Cerebral palsy research news

Monday 17 April 2023

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 cerebralpalsy.org.au/our-research

Professor Nadia Badawi AM
CP Alliance Chair of Cerebral Palsy Research

Subscribe to CP Research News

Interventions and Management

1. The Masticatory Structure and Function in Children with Cerebral Palsy-A Pilot Study

Karolina Szuflak, Roksana Malak, Brittany Fechner, Dorota Sikorska, Włodzimierz Samborski, Ewa Mojs, Karolina Gerreth

Healthcare (Basel). 2023 Apr 4;11(7):1029. doi: 10.3390/healthcare11071029.

(1) Background: Muscle tension around the head and neck influences orofacial functions. The data exist concerning head posture during increased salivation; however, little is known about muscle tightness during this process. This study aims to investigate whether or not any muscles are related to problems with eating, such as drooling in individuals with cerebral palsy; (2) Methods: Nineteen patients between the ages of 1 and 14 were examined prior to the physiotherapy intervention. This intervention lasted three months and consisted of: relaxing muscles via the strain-counterstrain technique, functional exercises based on the NeuroDevelopmental Treatment-Bobath method, and functional exercises for eating; (3) Results: the tone of rectus capitis posterior minor muscle on the left side ($p = 0.027$) and temporalis muscle on the right side ($p = 0.048$) before the therapy, and scalene muscle on the right side after the therapy ($p = 0.024$) were correlated with drooling behavior and were considered statistically significant. Gross motor function was not considered statistically significant with the occurrence of drooling behavior ($p \leq 0.05$). Following the therapeutic intervention, the frequency of drooling during feeding decreased from 63.16% to 38.89% of the total sample of examined patients; (4) Conclusions: The tightness of the muscles in the head area can cause drooling during feeding.

PMID: 37046956

2. Comment on: Risk factors for hip displacement in cerebral palsy: A population-based study of 121 nonambulatory children

Philippe Wagner, Gunnar Hägglund

J Child Orthop. 2023 Mar 15;17(2):191-192. doi: 10.1177/18632521231156548. eCollection 2023 Apr.

No abstract available

PMID: 37034200

3. Response to comment on Terjesen T and Horn J "Risk factors for hip displacement in cerebral palsy: A population-based study of 121 nonambulatory children"

Terje Terjesen, Joachim Horn

J Child Orthop. 2023 Mar 15;17(2):193-194. doi: 10.1177/18632521231156550. eCollection 2023 Apr.

No abstract available

PMID: 37034191

4. Exploring Temporospatial Gait Asymmetry, Dynamic Balance, and Locomotor Capacity After a 12-Week Split-Belt Treadmill Training in Adolescents with Unilateral Cerebral Palsy: A Randomized Clinical Study

Ragab K Elnaggar, Ahmed Alhowimel, Mazyad Alotaibi, Mohamed S Abdrabo, Mahmoud S Elfakharany

Phys Occup Ther Pediatr. 2023 Apr 10;1-18. doi: 10.1080/01942638.2023.2196334. Online ahead of print.

Aim: To investigate the effects of a 12-week split-belt treadmill walking (Sb-TW) practice using an error augmentation strategy on temporospatial gait asymmetries, dynamic balance, and locomotor capacity in adolescents with unilateral cerebral palsy (ULCP). Methods: Fifty-two adolescents with ULCP (age: 10-16 years) were randomized into either the Sb-TW group (n = 26; underwent repeated Sb-TW practice, with exaggeration of the initial step-length asymmetry, three times/week, for 12 sequential weeks) or control group (n = 26; received equivalent dosages of traditional single-belt treadmill training). Step-length and swing-time asymmetries, directional (LoSdirectional) and overall (LoSoverall) limits of stability, and locomotor capacity [6-minute walk test (6-MWT), Timed Up and Down Stair test (TUDS), and 10-m Shuttle Run Test (10mSRT)] were assessed pre- and post-intervention. Results: The Sb-TW group demonstrated more favorable changes in step-length asymmetry ($p < .001$, $\eta 2partial = 0.27$), LoSdirectional [affected side direction ($p = .033$, $\eta 2partial = 0.09$), forward direction ($p = .004$, $\eta 2partial = 0.16$), and backward direction ($p = .01$, $\eta 2partial = 0.12$)], and LoSoverall ($p < .001$, $\eta 2partial = 0.31$) than the control group. Also, the Sb-TW group showed significantly higher locomotor capacity [6-MWT ($p < .001$, $\eta 2partial = 0.38$), TUDS ($p = .032$, $\eta 2partial = 0.09$), 10mSRT ($p = .021$, $\eta 2partial = 0.10$)] as compared to the control group. Conclusion: The Sb-TW-induced adaptations can be capitalized on for remediating spatial gait asymmetry, dynamic balance deficits, and impaired locomotor performance in adolescents with ULCP.

PMID: 37038368

5. Effect of selective percutaneous myofascial lengthening and functional physiotherapy on walking in children with cerebral palsy: Three-dimensional gait analysis assessment

Vasileios C Skoutelis, Anastasios D Kanellopoulos, Stamatis Vrettos, Zacharias Dimitriadis, Argirios Dinopoulos, Panayiotis J Papagelopoulos, Vasileios A Kontogeorgakos

J Orthop Sci. 2023 Apr 6;S0949-2658(23)00080-5. doi: 10.1016/j.jos.2023.03.010. Online ahead of print.

Background: Walking is the most affected motor function in children with cerebral palsy (CP). Orthopaedic surgery is regularly used to improve ambulation in children with CP. Selective Percutaneous Myofascial Lengthening (SPML) is considered the state-of-the art technique for surgical lengthening of spastic/contracted muscles in CP. The purpose of this study was to investigate the effect of combined SPML surgery and postoperative functional physiotherapy on gait function and characteristics of children with spastic cerebral palsy (CP). Methods: Twenty-six children with spastic CP, aged 5-7 years, Gross Motor Function Classification System (GMFCS) levels II (n = 6), III (n = 12) and IV (n = 8) participated in a quasi-experimental one-group pretest-posttest study with a 9-month follow-up. The Global Motion Graph Deviation Index (MGDI) (including MGDI sub-indices of each joint in each plane of motion) and spatiotemporal parameters of a three-dimensional kinematic gait analysis were used to assess the gait function and characteristics, respectively. Results: Nine months following SPML and functional physiotherapy, statistically significant improvements ($p < 0.05$) were noted in the Global MGDI, the MGDIs of sagittal plane knee and ankle motion analysis graphs, and the four most common spatiotemporal measures of gait: walking velocity, stride length, step length, and cadence. Conclusion: Children with spastic CP seem to gain better overall gait function following SPML procedure and functional physiotherapy, by achieving higher walking velocity, longer stride length and step length, and faster cadence. Further studies with control group and longer follow-up three-dimensional gait analyses are warranted to validate these positive results.

PMID: 37031098

6. Analysis of cerebral palsy gait based on movement primitives

Shahab Tavasoli, Marzieh Tavasoli, Mahya Shojaeefard, Farzam Farahmand

Clin Biomech (Bristol, Avon). 2023 Mar 27;104:105947. doi: 10.1016/j.clinbiomech.2023.105947. Online ahead of print.

