variables appropriate for SCI, additionally taking into account other walking ability outcome measures.

PMID: 35444522

9. Investigation of neural and biomechanical impairments leading to pathological toe and heel gaits using neuromusculoskeletal modelling
Alice Bruel, Salim Ben Ghorbel, Andrea Di Russo, Dimitar Stanev, Stéphane Armand, Grégoire Courtine, Auke Ijspeert

J Physiol. 2022 Apr 20. doi: 10.1113/JP282609. Online ahead of print.

Key points: Pathological toe and heel gaits are commonly present in various conditions such as spinal cord injury, stroke or cerebral palsy. These conditions present various neural and biomechanical impairments and the cause-effect relationships between these impairments and pathological gaits are hard to establish clinically. Based on neuromechanical simulation, this study focuses on the plantarflexor muscles and builds a new reflex circuit controller to model and evaluate the potential effect of both neural and biomechanical impairments on gait. Our results suggest an important contribution of active reflex mechanisms in pathological toe gait. This "what if" based on neuromechanical modelling is thus deemed of great interest to target potential pathological gait causes. Abstract: This study investigates the pathological toe and heel gaits in human locomotion using neuromusculoskeletal modelling and simulation. In particular, it aims at investigating potential cause-effect relationships between biomechanical or neural impairments and pathological gaits. Toe and heel gaits are commonly present in spinal cord injury, stroke or cerebral palsy. Toe walking is mainly attributed to spasticity and contracture at plantarflexor muscles, whereas heel walking can be attributed to muscle weakness from biomechanical or neural origin. To investigate the effect of these impairments on gait, this study focuses on the soleus and gastrocnemius muscles as they contribute to ankle plantarflexion. We built a reflex circuit model on top of Geyer and Herr's work (2010) with additional pathways affecting the plantarflexor muscles. The SCONE software, which provides optimisation tools for 2D neuromechanical simulation of human locomotion, is used to optimise the corresponding reflex parameters and simulate healthy gait. We then modelled various bilateral plantarflexors biomechanical and neural impairments, and individually introduced them in the healthy model. We characterised the resulting simulated gaits as pathological or not by comparing ankle kinematics and ankle moment with the healthy optimised gait based on metrics used in clinical studies. Our simulations suggest that toe walking can be generated by hyperreflexia, whereas muscle and neural weaknesses induce partially heel gait. Thus, this "what if" approach is deemed of great interest as it allows the investigation of the effect of various impairments on gait and suggests an important contribution of active reflex mechanisms in pathological toe gait. Abstract figure legend Various biomechanical and neural impairments are individually modelled at the level of the plantarflexor muscles in a musculoskeletal model and a complex reflex circuit-based gait controller. For instance, as shown on the left, the plantarflexors spindle reflex gain (KS) is increased to mimic hyperreflexia. The gait controller is then optimised for each of the impaired condition and the resulting gaits are characterised as pathological gait based on ankle kinematics and ankle moment metrics used in clinical studies. Thus, this "what if" approach allows the investigation of the effect of various impairments on gait presented in the table on the right.

PMID: 35442531

10. Comparison of the Gait Biomechanical Constraints in Three Different Type of Neuromotor Damages
Silvia Minosse, Martina Favetta, Alberto Romano, Alessandra Pisano, Susanna Summa, Tommaso Schirinzi, Gessica Vasco,

Enrico Castelli, Maurizio Petrarca

Front Hum Neurosci. 2022 Mar 29;16:822205. doi: 10.3389/fnhum.2022.822205. eCollection 2022.

Background and objective: Absolute angle represents the inclination of a body segment relative to a fixed reference in space. This work compares the absolute and relative angles for exploring biomechanical gait constraints. Methods: Gait patterns of different neuromotor conditions were analyzed using 3D gait analysis: normal gait (healthy, H), Cerebral Palsy (CP), Charcot Marie Tooth (CMT) and Duchenne Muscular Dystrophy (DMD), representing central and peripheral nervous system and muscular disorders, respectively. Forty-two children underwent gait analysis: 10 children affected by CP, 10 children by CMT, 10 children by DMD and 12 healthy children. The kinematic and kinetic parameters were collected to describe the biomechanical pattern of participants' lower limbs. The absolute angles of thigh, leg and foot were calculated using the trigonometric relationship of the tangent. For each absolute series, the mean, range, maximum, minimum and initial contact were calculated. Kinematic and kinetic gait data were studied, and the results were compared with the literature. Results: Statistical analysis of the absolute angles showed how, at the local level, the single segments (thigh, leg and foot) behave differently depending on the pathology. However, if the lower limb is studied globally (sum of the kinematics of the three segments: thigh, leg and foot), a biomechanical constraint emerges. Conclusion: Each segment compensates separately for the disease deficit so as to maintain a global biomechanical invariance. Using a model of inter-joint co-variation could improve the interpretation of the clinical gait pattern.

PMID: 35422690

11. Early, Intensive, Lower Extremity Rehabilitation Shows Preliminary Efficacy After Perinatal Stroke: Results of a Pilot Randomized Controlled Trial
Caitlin Hurd, Donna Livingstone, Kelly Brunton, Allison Smith, Monica Gorassini, Man-Joe Watt, John Andersen, Adam Kirton, Jaynie F Yang

Neurorehabil Neural Repair. 2022 Apr 15;15459683221090931. doi: 10.1177/15459683221090931. Online ahead of print.