Background: Cerebral palsy is the most prevalent motor disorder among children. Despite extensive studies on motor modularity of gait of children with cerebral palsy, kinematic modularity of their gait has not been addressed which is the main goal of this study. Methods: The kinematics of the gait of 13 typical development children and 188 children with cerebral palsy was captured and analyzed, where the cerebral palsy children were grouped into True, Jump, Apparent, and Crouch. Non-negative matrix factorization method was used to extract the kinematic modulus of each group, which were then clustered to find their characteristic movement primitives. The movement primitives of groups were then matched based on the similarity of

their activation profiles. Findings: The number of movement primitives was three for the Crouch group, four for the other cerebral palsy groups, and five for the typical development group. Compared to the typical development children, the kinematic modules and activations of the cerebral palsy groups involved higher variability and co-activation, respectively ($P < 0.05$). Three temporally matched movement primitives were shared by all groups, but with altered structures. Interpretation: The gait of children with cerebral palsy involved lower complexity and higher variability due to the reduced and inconsistent kinematic modularity. Three basic movement primitives were sufficient to prodcue the overall gait kinematics, as observed in the Crouch group. Other movement primitives, were responsible for providing smooth transitions between basic movement primitives, as seen in more complex gait patterns.

PMID: 37030255

7. A 10.5-year follow-up of walking with unilateral spastic cerebral palsy

Alice Bonnefoy-Mazure, Geraldo De Coulon, Pierre Lascombes, Aline Bregou, Stéphane Armand

J Child Orthop. 2023 Mar 6;17(2):173-183. doi: 10.1177/18632521231154975. eCollection 2023 Apr.

Purpose: The purpose of this study was to describe gait evolution in patients with unilateral spastic cerebral palsy (USCP) using modified Gait Profile Score (mGPS without hip rotation), Gait Variable Score (GVS), walking speed, and the observed effects of single-level surgery (SLS) after 10 years. Methods: Fifty-two patients with USCP (Gross Motor Function Classification System I) and data from two Clinical Gait Analyses (CGAs) were included. The evolution of patients' mGPS, GVS, and walking speed were calculated. Two "no surgery" and "single-level surgery" patient categories were analyzed. Paired t-tests were used to compare the data between CGAs and as a function of treatment category. Pearson's correlations were used to examine relationships between baseline values and evolutions in mGPS and walking speed. Results: Mean ages (SD) at first and last CGAs were 9.3 (3.2) and 19.7 (6.0) years old, respectively, with an average follow-up of 10.5 (5.6) years. Mean mGPS for the patients' affected side was significantly lower at the last CGA for the full cohort: baseline = 8.5° (2.1) versus follow-up = 7.2° (1.6), effect size = 0.73, $p < 0.001$. Significant improvements in mGPS and GVS for ankle and foot progression were found for the SLS group. The mGPS change and mGPS at baseline ($r = -0.79$, $p < 0.001$) were negatively correlated. Conclusions: SLS patients demonstrated a positive long-term change in gait pattern over time. The group that had undergone surgery had worse gait scores at baseline than the group that had not, but the SLS group's last CGA scores were relatively closer to those of the "no surgery" group.

PMID: 37034199

8. Community-based physical activity interventions for adolescents and adults with complex cerebral palsy: A scoping review

Prue Morgan, Stacey Cleary, Iain Dutia, Keegan Bow, Nora Shields

Review Dev Med Child Neurol. 2023 Apr 9. doi: 10.1111/dmcn.15611. Online ahead of print.

Aim: To identify implementation strategies and safety outcomes (adverse events) of community-based physical activity interventions for adolescents and adults with complex cerebral palsy (CP). Method: Five electronic databases were systematically searched to April 2022. Data were extracted on the implementation and safety of physical activity interventions for adolescents and adults with CP, classified in Gross Motor Function Classification System (GMFCS) levels IV and V, delivered in a community setting. Results: Seventeen studies with 262 participants (160 participants classified in GMFCS levels IV or V) were included. Community settings included schools (n = 4), participants' homes (n = 3), gymnasia (n = 2), swimming pools (n = 2), and other settings (n = 4). Most studies specified medical or safety exclusion criteria. Implementation strategies included pre-exercise screening, use of adapted equipment, familiarization sessions, supervision, physical assistance, and physiological monitoring. Attendance was high and attrition low. Nine studies reported non-serious, expected, and related events. Four studies reported minor soreness and four studies reported minor fatigue post-exercise. Serious adverse events related to exercise were infrequent (reported for 4 of 160 participants [<2%]: three participants withdrew from an exercise programme and one participant ceased exercise for a short period). Most frequently reported was pain, requiring temporary exercise cessation or programme change, or study withdrawal (three participants). Interpretation: For most adolescents and adults with CP classified in GMFCS levels IV and V, physical activity interventions can be safely performed in a community setting, without post-exercise pain or fatigue, or serious adverse events.

PMID: 37032538

9. Utility of a Pediatric Adaptive Sports Clinic: A Case Series Review

Bilal Taib, Yangmyung Ma, Rohan Tandon, Rebecca Knight, Michael Gosling, Kim Gregory, Laura Sunderland, Carla Baldrighi, Kerstin Oestreich, Andrea Jester

Phys Occup Ther Pediatr. 2023 Apr 9;1-12. doi: 10.1080/01942638.2023.2197046. Online ahead of print.

Background: Limited funding is available for athletes with disabilities in the United Kingdom. This compounds the barriers to participation and development that already exist. Method: To combat this growing problem, a Multi-Disciplinary Pediatric Adaptive Sports Clinic was formed. Result: Fifteen athletes with disabilities attended the Clinic from November 2017 to November 2019. In our cohort, there were 10 males and 5 females (age range: 13-18 years). Most athletes participated at a grassroots level (n = 9). The range of diagnoses included cerebral palsy, Ehlers Danlos syndrome and congenital hand differences. Forty-four appointments were made after the initial meeting with a 95% attendance rate. Improvements beyond the minimal clinically important differences (MCID) for the Patient Specific Functional Scale, Numerical Pain Rating Scale, and Medical Research Council Manual Muscle Testing Scale were noted in over half of cases. Conclusion: With a focus on injury prevention and strength and conditioning techniques, this clinic supported athletes to successfully compete from a recreational to an elite level across all types of sports and adolescent ages by providing patient-specific regimens. Our case series provides preliminary evidence to suggest the formation of similar clinics that can support athletes with disabilities across a range of sports.

PMID: 37032436

10. Central retinal vein occlusion with moyamoya disease: a case report

Sha-Sha Song, Xin-Guo Jia, Li-Juan Zhao, Qing-Qiang Wang

Case Reports Am J Transl Res. 2023 Mar 15;15(3):2098-2102. eCollection 2023.