Background: Perinatal stroke injures motor regions of the brain, compromising movement for life. Early, intensive, active interventions for the upper extremity are efficacious, but interventions for the lower extremity remain understudied. Objective: To determine the feasibility and potential efficacy of ELEVATE-Engaging the Lower Extremity Via Active Therapy Early-on gross motor function. Methods: We conducted a single-blind, two-arm, randomized controlled trial (RCT), with the Immediate Group receiving the intervention while the Delay Group served as a 3-month waitlist control. A separate cohort living beyond commuting distance was trained by their parents with guidance from physical therapists. Participants were 8 months to 3 years old, with MRI-confirmed perinatal ischemic stroke and early signs of hemiparesis. The intervention was play-based, focused on weight-bearing, balance and walking for 1 hour/day, 4 days/week for 12 weeks. The primary outcome was the Gross Motor Function Measure-66 (GMFM-66). Secondary outcomes included steps and gait analyses. Final follow-up occurred at age 4. Results: Thirty-four children participated (25 RCT, 9 Parent-trained). The improvement in GMFM-66 over 12 weeks was greater for the Immediate than the Delay Group in the RCT (average change 3.4 units higher) and greater in younger children. Average step counts reached 1370-3750 steps/session in the last week of training for all children. Parent-trained children also improved but with greater variability. Conclusions: Early, activity-intensive lower extremity therapy for young children with perinatal stroke is feasible and improves gross motor function in the short term. Longer term improvement may require additional bouts of intervention.

PMID: 35427191

12. Speech and augmentative and alternative communication needs in young children with cerebral palsy
Mary Jo Cooley Hidecker

Dev Med Child Neurol. 2022 Apr 14. doi: 10.1111/dmcn.15232. Online ahead of print.

No abstract available

PMID: 35426117

13. Drooling outcome measures in paediatric disability: a systematic review
E Sforza, R Onesimo, C Leoni, V Giorgio, F Proli, F Notaro, E M Kuczynska, A Cerchiari, A Selicorni, D Rigante, G Zampino

Review Eur J Pediatr. 2022 Apr 20. doi: 10.1007/s00431-022-04460-5. Online ahead of print.

Drooling, or sialorrhea, is a common condition in patients with cerebral palsy, rare diseases, and neurodevelopmental disorders. The goal of this review was to identify the different properties of sialorrhea outcome measures in children. Four databases were analysed in search of sialorrhea measurement tools, and the review was performed according to the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement. The COnsensus-based Standards for the selection of health status Measurement INstruments (COSMIN) checklist was used for quality appraisal of the outcome measures. The initial search yielded 891 articles, 430 of which were duplicates. Thus, 461 full-text articles were evaluated. Among these, 21 met the inclusion criteria, reporting 19 different outcome measures that encompassed both quantitative measures and parent/proxy questionnaires. Conclusions: Among the outcome measures found through this review, the 5-min Drooling Quotient can objectively discriminate sialorrhea frequency in patients with developmental disabilities. The Drooling Impact Scale can be used to evaluate changes after treatment. The modified drooling questionnaire can measure sialorrhea severity and its social acceptability. To date, the tests proposed in this review are the only tools displaying adequate measurement properties. The acquisition of new data about reliability, validity, and responsiveness of these tests will confirm our findings. What is Known: • Although sialorrhea is a recognized problem in children with disabilities, especially those with cerebral palsy (CP), there is a lack of confidence among physicians in measuring sialorrhea. What is New: • Few sialorrhea measures are available for clinicians that may guide decision-making and at the same time have strong evidence to provide confidence in the results. • A combination of both quantitative measures and parent/proxy questionnaires might provide an adequate measurement of sialorrhea in children.

PMID: 35441248

14. Correlation between fatigue and quality of life self-reported by adolescents with cerebral palsy [Article in English, Portuguese]
Mariana Ceravolo Ferreira, Nathália Ribeiro Garcia, Maria Aparecida da Silva Vieira, Cejane Oliveira Martins Prudente, Maysa Ferreira Martins Ribeiro

Rev Bras Enferm. 2022 Apr 15;75(4):e20210716. doi: 10.1590/0034-7167-2021-0716. eCollection 2022.
Objectives: to investigate the correlation between fatigue and quality of life in adolescents with cerebral palsy who are susceptible to more significant fatigue and lower quality of life. Methods: cross-sectional study conducted with 101 adolescents with cerebral palsy. Instruments such as the Pediatric Quality of Life Inventory and Gross Motor Function Classification System were used, and Kolmogorov-Smirnov, Mann-Whitney, and Spearman tests were applied. Results: older adolescents self-reported higher fatigue levels, and female adolescents, quadriplegic, with worse motor function, older, and not attending school had lower quality of life scores. Higher fatigue levels correlated with lower quality of life in all domains ($p<0.01$), especially in tiredness (general and mental) and functioning (social, academic, and psychosocial). Conclusions: fatigue correlated negatively with the quality of life of adolescents with cerebral palsy, showing that the higher the level of fatigue, the more compromised is the adolescents' life.

PMID: 35442315

15. Classification, prevalence and integrated care for neurodevelopmental and child mental health disorders: A brief overview for paediatricians
Michael O Ogundele, Michael Morton

Review World J Clin Pediatr. 2022 Mar 9;11(2):120-135. doi: 10.5409/wjcp.v11.i2.120.

'Neurodevelopmental disorders' comprise a group of congenital or acquired long-term conditions that are attributed to disturbance of the brain and or neuromuscular system and create functional limitations, including autism spectrum disorder, attention deficit/ hyperactivity disorder, tic disorder/ Tourette's syndrome, developmental language disorders and intellectual disability. Cerebral palsy and epilepsy are often associated with these conditions within the broader framework of paediatric neurodisability. Co-occurrence with each other and with other mental health disorders including anxiety and mood disorders and behavioural disturbance is often the norm. Together these are referred to as neurodevelopmental, emotional, behavioural, and intellectual disorders (NDEBIDs) in this paper. Varying prevalence rates for NDEBID have been reported in developed countries, up to 15%, based on varying methodologies and definitions. NDEBIDs are commonly managed by either child health paediatricians or child/ adolescent mental health (CAMH) professionals, working within multidisciplinary teams alongside social care, education, allied healthcare practitioners and voluntary sector. Fragmented services are common problems for children and young people with multi-morbidity, and often complicated by sub-threshold diagnoses. Despite repeated reviews, limited consensus among clinicians about classification of the various NDEBIDs may hamper service

improvement based upon research. The recently developed "Mental, Behavioural and Neurodevelopmental disorder" chapter of the International Classification of Diseases-11 offers a way forward. In this narrative review we search the extant literature and discussed a brief overview of the aetiology and prevalence of NDEBID, enumerate common problems associated with current classification systems and provide recommendations for a more integrated approach to the nosology and clinical care of these related conditions.

PMID: 35433298

16. Altered spontaneous cortical activity predicts pain perception in individuals with cerebral palsy
Michael P Trevarrow, Anna Reelfs, Lauren R Ott, Samantha H Penhale, Brandon J Lew, Jessica Goeller, Tony W Wilson, Max J Kurz

Brain Commun. 2022 Apr 4;4(2):fcac087. doi: 10.1093/braincomms/fcac087. eCollection 2022.

Cerebral palsy is the most common paediatric neurological disorder and results in extensive impairment to the sensorimotor system. However, these individuals also experience increased pain perception, resulting in decreased quality of life. In the present study, we utilized magnetoencephalographic brain imaging to examine whether alterations in spontaneous neural activity predict the level of pain experienced in a cohort of 38 individuals with spastic diplegic cerebral palsy and 67 neurotypical controls. Participants completed 5 min of an eyes closed resting-state paradigm while undergoing a magnetoencephalography recording. The magnetoencephalographic data were then source imaged, and the power within the delta (2-4 Hz), theta (5-7 Hz), alpha (8-12 Hz), beta (15-29 Hz), low gamma (30-59 Hz) and high gamma (60-90 Hz) frequency bands were computed. The resulting power spectral density maps were analysed vertex-wise to identify differences in spontaneous activity between groups. Our findings indicated that spontaneous cortical activity was altered in the participants with cerebral palsy in the delta, alpha, beta, low gamma and high gamma bands across the occipital, frontal and secondary somatosensory cortical areas (all p FWE < 0.05). Furthermore, we also found that the altered beta band spontaneous activity in the secondary somatosensory cortices predicted heightened pain perception in the individuals with cerebral palsy ($P = 0.039$). Overall, these results demonstrate that spontaneous cortical activity within individuals with cerebral palsy is altered in comparison to their neurotypical peers and may predict increased pain perception in this patient population. Potentially, changes in spontaneous resting-state activity may be utilized to measure the effectiveness of current treatment approaches that are directed at reducing the pain experienced by individuals with cerebral palsy.

PMID: 35441137

17. Cardio-pulmonary-resuscitation for people who use a wheelchair and/or have an atypical chest shape: an educational intervention
Elisha M Deegan, Annette Saunders, Nathan J Wilson, Damhnat McCann

Disabil Rehabil. 2022 Apr 19;1-8. doi: 10.1080/09638288.2022.2062464. Online ahead of print.

Purpose: To determine the impact of the addition of information specific to people with atypical chest shapes and/or in a wheelchair during mandatory CPR classes on staff confidence to respond to emergency scenarios with these populations. Materials and methods: A pre-test post-test intervention study was conducted with staff from one of the largest disability organisations in Tasmania, Australia. Supplemented CPR and BLS classes were presented to participants. A purpose-designed questionnaire was completed pre, post, and six-months post after the training. Results: A significant rise in confidence post-training was demonstrated, and this was retained at the six-month time point. Time spent in the disability sector before the supplemented training or attendance at previous standard CPR classes did not have a significant effect on confidence levels before the supplemented training. Conclusions: Confidence is closely linked to willingness to act during emergency situations. Improved confidence may therefore result in improved willingness to act for people with disability, atypical chest shapes, and wheelchair users, thus improving health outcomes for these populations and providing this cohort with access to more equitable healthcare.IMPLICATIONS FOR REHABILITATIONGuidelines for undertaking CPR and BLS on people with atypical chest shapes and/or in a wheelchair are not currently available.Including information specific to people with atypical chest shapes and/or in a wheelchair during mandatory CPR classes increases staff confidence to respond to such situations.Supplementary disability-specific information can be successfully incorporated into existing CPR and BLS training.