Moyamoya disease is mainly caused by stenosis or occlusion of the terminal internal carotid artery, anterior cerebral artery, and proximal middle cerebral artery, and an abnormal vascular network is formed near the stenosis or occlusion of vascular lesions. Moyamoya disease can lead to a series of complications such as transient cerebral ischemia, cerebral infarction, and cerebral hemorrhage, which have been reported in the literature. Eye involvement with moyamoya disease is relatively rare in the literature. This article introduces a case of central retinal vein occlusion in a teenager related to moyamoya disease. The patient was only 16 years old and suddenly suffered from vision loss in the left eye. After detailed ophthalmological examination, she was diagnosed with central retinal vein occlusion in the left eye. In order to find the exact cause, we conducted head and neck CTA and brain DSA examinations on the patient, and finally found that the main cause of central retinal vein occlusion in this patient was moyamoya disease, which indicated that central retinal vein occlusion in young people may be caused by moyamoya disease in the early stage. This discovery has great clinical significance, for characteristic manifestations of the eye, suggesting that examination of moyamoya disease is a routine item for such patients, so as to achieve early detection, early diagnosis and early treatment, in order to avoid cerebral infarction, cerebral palsy, and serious or even life-threatening complications such as bleeding.

PMID: 37056866

11. Perspectives on ankle-foot technology for improving gait performance of children with Cerebral Palsy in daily-life: requirements, needs and wishes

Cristina Bayón, Marleen van Hoorn, Antonio Barrientos, Eduardo Rocon, Joyce P Trost, Edwin H F van Asseldonk

J Neuroeng Rehabil. 2023 Apr 12;20(1):44. doi: 10.1186/s12984-023-01162-3.

Background: Ankle-foot orthoses (AFOs) are extensively used as a primary management method to assist ambulation of children with Cerebral Palsy (CP). However, there are certain barriers that hinder their prescription as well as their use as a mobility device in all kinds of daily-life activities. This exploratory research attempts to further understand the existing limitations of current AFOs to promote a better personalization of new design solutions. Methods: Stakeholders' (professionals in CP and end-users with CP) perspectives on AFO technology were collected by two online surveys. Respondents evaluated the limitations of current assistive solutions and assessment methods, provided their expectations for a new AFO design, and analyzed the importance of different design features and metrics to enrich the gait performance of these patients in daily-life. Quantitative responses were rated and compared with respect to their perceived importance. Qualitative responses were classified into themes by using content analysis. Results: 130 survey responses from ten countries were analyzed, 94 from professionals and 36 from end-users with CP. The most highly rated design features by both stakeholder groups were the comfort and the ease of putting on and taking off the assistive device. In general, professionals preferred new features to enrich the independence of the patient by improving gait at functional levels. End-users also considered their social acceptance and participation. Health care professionals reported a lack of confidence concerning decision-making about AFO prescription. To some degree, this may be due to the reported inconsistent understanding of the type of assistance required for each pathological gait. Thus, they indicated that more information about patients' day-to-day walking performance would be beneficial to assess patients' capabilities. Conclusion: This study emphasizes the importance of developing new approaches to assess and treat CP gait in daily-life situations. The stakeholders' needs and criteria reported here may serve as insights for the design of future assistive devices and for the follow-up monitoring of these patients.

PMID: 37046284

12. Design of pediatric robot to simulate infant biomechanics for neuro-developmental assessment in a sensorized gym

Jal Panchal, O Francis Sowande, Laura Prosser, Michelle J Johnson

Proc IEEE RAS EMBS Int Conf Biomed Robot Biomechatron. 2022 Aug;2022:10.1109/biorob52689.2022.9925371. doi: 10.1109/biorob52689.2022.9925371. Epub 2022 Nov 3.

Infants at risk for developmental delays often exhibit postures and movements that may provide a window into potential impairment for cerebral palsy and other neuromotor conditions. We developed a simple 4 DOF robot pediatric simulator to help provide insight into how infant kinematic movements may affect the center of pressure (COP), a common measure thought to be sensitive to neuromotor delay when assessed from supine infants at play. We conducted two experiments: 1) we compared changes in COP caused by limb movements to a human infant and 2) we determined if we could predict COP position due to limb movements using simulator kinematic pose retrieved from video and a sensorized mat. Our results indicate that the limb movements alone were not sufficient to mimic the COP in a human infant. In addition, we show that given a robot simulator and a simple camera, we can predict COP measured by a force sensing mat. Future directions suggest a more complex robot is needed such as one that may include trunk DOF.

PMID: 37041966

13. Etiological risk factors in children with cerebral palsy

Alev Başaran, Zehra Kilinç, Hidir Sari, Ercan Gündüz

Medicine (Baltimore). 2023 Apr 14;102(15):e33479. doi: 10.1097/MD.0000000000033479.

To evaluate the etiological risk factors of cerebral palsy, especially the preventable ones. The study was carried out with the mothers of 210 children with cerebral palsy (CP) registered in Mardin Guidance and Research Center between February and May 2022. The data form prepared by the researchers was applied to the mothers by face-to-face interview technique. The data form consisted of 29 questions including sociodemographic characteristics of the child and mother, risk factors for CP, and secondary medical problems of the child. Of the 210 patients included in the study, 43.3% (91) were female and 56.7% (119) were male. The mean age of the children was 67.4 (SD = 50.6) weeks, and 73.3% of children were premature. The number of children with a birth weight below 2500 g was 48.1% (101). The mean birth weight was 2472.5 (SD = 871.8) g. The children with another disabled sibling consisted 6.2% of the population. Among the mothers, 41.9% stated that they were illiterate and 73.3% stated that their income status was low. The rate of the parents that were related to each other was 51%. In our study, it was noteworthy that most of the children were premature, had low birth weight, more than half of them had parents who were relatives, the education level of the mothers was low, the socioeconomic status of most of the families was low, and most of these risk factors were preventable.

PMID: 37058062

14. Catalog of EQ-5D-3L Health-Related Quality-of-Life Scores for 199 Chronic Conditions and Health Risks in Denmark

Michael Falk Hvidberg, Karin Dam Petersen, Michael Davidsen, Flemming Witt Udsen, Anne Frølich, Lars Ehlers, Mónica Hernández Alava

MDM Policy Pract. 2023 Apr 9;8(1):23814683231159023. doi: 10.1177/23814683231159023. eCollection 2023 Jan-Jun.