PMID: 35438592

18. Botulinum Toxin Injection of the External Sphincter in Adults with Cerebral Palsy
Ruthie Su, Wade Bushman

Editorial J Urol. 2022 Apr 21;101097JU0000000000002710. doi: 10.1097/JU.0000000000002710. Online ahead of print.

No abstract available

PMID: 35446146

19. The brain-reading devices helping paralysed people to move, talk and touch
Liam Drew

Nature. 2022 Apr;604(7906):416-419. doi: 10.1038/d41586-022-01047-w.

No abstract available

PMID: 35444327

20. Supportive mobility device use across the life span by individuals with cerebral palsy: A qualitative study
Heather A Feldner, Deborah Gaebler-Spira, Varun Awasthi, Kristie Bjornson

Dev Med Child Neurol. 2022 Apr 15. doi: 10.1111/dmcn.15243. Online ahead of print.

Aim: To understand the mobility experiences, supportive mobility device (SMD) use, and desired participation outcomes of individuals with cerebral palsy (CP) across the life span, and describe how perspectives of rehabilitation care and professional resources may influence mobility decision-making processes and outcomes. Method: In the second phase of an overarching study, focus groups were conducted with 164 participants (68 individuals with CP; 32 females, 36 males; mean age 17y 8mo, SD 11y 11mo, range 3-68y), 74 caregivers (50 females, 24 males), and 22 healthcare providers (14 females, eight males) across four US cities. Sessions were audio-recorded, transcribed, and analysed using constant comparison. Results: Six themes emerged. Five presented across all stakeholder groups: (1) the system is broken; (2) equipment is simultaneously liberating and restricting; (3) adaptation across the life span; (4) designed for transport, not for living; and (5) sharing our stories and sharing resources. One theme (theme 6) was specific to healthcare providers: caught in the middle. Interpretation: This qualitative study underscores the simultaneous value and frustration associated with SMDs as described by the community with CP, and recognition among all stakeholders of the need to improve connections and resource networks within the community with CP to improve SMD design and provision processes across device types and across the life span for individuals with CP.

PMID: 35426449

21. The Effect of Constraint-Induced Movement Therapy Combined With Repetitive Transcranial Magnetic Stimulation on Hand Function in Preschool Children With Unilateral Cerebral Palsy: A Randomized Controlled Preliminary Study
Qianwen Wu, Tingting Peng, Liru Liu, Peishan Zeng, Yunxian Xu, Xubo Yang, Yiting Zhao, Chaoqiong Fu, Shiya Huang, Yuan Huang, Hongyu Zhou, Yun Liu, Hongmei Tang, Lu He, Kaishou Xu

Front Behav Neurosci. 2022 Apr 5;16:876567. doi: 10.3389/fnbeh.2022.876567. eCollection 2022.

Constraint-induced movement therapy (CIMT) combined with repetitive transcranial magnetic stimulation (rTMS) have shown great potential in improving function in schoolchildren with unilateral cerebral palsy attributed to perinatal stroke. However, the prospect of application in preschool children with unilateral cerebral palsy (UCP) attributed to various brain disorders remains unclear. In this prospective, assessor-blinded, randomized controlled study, 40 preschool children with UCP (aged 2.5-6 years) were randomized to receive 10 days of CIMT combined with active or sham rTMS. Assessments were performed at baseline, 2 weeks, and 6 months post-intervention to investigate upper limb extremity, social life ability, and perceived changes by parents and motor-evoked potentials. Overall, 35 participants completed the trial. The CIMT plus active stimulation group had greater gains in the affected hand function (range of motion, accuracy, and fluency) than the CIMT plus sham stimulation group ($P < 0.05$), but there was no significant difference in muscular tone, social life ability, and perceived changes by parents between the two groups ($P > 0.05$). In addition, there was no significant difference in hand function between children with and without motor-evoked potential ($P > 0.05$). No participants reported severe adverse events during the study session. In short, the treatment of CIMT combined with rTMS is safe and feasible for preschool children with UCP attributed to various brain disorders. Randomized controlled studies with large samples and long-term effects are warranted.

PMID: 35449560

22. Robotic mapping of motor cortex in children with perinatal stroke and hemiparesis
Hsing-Ching Kuo, Ephrem Zewdie, Adrianna Giuffre, Liu Shi Gan, Helen L Carlson, James Wrightson, Adam Kirton

Hum Brain Mapp. 2022 Apr 22. doi: 10.1002/hbm.25881. Online ahead of print.

Brain stimulation combined with intensive therapy may improve hand function in children with perinatal stroke-induced unilateral cerebral palsy (UCP). However, response to therapy varies and underlying neuroplasticity mechanisms remain unclear. Here, we aimed to characterize robotic motor mapping outcomes in children with UCP. Twenty-nine children with perinatal stroke and UCP (median age 11 ± 2 years) were compared to 24 typically developing controls (TDC). Robotic, neuronavigated transcranial magnetic stimulation was employed to define bilateral motor maps including area, volume, and peak motor evoked potential (MEP). Map outcomes were compared to the primary clinical outcome of the Jebsen-Taylor Test of Hand Function (JTT). Maps were reliably obtained in the contralesional motor cortex (24/29) but challenging in the lesioned hemisphere (5/29). Within the contralesional M1 of participants with UCP, area and peak MEP amplitude of the unaffected map were larger than the affected map. When comparing bilateral maps within the contralesional M1 in children with UCP to that of TDC, only peak MEP amplitudes were different, being smaller for the affected hand as compared to TDC. We observed correlations between the unaffected map when stimulating the contralesional M1 and function of the unaffected hand. Robotic motor mapping can characterize motor cortex neurophysiology in children with perinatal stroke. Map area and peak MEP amplitude may represent discrete biomarkers of developmental plasticity in the contralesional M1. Correlations between map metrics and hand function suggest clinical relevance and utility in studies of interventional plasticity.

PMID: 35451540

23. Trends in survival, perinatal morbidities and two-year neurodevelopmental outcomes in extremely low-birthweight infants over four decades
Amir M Zayegh, Lex W Doyle, Rosemarie A Boland, Rheanna Mainzer, Alicia J Spittle, Gehan Roberts, Leah M Hickey, Peter J Anderson, Jeanie L Y Cheong, Victorian Infant Collaborative Study Group

Paediatr Perinat Epidemiol. 2022 Apr 18. doi: 10.1111/ppe.12879. Online ahead of print.

Background: Although outcomes for infants born extremely low birthweight (ELBW; <1000 g birthweight) have improved over time, it is important to document survival and morbidity changes following the advent of modern neonatal intensive care in the 1990s. Objective: To describe trends in survival, perinatal outcomes and neurodevelopment to 2 years' corrected age over time across six discrete geographic cohorts born ELBW between 1979 and 2017. Methods: Analysis of data from discrete population-based prospective cohort studies of all live births free of lethal anomalies with birthweight 500-999 g in the state of Victoria, Australia, over 6 eras: 1979-80, 1985-87, 1991-92, 1997, 2005 and 2016-17. Perinatal data collected included survival, duration and type of respiratory support, neonatal morbidities and two-year neurodevelopmental outcomes. Results: More ELBW live births were inborn (born in a maternity hospital with a neonatal intensive care unit) over time (1979-80, 70%; 2016-17, 84%), and more were offered active care (1979-80, 58%; 2016-17, 90%). Survival to 2 years rose substantially, from 25% in 1979-80 to 80% in 2016-17. In survivors, rates of any assisted ventilation rose from 75% in 1979-80 to 99% in 2016-17. Cystic periventricular leukomalacia, severe retinopathy of prematurity and blindness improved across eras. Two-year data were available for 95% (1054/1109) of survivors. Rates of cerebral palsy, deafness and major neurodevelopmental disability changed little over time. The annual numbers with major neurodevelopmental disability increased from 12.5 in 1979-80 to 30 in 2016-17, but annual numbers free of major disability increased much more, from 31 in 1979-80 to 147 in 2016-17. Conclusions: Active care and survival rates in ELBW children have increased dramatically since 1979 without large changes in neonatal morbidities. The numbers of survivors free of major neurodevelopmental disability have increased more over time than those with major disability.

PMID: 35437828

24. Early factors associated with risk of developmental coordination disorder in very preterm children: A prospective area-based cohort study in Italy
Stefania Zoia, Marina Biancotto, Barbara Caravale, Alessandra Valletti, Laura Montelisciani, Ileana Croci, Fabio Voller, Franca Rusconi, Marco Carrozzi, Valeria Chiandotto, Domenico Di Lallo, Stefano Vicari, Marina Cuttini

Paediatr Perinat Epidemiol. 2022 Apr 18. doi: 10.1111/ppe.12878. Online ahead of print.

Background: Developmental coordination disorder (DCD) is a motor disorder of unknown aetiology that may have long-term consequences on daily activities, and psychological and physical health. Studies investigating risk factors for DCD have so far provided inconsistent results. Objectives: To assess, using a parent-report screening tool, risk of DCD in school-age very preterm children born in Italy, and investigate the associated early biomedical and sociodemographic factors. Methods: A prospective area-based cohort (804 children, response rate 73.4%) was assessed at 8-11 years of age in three Italian regions. Perinatal data were abstracted from medical records. DCD risk was measured using the Italian-validated version of the Developmental Coordination Disorder Questionnaire (DCDQ-IT). For this study, children with cognitive deficit (i.e. intelligence quotient <70), cerebral palsy, severe vision and hearing disabilities, and other impairments affecting movement were excluded. A total of 629 children were analysed. We used inverse probability weighting to account for loss to follow-up, and multilevel, multivariable modified Poisson models to obtain adjusted risk ratio (aRR) and 95% confidence interval (CI). Missing values in the covariates were imputed. Results: 195 children (weighted proportion 31.8%, 95% CI 28.2, 35.6) scored positive on the DCDQ-IT, corresponding to the 15th centile of the reference Movement-ABC test. Factors associated with overall DCD risk were male sex (aRR 1.35, 95% CI 1.05, 1.73), intrauterine growth restriction (aRR 1.45, 95% CI 1.14, 1.85), retinopathy of prematurity (aRR 1.62, 95% CI 1.07, 2.45), and older maternal age at delivery (aRR 1.39, 95% CI 1.09, 1.77). Complete maternal milk feeding at discharge from the neonatal unit and higher parental socio-economic status were associated with decreased risk. Conclusions: Both biomedical and sociodemographic factors increase DCD risk. These findings can contribute to elucidating the origins of this disorder, and assist in the identification of children at risk for early referral and intervention.