Background. Assessments of health-related quality of life (HRQoL) are essential in estimating quality-adjusted life-years. It is sometimes not feasible to collect primary HRQoL data, and reliable secondary sources are necessary. Current "off-the-shelf" HRQoL catalogs are based on older diagnosis classifications and include a limited number of diseases. This article aims to provide 1) a Danish EQ-5D-3L-based HRQoL catalog for 199 nationally representative chronic conditions based on ICD-10 codes and 2) a complementary model-based catalog controlling for age, sex, comorbidities, lifestyle, and health risks. Design. A total of 55,616 respondents from 3 national health survey samples were pooled and combined with 7 national registers containing patient-level information on diagnoses, health care activity, and sociodemographics. EQ-5D-3L data were converted to utility scores using the Danish EQ-5D-3L value set to estimate the mean utility for each chronic disease population. Adjusted limited dependent variable mixture models were estimated and used to provide a regression-based catalog of utilities/ disutilities. Results. Diseases with the lowest mean EQ-5D score in the Danish population were systemic sclerosis (M34; score = 0.432), fibromyalgia (M797; score = 0.490), rheumatism (M790; score = 0.515), dementia (F00, G30; score = 0.546), posttraumatic stress syndrome (F431; score = 0.557), and systemic atrophies (G10-G14; score = 0.583. Based on the estimated models, the largest estimated disutilities were cystic fibrosis, cerebral palsy, depression, dorsalgia, sclerosis, and fibromyalgia. Lifestyle factors, including perceived stress, loneliness, and body mass index, were also significantly associated with low

HRQoL. Conclusions. This study provides a comprehensive nationally representative catalog and a model-based catalog of EQ -5D-3L-based HRQoL scores for Denmark that can be used to describe aspects of disease burden and allocate resources within health care. Additional Stata programs are also provided to facilitate predictions in other populations. Highlights: A Danish national representative catalog of health-related quality-of-life scores for 199 chronic conditions is presented, which provides population estimates for chronic conditions subgroups that can be used for health economic evaluation.Two separate regression models of EQ-5D-3L utility scores with different sets of control variables are estimated to allow researchers to adjust for differences in the composition of the subgroups and provide a tool that can be used in other settings.Results indicate that health -related quality of life varies across disease groups but is lowest for renal disease, mental and behavioral disorders, benign neoplasms and diseases of the blood, digestive systems, and nervous systems.Health risks and lifestyle factors such as perceived stress, loneliness, and a large body mass index are highly correlated with health-related quality of life, and, in many cases, the correlation is higher than with individual diseases.

PMID: 37056295

15. Cross-cultural adaptation, reliability and validation of the Gillette Functional Assessment Questionnaire (FAQ) into Brazilian Portuguese in patients with cerebral palsy

Acácia Pinheiro Alvares Fernandes da Silva, Daniela Bassi-Dibai, Brunno Lima Moreira, Aline Dalfito Gava, Henrique Yuji Takahasi, Larissa Gustinelli Pereira Belo Salomão, Marcela Cacere, Fernanda de Freitas Thomaz, Almir Vieira Dibai-Filho

BMC Pediatr. 2023 Apr 11;23(1):165. doi: 10.1186/s12887-023-03989-0.

Background: The purpose of this study was to translate, cross-culturally adapt and validate the Gillette Functional Assessment Questionnaire (FAQ) into Brazilian Portuguese. Methods: The translation and cross-cultural adaptation was carried out in accordance with international recommendations. The FAQ was applied to a sample of 102 patients diagnosed with cerebral palsy (CP). Construct validity was assessed using Spearman's correlation coefficient (rho), and the FAQ score was correlated with the Functional Mobility Scale (FMS) and Gross Motor Function Classification Scale (GMFCS). A subsample of 50 patients was used to assess reliability using intraclass correlation coefficient (ICC), standard error of measurement (SEM) and minimum detectable difference (MDD). Ceiling and floor effects were also evaluated. Results: The Brazilian version of the FAQ showed excellent test-retest reliability by the assessment of the physiotherapist (ICC = 0.99) and respondent (ICC = 0.97), as well as excellent inter-examiner reliability (ICC = 0.94). The SEM was 0.23 (physiotherapist), 0.47 (respondent) and 0.64 (inter-examiner), while the MDD was 0.64 (physiotherapist), 1.29 (respondent) and 1.76 (inter-examiner). The classification of gross motor function showed a high correlation with the FAQ applied by the physiotherapist (rho = -0.89) and by the respondent (rho = -0.87). The FMS-5 m was highly correlated with the FAQ applied by the physiotherapist and the respondent (rho = 0.88 and rho = 0.87, respectively). The FMS-50 and FMS-500 presented very high correlation with the FAQ applied by the physiotherapist (rho = 0.91 for both) and high correlation with the FAQ applied by the respondent (rho = 0.89 and rho = 0.88, respectively). The Brazilian version of the FAQ did not present the ceiling and floor effects. Conclusion: The FAQ presented adequate psychometric properties in patients with CP, indicating that it is possible to use it as a measure of functional gait mobility in Brazil.

PMID: 37038163

16. Severe cerebral palsy survival is similar in California, USA and Victoria, Australia

Lucas Walz, Jordan C Brooks, David J Strauss, Robert M Shavelle

Dev Med Child Neurol. 2023 Apr 10. doi: 10.1111/dmcn.15616. Online ahead of print.

No abstract available

PMID: 37036187

17. Prevalence, birth, and clinical characteristics of dyskinetic cerebral palsy compared with spastic cerebral palsy subtypes: A Norwegian register-based study

Thomas L Evensen, Torstein Vik, Guro L Andersen, Solveig Bjellmo, Sandra Julsen Hollung

Dev Med Child Neurol. 2023 Apr 9. doi: 10.1111/dmcn.15598. Online ahead of print.

Aim: To study the prevalence, birth, and clinical characteristics of children with dyskinetic cerebral palsy (CP) in Norway compared with spastic quadriplegic CP and other spastic CP subtypes. Method: Data on children born from 1996 to 2015 were collected from the Norwegian Quality and Surveillance Registry for Cerebral Palsy and the Medical Birth Registry of Norway. Results: One hundred and seventy (6.8%) children had dyskinetic CP. The birth prevalence decreased during 1996 to 2015 from 0.21 to 0.07 per 1000 livebirths ($p < 0.001$). Dyskinetic CP was more often associated with term/post-term birth, and

motor and associated impairments were more severe compared with spastic bilateral and unilateral CP, but less severe than spastic quadriplegic CP. On neuroimaging, grey matter injuries were most prevalent in dyskinetic CP (mainly basal ganglia/thalamus) and spastic quadriplegic CP (mainly cortico-subcortical), white matter injuries in spastic bilateral, and white and grey matter injuries were equally common in spastic unilateral CP. Normal neuroimaging and brain maldevelopment were present in 25% of children with dyskinetic CP. Interpretation: The decrease in birth prevalence of dyskinetic CP was probably due to improved antenatal and perinatal care. Potential sentinel events at term were more common in dyskinetic CP than other spastic CP subtypes. However, probable antenatal aetiologies were most prevalent. Motor and associated impairments were less severe in children with dyskinetic CP compared with spastic quadriplegic CP.

PMID: 37032498

18. Transition to adult services experienced by young people with cerebral palsy: A cross-sectional study

No authors listed

Dev Med Child Neurol. 2023 Apr 14. doi: 10.1111/dmcn.15623. Online ahead of print.

No abstract available

PMID: 37060106

19. Reason-Based Recommendations From a Developmental Systems Approach for Students With Needs Across Functional Domains

Tara V McCarty, Carol A Miller

Lang Speech Hear Serv Sch. 2023 Apr 14;1-10. doi: 10.1044/2023_LSHSS-22-00144. Online ahead of print.