PMID: 35437802

25. Correction to: Long-term risk of epilepsy, cerebral palsy and attention-deficit/hyperactivity disorder in children affected by a threatened abortion in utero
Elena Dudukina, Erzsébet Horváth-Puhó, Henrik Toft Sørensen, Vera Ehrenstein

Published Erratum Int J Epidemiol. 2022 Apr 19;dyac077. doi: 10.1093/ije/dyac077. Online ahead of print.

No abstract available

PMID: 35437592

26. Brief report: Fertility rates in women with intellectual and developmental disabilities in Wisconsin Medicaid
Eric Rubenstein, Deborah B Ehrenthal, Jenna Nobles, David C Mallinson, Lauren Bishop, Marina C Jenkins, Hsiang-Hui Kuo, Maureen S Durkin

Disabil Health J. 2022 Mar 24;101321. doi: 10.1016/j.dhjo.2022.101321. Online ahead of print.

Background: Women with intellectual and developmental disabilities (IDD) face stigma and inequity surrounding opportunity and care during pregnancy. Little work has quantified fertility rates among women with IDD which prevents proper allocation of care. Objective: Our objective was to cross-sectionally describe fertility patterns among women with and without intellectual and developmental disabilities (IDD) in 10-years of Medicaid-linked birth records. Study design: Our sample was Medicaid-enrolled women with live births in Wisconsin from 2007 to 2016. We identified IDD through prepregnancy Medicaid claims. We calculated general fertility-, age-specific-, and the total fertility-rates and 95% confidence intervals (95% CI) for women with and without IDD and generated estimates by year and IDD-type. Results: General fertility rate in women with IDD was 62.1 births per 1000 women with IDD (95% CI 59.2, 64.9 per 1000 women) and 77.1 per 1000 for women without IDD (95% CI: 76.8, 77.4 per 1000 women). General fertility rate ratio was 0.81 (95% CI: 0.7, 0.9). Total fertility was 1.80 births per woman with IDD and 2.05 births per woman without IDD (rate ratio: 0.89 95% CI: 0.5, 1.5). Peak fertility occurred later for autistic women (30-34 years), compared with women with other IDD (20-24 years). Conclusion: In Wisconsin Medicaid, general fertility rate of women with IDD was lower than women without IDD: the difference was attenuated when accounting for differing age distributions. Results highlight the disparities women with IDD face and the importance of allocating pregnancy care within Medicaid.

PMID: 35430181

27. Delivery timing in dichorionic diamniotic twin pregnancies complicated by preeclampsia: a decision analysis
Bethany T Waites, Allison R Walker, Aaron B Caughey

J Matern Fetal Neonatal Med. 2022 Apr 18;1-6. doi: 10.1080/14767058.2022.2053103. Online ahead of print.

Objective: To determine the optimal timing of delivery in Dichorionic-diamniotic (DCDA) pregnancies complicated by preeclampsia without severe features. Methods: A decision-analytic model was created to compare outcomes of expectant management vs. delivery from 34 to 37w0d. Outcomes included quality-adjusted life years (QALYs), development of severe preeclampsia, maternal mortality, maternal stroke, small for gestational age (SGA) due to fetal growth restriction (FGR) detected antenatally, stillbirth, cerebral palsy (CP), and neonatal mortality. Probabilities, utilities, and life expectancies were derived from the literature. Univariate analysis was used to evaluate the impact of delivery at various gestational ages. Maternal and neonatal outcomes were calculated for a theoretical cohort of 10,000 DCDA pregnancies with preeclampsia. Results: The optimal gestational age for delivery was 36w0d when the total QALYs (868,112) were highest. Delivery at 34w0d resulted in the fewest cases of severe preeclampsia, maternal mortality, and maternal stroke (0, 4, and 15 cases per 10,000, respectively). The incidence of each of these adverse outcomes increased with gestational age, with the greatest number of adverse outcomes at 37w0d (2452 cases of severe preeclampsia, eight maternal deaths, and 31 cases of maternal stroke per 10,000). Delivery at 34w0d resulted in the fewest cases of severe preeclampsia (0), maternal stroke (15), maternal mortality (4), stillbirth (0), and SGA (1183). However, this strategy was also associated with most cases of neonatal CP (91) and neonatal mortality (87). Conclusion: DCDA twin pregnancies complicated by preeclampsia without severe features appear to have the best outcomes when delivered at 36w0d. Specifically, when compared to delivery at 37w0d, this strategy reduced maternal and neonatal morbidity and mortality.