Purpose: This tutorial aims to introduce school-based speech-language pathologists (SLPs) to developmental systems theory as a framework for considering interactions across functional domains, such as language, vision, and motor, for students with complex needs. Method: This tutorial summarizes the current literature on developmental systems theory in its application to working with students who have needs in multiple domains of functioning in addition to communication. A hypothetical case of a student, James, with cerebral palsy, cortical visual impairment, and complex communication needs, is presented to illustrate the primary tenets of the theory. Results: Specific reason-based recommendations are presented that SLPs can put to practice with their own caseload in direct response to the three tenets of developmental systems theory. Conclusions: A developmental systems approach will be useful in expanding SLP knowledge of where to begin and how to best serve children with language, motor, vision, and other concomitant needs. The tenets, including sampling, context dependency, and interdependency, and the application of developmental systems theory can be instrumental in providing a way forward for SLPs struggling with the assessment and intervention of students with complex needs.

PMID: 37059086

20. Long-term consequences of neonatal encephalopathy in the hypothermia era: protocol for a follow-up cohort study at 9 years of age

Marie Brossard-Racine, Emmanouille Rampakakis, Christine Lucas Tardif, Guillaume Gilbert, Angela White, Thuy Mai Luu , Anne Gallagher, Elana Pinchefsky, Tina Montreuil, Marie-Noelle Simard, Pia Wintermark

BMJ Open. 2023 Apr 13;13(4):e073063. doi: 10.1136/bmjopen-2023-073063.

Introduction: Therapeutic hypothermia (TH) became the standard of care treatment for neonates with moderate and severe neonatal encephalopathy (NE) in most industrialized countries about 10 years ago. Although TH is effective in reducing mortality and the incidence of severe developmental disabilities, the recent literature converges in reporting frequent cognitive and behavioural difficulties at school entry in children with NE-TH. Although these challenges are deemed minor compared with cerebral palsy and intellectual disability, their impacts on a child's self-determination and family's well-being are quite significant. Therefore, the nature and extent of these difficulties need to be comprehensively described so that appropriate care can be offered. Methods and analysis: The current study will be the largest follow-up study of neonates with NE treated with TH to characterize their developmental outcomes and associated brain structural profiles at 9 years of age. Specifically, we will compare executive function, attention, social cognition, behaviour, anxiety, self-esteem, peer problems, brain volume, cortical features, white matter microstructure and myelination between children with NE-TH and matched peers without NE. Associations of perinatal risk factors and structural brain integrity with cognitive, behavioural and psycho-emotional deficits will be evaluated to inform about the potential aggravating and protective factors associated with function. Ethics and dissemination: This study is supported by the Canadian Institute of Health Research (202203PJT-480065-CHI-CFAC-168509), and received approval from the Pediatric Ethical Review Board of the McGill University Health Center (MP-37-2023-9320). The study findings will be disseminated in scientific journals and conferences and presented to parental associations and

healthcare providers to inform best practices. Trial registration number: NCT05756296.

PMID: 37055215

21. Dendrimer-enabled targeted delivery attenuates glutamate excitotoxicity and improves motor function in a rabbit model of cerebral palsy

Fan Zhang, Zhi Zhang, Jesse Alt, Siva P Kambhampati, Anjali Sharma, Sarabdeep Singh, Elizabeth Nance, Ajit G Thomas, Camilo Rojas, Rana Rais, Barbara S Slusher, Rangaramanujam M Kannan, Sujatha Kannan

J Control Release. 2023 Apr 11;S0168-3659(23)00267-5. doi: 10.1016/j.jconrel.2023.04.017. Online ahead of print.

Glutamate carboxypeptidase II (GCPII), localized on the surface of astrocytes and activated microglia, regulates extracellular glutamate concentration in the central nervous system (CNS). We have previously shown that GCPII is upregulated in activated microglia in the presence of inflammation. Inhibition of GCPII activity could reduce glutamate excitotoxicity, which may decrease inflammation and promote a 'normal' microglial phenotype. 2-(3-Mercaptopropyl) pentanedioic acid (2-MPPA) is the first GCPII inhibitor that underwent clinical trials. Unfortunately, immunological toxicities have hindered 2-MPPA clinical translation. Targeted delivery of 2-MPPA specifically to activated microglia and astrocytes that over-express GCPII has the potential to mitigate glutamate excitotoxicity and attenuate neuroinflammation. In this study, we demonstrate that 2-MPPA when conjugated to generation-4, hydroxyl-terminated polyamidoamine (PAMAM) dendrimers (D-2MPPA) localize specifically in activated microglia and astrocytes only in newborn rabbits with cerebral palsy (CP), not in controls. D-2MPPA treatment led to higher 2-MPPA levels in the injured brain regions compared to 2-MPPA treatment, and the extent of D-2MPPA uptake correlated with the injury severity. D-2MPPA was more efficacious than 2-MPPA in decreasing extracellular glutamate level in ex vivo brain slices of CP kits, and in increasing transforming growth factor beta 1 (TGF-β1) level in primary mixed glial cell cultures. A single systemic intravenous dose of D-2MPPA on postnatal day 1 (PND1) decreased microglial activation and resulted in a change in microglial morphology to a more ramified form along with amelioration of motor deficits by PND5. These results indicate that targeted dendrimer-based delivery specifically to activated microglia and astrocytes can improve the efficacy of 2-MPPA by attenuating glutamate excitotoxicity and microglial activation.

PMID: 37054778

22. Baby Intensive Early Active Treatment (babiEAT): A Pilot Randomised Controlled Trial of Feeding Therapy for Infants with Cerebral Palsy and Oropharyngeal Dysphagia

Amanda Khamis, Nadia Badawi, Catherine Morgan, Iona Novak

J Clin Med. 2023 Apr 3;12(7):2677. doi: 10.3390/jcm12072677.

Cerebral palsy (CP), results in impairment of muscle function including the face, mouth, and throat, leading to oropharyngeal dysphagia (OPD), which affects 85% of children with CP. OPD increases risk of deficiencies in growth, neurological development, and aspiration pneumonia, a leading cause of death in CP. This pilot randomised controlled trial aimed to (i) assess feasibility and acceptability of a novel neuroplasticity and motor-learning feeding intervention program, Baby Intensive Early Active Treatment (babiEAT), and standard care, and (ii) explore preliminary efficacy of babiEAT on health and caregiver feeding-related quality of life (QoL). A total of 14 infants with both CP and OPD were randomly allocated to 12 weeks of babiEAT or standard care. Results indicate that babiEAT and standard care are equally feasible, and acceptable. Parents in the babiEAT group thought recommendations were significantly more effective than standard care parents, were more likely to recommend the program to a friend and reported higher QoL. babiEAT infants showed significantly greater efficiency in fluid intake, fewer compensatory strategies with cup drinking, consumption of more advanced food textures, and shorter mealtimes without impacting intake, aspiration risk, or weight. This small pilot study shows promise for babiEAT in infants with CP and OPD. Further research is needed to determine strength of its effects.