PMID: 35437110

28. Hypoxic Ischemic Encephalopathy (HIE) in Term and Preterm Infants
Sanja Ristovska, Orhideja Stomnaroska, Dragan Danilovski

Pril (Makedon Akad Nauk Umet Odd Med Nauki). 2022 Apr 22;43(1):77-84. doi: 10.2478/prilozi-2022-0013.

Hypoxic-ischemic syndrome (HIS) and Hypoxic-ischemic encephalopathy (HIE) are conditions that affect term and premature babies, with different pathophysiology and different brain disorders. HIE appears in 1-6 / 1000 live births and 26/1000 live births in developing countries. 15-20% die in the early neonatal period, while surviving babies have severe neurological impairment, including cerebral palsy, epilepsy, visual and hearing impairment, cognitive impairment, intellectual, behavioural, and social disorders. The hypoxic-ischemic event occurs before, during or after birth. The reasons may be related to the mother, the way of birth, the placenta, and the newborn. The criteria for diagnosis of HIE include a combination of perinatal factors, the need for resuscitation, standard neurological examinations, neurophysiological monitoring, neuroimaging methods and biochemical markers. The most effective treatment for HIE is hypothermia in combination with pharmacological therapy. HIE and HIS are problem that still persist in developing countries due to inadequate obstetric care, neonatal resuscitation, and hypothermia. Current and emerging research for HIE examines new markers for early recognition, treatment, and appropriate neuroprotection of high-risk term and premature infants.

PMID: 35451288

29.Therapeutic hypothermia in neonatal hypoxic encephalopathy: A systematic review and meta-analysis
Joseph L Mathew, Navneet Kaur, Jeanne M Dsouza

Meta-Analysis J Glob Health. 2022 Apr 9;12:04030. doi: 10.7189/jogh.12.04030. eCollection 2022.

Background: Therapeutic hypothermia (TH) is regarded as the most efficacious therapy for neonatal hypoxic encephalopathy. However, limitations in previous systematic reviews and the publication of new data necessitate updating the evidence. We conducted this up-to-date systematic review to evaluate the effects of TH in neonatal encephalopathy on clinical outcomes. Methods: In this systematic review and meta-analysis, we searched Medline, Cochrane Library, Embase, LIVIVO, Web of Science, Scopus, CINAHL, major trial registries, and grey literature (from inception to October 31, 2021), for randomized controlled trials (RCT) comparing TH vs normothermia in neonatal encephalopathy. We included RCTs enrolling neonates (gestation ≥35 weeks) with perinatal asphyxia and encephalopathy, who received either TH (temperature ≤34°C) initiated within 6 hours of birth for ≥48 hours, vs no cooling. We excluded non-RCTs, those with delayed cooling, or cooling to >34°C. Two authors independently appraised risk-of-bias and extracted data on mortality and neurologic disability at four time points: neonatal (from randomization to discharge/death), infancy (18-24 months), childhood (5-10 years), and long-term (>10 years). Other outcomes included seizures, EEG abnormalities, and MRI findings. Summary data from published RCTs were pooled

through fixed-effect meta-analysis. Results: We identified 36 863 citations and included 39 publications representing 29 RCTs with 2926 participants. Thirteen studies each had low, moderate, and high risk-of-bias. The pooled risk ratios (95% confidence interval, CI) were as follows: neonatal mortality: 0.87 (95% CI = 0.75, 1.00), n = 2434, I2 = 38%; mortality at 18-24 months: 0.88 (95% CI = 0.78, 1.01), n = 2042, I2 = 51%; mortality at 5-10 years: 0.81 (95% CI = 0.62, 1.04), n = 515, I2 = 59%; disability at 18-24 months: 0.62 (95% CI = 0.52, 0.75), n = 1440, I2 = 26%; disability at 5-10 years: 0.68 (95% CI = 0.52, 0.90), n = 442, I2 = 3%; mortality or disability at 18-24 months: 0.78 (95% CI = 0.72, 0.86), n = 1914, I2 = 54%; cerebral palsy at 18-24 months: 0.63 (95% CI = 0.50, 0.78), n = 1136, I2 = 39%; and childhood cerebral palsy: 0.63 (95% CI = 0.46, 0.85), n = 449, I2 = 0%. Some outcomes showed significant differences by study-setting; the risk ratio (95% CI) for mortality at 18-24 months was 0.79 (95% CI = 0.66,0.93), n = 1212, I2 = 7% in high-income countries, 0.67 (95% CI = 0.41, 1.09), n = 276, I2 = 0% in upper-middle-income countries, and 1.18 (95% CI = 0.94, 1.47), n = 554, I2 = 75% in lower-middle-income countries. The corresponding pooled risk ratios for 'mortality or disability at 18-24 months' were 0.77 (95% CI = 0.69, 0.86), n = 1089, I2 = 0%; 0.56 (95% CI = 0.41, 0.78), n = 276, I2 = 30%; and 0.92 (95% CI = 0.77, 1.09), n = 549, I2 = 86% respectively. Trials with low risk of bias showed risk ratio of 0.97 (95% CI = 0.80, 1.16, n = 1475, I2 = 62%) for neonatal mortality, whereas trials with higher risk of bias showed 0.71 (95% CI = 0.55, 0.91), n = 959, I2 = 0%. Likewise, risk ratio for mortality at 18-24 months was 0.96 (95% CI = 0.83, 1.13), n = 1336, I2 = 58% among low risk-of-bias trials, but 0.72 (95% CI = 0.56, 0.92), n = 706, I2 = 0%, among higher risk of bias trials. Conclusions: Therapeutic hypothermia for neonatal encephalopathy reduces neurologic disability and cerebral palsy, but its effect on neonatal, infantile and childhood mortality is uncertain. The setting where it is implemented affects the outcomes. Low(er) quality trials overestimated the potential benefit of TH.