PMID: 37048760

23. Emotion Regulation Is Associated with Anxiety, Depression and Stress in Adults with Cerebral Palsy

Ingrid Honan, Emma Waight, Joan Bratel, Fiona Given, Nadia Badawi, Sarah McIntyre, Hayley Smithers-Sheedy

J Clin Med. 2023 Mar 28;12(7):2527. doi: 10.3390/jcm12072527.

Emotion regulation difficulties are associated with many neurological conditions and negatively impact daily function. Yet little is known about emotion regulation in adults with cerebral palsy (CP). Our aim was to investigate emotion regulation in adults with CP and its relationship with condition-related and/or socio-demographic factors. In a cross-sectional study of adults with CP, participants completed a survey containing the Difficulties in Emotion Regulation Scale (DERS), Depression Anxiety and Stress Scale-21 (DASS-21), and socio-demographic and condition-related questions. Descriptive statistics, chi-squared and Mann-Whitney tests were performed. Of the 42 adults with CP (x31.5 years, SD13.5) that were tested, 38 had within normal

limits DERS total scores; however, a significantly higher proportion of participants experienced elevated scores (i.e., more difficulties with emotion regulation) than would be expected in the general population across five of the six DERs subdomains. Moderate-extremely severe depression and anxiety symptoms were reported by 33% and 60% of participants, respectively. The DERS total scores for participants with elevated depression, anxiety, and stress scores were significantly higher than the DERS totals score for those without elevated depression, anxiety, and stress scores. DERS and DASS-21 scores did not differ significantly by condition-related nor socio-demographic characteristics. In conclusion, emotion regulation difficulties were associated with elevated symptoms of depression and anxiety, which were overrepresented in the adults with CP participating in this study.

PMID: 37048620

24. Dietary Patterns of Competitive Swimmers with Moderate-to-Severe Cerebral Palsy: A 3-Year Longitudinal Evaluation

Jacqueline L Walker, Jessica R Cartwright, Iain M Dutia, Mikaela Wheeler, Sean M Tweedy

Int J Environ Res Public Health. 2023 Mar 30;20(7):5331. doi: 10.3390/ijerph20075331.

Aim: To evaluate the longitudinal dietary patterns of three adolescents with moderate-to-severe cerebral palsy (CP) participating in a performance-focused swimming training intervention. Method: Participants were three previously inactive adolescents with CP (15-16 years, GMFCS IV) who had recently (<6 months) enrolled in a swimming training program. Diet quality from diet histories was calculated at 10-time points over 3.25 years using the Dietary Guidelines Index for Children and Adolescents (DGI-CA) and the Healthy Eating Index for Australian Adults (HEIFA-2013). A food group analysis was compared to the Australian Guide to Healthy Eating recommendations. Trends were considered in the context of dietary advice given and the training load. Results: Longitudinal diet quality scores were consistent and ranged from 40 to 76 (DGI-CA) and 33 to 79 (HEIFA-2013). Food group intake remained stable; participants rarely met the recommendations for fruit, vegetables, dairy, grain, and meat but frequently achieved discretionary serves. Conclusions: Participants with moderate-to-severe CP who were enrolled in a performance-focused swimming training intervention and were monitored frequently maintained diet quality throughout a period where it conventionally declined. Scores were higher than the general population and were maintained irrespective of the training load. Participants frequently met food group recommendations for discretionary foods and were comparable to the general population for other food groups.

PMID: 37047946

25. Autonomous optimization of neuroprosthetic stimulation parameters that drive the motor cortex and spinal cord outputs in rats and monkeys

Marco Bonizzato, Rose Guay Hottin, Sandrine L Côté, Elena Massai, Léo Choinière, Uzay Macar, Samuel Laferrière, Parikshat Sirpal, Stephan Quessy, Guillaume Lajoie, Marina Martinez, Numa Dancause

Cell Rep Med. 2023 Apr 5;101008. doi: 10.1016/j.xcrm.2023.101008. Online ahead of print.

Neural stimulation can alleviate paralysis and sensory deficits. Novel high-density neural interfaces can enable refined and multipronged neurostimulation interventions. To achieve this, it is essential to develop algorithmic frameworks capable of handling optimization in large parameter spaces. Here, we leveraged an algorithmic class, Gaussian-process (GP)-based Bayesian optimization (BO), to solve this problem. We show that GP-BO efficiently explores the neurostimulation space, outperforming other search strategies after testing only a fraction of the possible combinations. Through a series of real-time multi-dimensional neurostimulation experiments, we demonstrate optimization across diverse biological targets (brain, spinal cord), animal models (rats, non-human primates), in healthy subjects, and in neuroprosthetic intervention after injury, for both immediate and continual learning over multiple sessions. GP-BO can embed and improve "prior" expert/clinical knowledge to dramatically enhance its performance. These results advocate for broader establishment of learning agents as structural elements of neuroprosthetic design, enabling personalization and maximization of therapeutic effectiveness.

PMID: 37044093

26. Cation leak through the ATP1A3 pump causes spasticity and intellectual disability

Daniel G Calame, Cristina Moreno Vadillo, Seth Berger, Timothy Lotze, Marwan Shinawi, Javaher Poupak, Corina Heller, Julie Cohen, Richard Person, Aida Telegrafi, Chalongchai Phitsanuwong, Kaylene Fiala, Isabelle Thiffault, Florencia Del Viso, Dihong Zhou, Emily A Fleming, Tomi Pastinen, Ali Fatemi, Sruthi Thomas, Samuel I Pascual, Rosa J Torres, Carmen Prior, Clara Gómez-González, Saskia Biskup, James R Lupski, Dragan Maric, Miguel Holmgren, Debra Regier, Sho T Yano

Brain. 2023 Apr 12;awad124. doi: 10.1093/brain/awad124. Online ahead of print.

ATP1A3 encodes the α3 subunit of the sodium-potassium ATPase, one of two isoforms responsible for powering electrochemical gradients in neurons. Heterozygous pathogenic ATP1A3 variants produce several distinct neurological syndromes, yet the molecular basis for phenotypic variability is unclear. We report a novel recurrent variant, ATP1A3 (NM_152296.5):c.2324C > T; p.(Pro775Leu), in nine individuals associated with the primary clinical features of progressive or non-progressive spasticity and developmental delay/intellectual disability. No patients fulfill diagnostic criteria for ATP1A3-associated syndromes including alternating hemiplegia of childhood, rapid-onset dystonia-parkinsonism, or cerebellar ataxia-areflexia-pes cavus-optic atrophy-sensorineural hearing loss (CAPOS), and none were suspected of having an ATP1A3-related disorder. Uniquely among known ATP1A3 variants, P775L causes leakage of sodium ions and protons into the cell, associated with impaired sodium binding/occlusion kinetics favoring states with fewer bound ions. These phenotypic and electrophysiologic studies demonstrate that ATP1A3:c.2324C > T; p.(Pro775Leu) results in mild ATP1A3-related phenotypes resembling complex hereditary spastic paraplegia or idiopathic spastic cerebral palsy. Cation leak provides a molecular explanation for this genotype-phenotype correlation, adding another mechanism to further explain phenotypic variability and highlighting the importance of biophysical properties beyond ion transport rate in ion transport diseases.