PMID: 35444799

30. Encouraging effect of autologous bone marrow aspirate concentrate in rehabilitation of children with cerebral palsy
D M Maric, M Radomir, Z Milankov, I Stanojevic, D Vojvodic, G Velikic, S Susnjevic, D L Maric, D Abazovic

Eur Rev Med Pharmacol Sci. 2022 Apr;26(7):2330-2342. doi: 10.26355/eurrev_202204_28462.

Objective: In this study, we used autologous bone marrow aspirate concentrate (BMAC) transplantation to treat children with cerebral palsy (CP) to improve their motor and cognitive functions. Patients and methods: Forty-two patients with CP received BMAC. The transplantation of stem cells via the intrathecal route includes three BMAC applications. The patients' examination was before the injection of stem cells, with follow-ups on 1, 3, 6, and 12 months after the injections. The assessments included the gross motor function classification scale, the Ashworth scale, and the Learning accomplishment profile-diagnostic scale. Results: This study included 42 patients with CP who received three BMAC intrathecal administrations. A personalized home rehabilitation program was designed and included for each patient in the study. After the treatment, we observed a reduction of spasticity in 58% of patients and significant cognitive improvement in 35% of patients. Conclusions: The outcome of this study indicates that stem cell therapy and personalized training can improve the development of children with CP. The crucial goal of this therapeutic intervention is to substitute injured tissue with new tissues by activating the regenerative capacity of stem cells.

PMID: 35442487

31. Common data elements to standardize genomics studies in cerebral palsy
Yana A Wilson, Hayley Smithers-Sheedy, Katarina Ostojic, Emma Waight, Michael C Kruer, Michael C Fahey, ICPGC Phenotype Working Group*; Gareth Baynam, Jozef Gécz, Nadia Badawi, Sarah McIntyre

Dev Med Child Neurol. 2022 Apr 20. doi: 10.1111/dmcn.15245. Online ahead of print.

Aim: To define clinical common data elements (CDEs) and a mandatory minimum data set (MDS) for genomic studies of cerebral palsy (CP). Method: Candidate data elements were collated following a review of the literature and existing CDEs. An online, three-round Delphi survey was used to rate each data element as either 'core', 'recommended', 'exploratory', or 'not required'. Members of the International Cerebral Palsy Genomics Consortium (ICPGC) rated the core CDEs as either mandatory or not, to form the MDS. For both the CDEs and the MDS, a data element was considered to have reached consensus if more than 75% of respondents agreed. Results: Forty-six individuals from around the world formed the Delphi panel: consumers (n=2), scientists/researchers (n=17), medical (n=19), and allied health professionals (n=8). The CDEs include 107 data elements across six categories: demographics, diagnostics, family history, antenatal and neonatal details, clinical traits, and CP-specific assessments. Of these, 10 are mandatory, 42 core, 41 recommended, and 14 are exploratory. Interpretation: The ICPGC CDEs provide a foundation for the standardization of phenotype data captured in CP genomic studies and will benefit international collaborations and pooling of data, particularly in rare conditions.

PMID: 35441707

32. Val66et Polymorphism Is Associated with Altered Motor-Related Oscillatory Activity in Youth with Cerebral Palsy
Michael P Trevarrow, Hannah Bergwell, Jennifer Sanmann, Tony W Wilson, Max J Kurz

Brain Sci. 2022 Mar 24;12(4):435. doi: 10.3390/brainsci12040435.

Brain-derived neurotrophic factor (BDNF) plays a critical role in the capacity for neuroplastic change. A single nucleotide polymorphism of the BDNF gene is well known to alter the activity-dependent release of the protein and may impact the capacity for neuroplastic change. Numerous studies have shown altered sensorimotor beta event-related desynchronization (ERD) responses in youth with cerebral palsy (CP), which is thought to be directly related to motor planning. The objective of the current investigation was to use magnetoencephalography (MEG) to evaluate whether the BDNF genotype affects the strength of the sensorimotor beta ERD seen in youth with CP while youth with CP performed a leg isometric target matching task. In addition, we collected saliva samples and used polymerase chain reaction (PCR) amplification to determine the status of the amino acid fragment containing codon 66 of the BDNF gene. Our genotyping results identified that 25% of the youth with CP had a Val66Met or Met66Met polymorphism at codon 66 of the BDNF gene. Furthermore, we identified that the beta ERD was stronger in youth with CP who had the Val66Met or Met66Met polymorphism in comparison to those without the polymorphism ($p = 0.042$). Overall, these novel findings suggest that a polymorphism at the BDNF gene may alter sensorimotor cortical oscillations in youth with CP.

PMID: 35447966

33. Meeting the unmet needs of disabled adults with cerebral palsy
Shirli Werner

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No abstract available

PMID: 35451083