PMID: 37043503

27. Health-related quality of life in children with cerebral palsy associated with congenital Zika infection

Fernanda Jordão Pinto Marques, Alessandra Lemos de Carvalho, Eliana Valverde Magro Borigato, Luiz Felipe Vieira de Oliveira, Lenamaris Mendes Rocha Duarte, Adriana Goncalves da Silva, Claret Luiz Dias Amarante, Laura Jácome de Melo Pereira, Elise Ferreira Tavares, Lilian Gleice de Sena da Costa, Carolina Alves Rezende Alcântara, Andrea Nakamura Salinas, Fernanda de Lourdes da Cunha Pinto, Gerliane Carvalho de Alcântara, Fabiana Utsch, Cinthia Ramos Diniz Silva, Dirlene Araujo Dos Reis, Wilerson Marques Bessa, Rafaela Christine Dutra, Paloma Ventura, Tatiana Souza Oliveira

Rev Paul Pediatr. 2023 Apr 7;41:e2022016. doi: 10.1590/1984-0462/2023/41/2022016. eCollection 2023.

Objective: To describe the health-related quality of life (QOL) in children with cerebral palsy (CP) associated with congenital Zika infection. Methods: Cross-sectional study of a consecutive series of children, followed in a referral multicentric rehabilitation network in Brazil. We invited the caregivers to respond to the Brazilian version of the Caregiver Priorities & Child Health Index of Life with Disabilities (CPCHILDTM) questionnaire. Statistical analysis was performed with the Statistical Package for the Social Sciences (SPSS) 26.0™. We used absolute and relative frequencies for categorical variables and mean and standard deviation for continuous variables. Results: The sample consisted of 193 children, at mean age of 50.3±7.6 months. We observed a predominance of children with cerebral palsy (CP) with Gross Motor Function Classification System (GMFCS) level V (93.7%). Epilepsy (88.4%) was the most common comorbidity. CPCHILDTM mean scores were activities of daily living (ADL)/personal care 43.2±12.6; positioning, transferring and mobility 33.7±16.5; comfort and emotions 84.4±15.2; communication and social interaction (CoSI) 48.2±24.3; health 70.9±17.1; and overall quality of life (OQOL) 72.1±17.1. Total score was 54.8±11.3. Conclusions: Among children with cerebral palsy (CP) related to congenital Zika syndrome, the quality of life (QOL) scores were very similar to other populations with cerebral palsy (CP). The activities of positioning, transferring and mobility had the greatest impact on health-related quality of life (QOL). Rehabilitation strategies and public policies should prioritize aspects related to mobility for this population.

PMID: 37042942

28. Psychometric properties of the Obstacles and Curb tests and their discriminative ability across functional levels in ambulatory children with spastic cerebral palsy

Maha F Algabbani, Banan A Almass, Afaf A M Shaheen, Adel Alhusaini, Muneera M Almurdi, Samiah Alqabbani

Int J Rehabil Res. 2023 Apr 4. doi: 10.1097/MRR.0000000000000575. Online ahead of print.

The Obstacles and Curb tests are timed walking assessments that have emerged from the Spinal Cord Injury Functional Ambulation Profile and have been modified for children; however, their psychometric properties have not been adequately investigated. The aim of this research was to examine the psychometric properties of the Obstacles and Curb tests for children with cerebral palsy (CP). This cross-sectional study included 68 children aged 6-12 years; there were 34 children with CP and 34 age- and sex-matched typically developing children. Validity was examined by correlation with the 10-m Walk Test (10-MWT), Modified Time Up and Go test (mTUG), and Pediatric Balance Scale (PBS). Differences in the Obstacle and Curb test scores were calculated between children with CP and typically developing children and within different Gross Motor Function Classification System (GMFCS) levels. Children with CP completed the tests twice within a 30-min interval in the same session. The tests showed significant strong to very strong correlations with the 10-MWT, mTUG, and PBS. The within-session reliability was excellent, typically developing children were significantly faster than children with CP with high sensitivity and specificity, and the time differed significantly within the GMFCS level. Thus, the Obstacles and Curb tests can be considered valid, reliable, and sensitive walking tests for ambulatory children with CP.

PMID: 37042182

29. Randomized clinical trials of physical therapy for cerebral palsy: a review of study outcomes, methodological quality, and publication merits

André L F Meireles, Natália A Menegol, Giovana A Perin, Luciana S Sanada

Int J Rehabil Res. 2023 Apr 4. doi: 10.1097/MRR.0000000000000576. Online ahead of print.

The study aimed to examine the main characteristics of clinical trials of motor interventions in physical therapy in children with cerebral palsy (CP). The Physiotherapy Evidence Database (PEDro) was used to collect information on clinical trials regarding motor outcomes in physical therapy in children with CP. Two reviewers independently screened, selected the studies, and extracted data. The characteristics extracted were CP subtype; age group; gross motor function and manual motor ability; methodological quality; open access status; 2020 journal impact factor, Consolidated Standards of Reporting Trials (CONSORT) endorsement; primary outcome; intervention adopted, and assessment instruments. The search strategy resulted in 313 articles from 120 different journals. Most of the clinical trials included participants with spastic bilateral subtype, aged between 6 and 12 years old, and with fewer limitations in gross and manual motor abilities. The most used primary outcomes covering the International Classification of Functioning, Disability and Health (ICF) domain of activity were gross motor function (18.8%) and upper limb and hand function (16.3%), with the Gross Motor Function Measurement being the most frequently used instrument (19.8%). Articles with better scores on the PEDro scale were published in journals with a higher impact factor, and higher rates of CONSORT endorsement, and most were not open access. Clinical trials investigating motor interventions used in physical therapy for children with CP tend to focus on patients with milder gross and manual motor function impairments and often explore the body function domain of the ICF. Furthermore, these studies have moderate methodological quality, and a substantial proportion of them fail to follow adequate reporting and methodological recommendations.

PMID: 37042180

30. Umbilical cord blood acid-base analysis at birth and long-term neurodevelopmental outcomes in children: a systematic review and meta-analysis

H T Myrhaug, A Kaasen, A S D Pay, L Henriksen, G Smedslund, O D Saugstad, E Blix

Review BJOG. 2023 Apr 11. doi: 10.1111/1471-0528.17480. Online ahead of print.

Background: Umbilical cord blood acid-base sampling is routinely performed at many hospitals. Recent studies have questioned this practice and the association of acidosis with cerebral palsy. Objective: To investigate the associations between the results of umbilical cord blood acid-base analysis at birth and long-term neurodevelopmental outcomes and mortality in children. Search strategy: We searched six databases using the search strategy: umbilical cord AND outcomes. Selection criteria: Randomised controlled trials, cohorts and case-control studies from high-income countries that investigated the association between umbilical cord blood analysis and neurodevelopmental outcomes and mortality from 1 year after birth in children born at term. Data collection and analysis: We critically assessed the included studies, extracted data and conducted meta-analyses comparing adverse outcomes between children with and without acidosis, and the mean proportions of adverse outcomes. The certainty of evidence was assessed using the Grading of Recommendations, Assessment, Development and Evaluations approach. Main results: We have very low confidence in the following findings: acidosis was associated with higher cognitive development scores compared with non-acidosis (mean difference 5.18, 95% CI 0.84-9.52; n = two studies). Children with acidosis also showed a tendency towards higher risk of death (relative risk [RR] 5.72, 95% CI 0.90-36.27; n = four studies) and CP (RR 3.40, 95% CI 0.86-13.39; n = four studies), although this was not statistically significant. The proportion of children with CP was 2.39/1000 across the studies, assessed as high certainty evidence. Conclusion: Due to low certainty of evidence, the associations between umbilical cord blood gas analysis at delivery and long-term neurodevelopmental outcomes in children remains unclear.

PMID: 37041099

31. Diffusion Tensor Imaging to Predict Neurodevelopmental Impairment in Infants After Hypoxic-Ischemic Injury

Christa Tabacaru, Adebayo Braimah, Beth Kline-Fath, Nehal Parikh, Stephanie Merhar

Am J Perinatol. 2023 Apr 11. doi: 10.1055/a-2071-3057. Online ahead of print.

Background: MRI is standard of care for evaluation of brain injury after hypoxic-ischemic encephalopathy (HIE) in term newborns. This study utilizes diffusion tensor imaging (DTI) to 1) identify infants at highest risk of development of cerebral palsy (CP) following HIE and to 2) identify regions of the brain critical to normal fidgety general movements (GMs) at 3-4 months post-term. Absence of these normal, physiologic movements is highly predictive of CP. Methods: Term infants treated with hypothermia for HIE from January 2017 to December 2021 were consented for participation and had brain MRI with DTI after rewarming. The Prechtl General Movements Assessment (GMA) was performed at 12-16 weeks of age. Structural MRI

images were reviewed for abnormalities, and DTI data were processed with the FMRIB Software Library (FSL). Infants underwent the Bayley Scales of Infant and Toddler Development III test at 24 months. Results: 45 infant families were consented; three infants died prior to MRI and were excluded, and a fourth infant was excluded due to diagnosis of a neuromuscular disorder. 21 infants were excluded due to major movement artifact on diffusion images. Ultimately, 17 infants with normal fidgety GMs were compared to 3 infants with absent fidgety GMs with similar maternal and infant characteristics. Infants with absent fidgety GMs had decreased fractional anisotropy of several important white matter tracts, including the posterior limb of the internal capsule, optic radiations, and corpus callosum ($p<0.05$). All three infants with absent fidgety GMs and two with normal GMs went on to be diagnosed with CP. Conclusion: This study identifies white matter tracts of the brain critical to development of normal fidgety GMs in infants at 3-4 months post-term using advanced MRI techniques. These findings identify those at highest risk for CP among infants with moderate/severe HIE prior to hospital discharge.

PMID: 37040878

32. Evaluation of the impact of continuous Kangaroo Mother Care (KMC) initiated immediately after birth compared to KMC initiated after stabilization in newborns with birth weight 1.0 to < 1.8 kg on neurodevelopmental outcomes: Protocol for a follow-up study

E A Adejuyigbe, I Agyeman, P Anand, H C Anyabolu, S Arya, E N Assenga, S Badhal, N W Brobby, H K Chellani, N Chopra, P K Debata, Q Dube, T Dua, L Gadama, R Gera, C K Hammond, S Jain, F Kantumbiza, K Kawaza, E N Kija, P Lal, M Mallewa, M K Manu, A Mehta, T Mhango, H E Naburi, S Newton, I Nyanor, P A Nyako, O J Oke, A Patel, G Phlange-Rhule, R Sehgal, R Singhal, N Wadhwa, A B Yiadom

Trials. 2023 Apr 10;24(1):265. doi: 10.1186/s13063-023-07192-5.

Background: Preterm birth or low birth weight is the single largest cause of death in newborns, however this mortality can be reduced through newborn care interventions, including Kangaroo Mother Care (KMC). Previously, a multi-country randomized controlled trial, coordinated by the World Health Organization (WHO), reported a significant survival advantage with initiation of continuous KMC immediately after birth compared with initiation of continuous KMC a few days after birth when the baby is considered clinically stable. Whether the survival advantage would lead to higher rates of neurodevelopmental morbidities, or the immediate KMC will also have a beneficial effect on cognitive development also, has not been investigated. We therefore propose to test the hypothesis that low-birth-weight infants exposed to immediate KMC will have lower rates of neurodevelopmental impairment in comparison to traditional KMC-treated infants, by prospectively following up infants already enrolled in the immediate KMC trial for the first 2 years of life, and assessing their growth and neurodevelopment. Methods: This prospective cohort study will enroll surviving neonates from the main WHO immediate KMC trial. The main trial as well as this follow-up study are being conducted in five low- and middle-income countries in South Asia and sub-Saharan Africa. The estimated sample size for comparison of the risk of neurodevelopmental impairment is a total of 2200 children. The primary outcome will include rates of cerebral palsy, hearing impairment, vision impairment, mental and motor development, and epilepsy and will be assessed by the age of 3 years. The analysis will be by intention to treat. Discussion: Immediate KMC can potentially reduce low-birth-weight-associated complications such as respiratory disease, hypothermia, hypoglycemia, and infection that can result in impaired neurocognitive development. Neuroprotection may also be mediated by improved physiological stabilization that may lead to better maturation of neural pathways, reduced risk of hypoxia, positive parental impact, improved sleep cycles, and improved stress responses. The present study will help in evaluating the overall impact of KMC by investigating the long-term effect on neurodevelopmental impairment in the survivors.

PMID: 37038239

33. Impact of Etiology on Seizure and Quantitative Functional Outcomes in Children with Cerebral Palsy (CP) and Medically Intractable Epilepsy (MIE) Undergoing Hemispherotomy/Hemispherectomy

Mark A Damante, Nathan Rosenberg, Ammar Shaikhouni, Hannah K Johnson, Jeffrey W Leonard, Adam P Ostendorf, Jonathan A Pindrik

World Neurosurg. 2023 Apr 8;S1878-8750(23)00490-4. doi: 10.1016/j.wneu.2023.04.016. Online ahead of print.

Objective: To compare functional and seizure outcomes in children with vascular and dysplastic etiologies of cerebral palsy (CP) and medically intractable epilepsy (MIE) following functional hemispherotomy (FH) or anatomic hemispherectomy (AH). Methods: Consecutive patients satisfying inclusion criteria from 07/01/2015 to 12/01/2019 were reviewed for demographic data and seizure (Engel classification) and functional (Functional Independence Measure for Children [WeeFIM]) outcomes. Results: After a mean follow up of 2 years 8 months (1 year 2 months), 11 of 18 patients achieved post-operative seizure freedom without significant difference between vascular (5/7) and dysplastic (6/11) etiologies ($p=0.64$). Functional assessments were completed for 15 of 18 of subjects, split comparably between groups. Mean change in WeeFIM from pre-operative baseline to inpatient rehabilitation admission (vascular, -35.3 (13.2); MCD, -34.5 (25.0); $p=0.69$), inpatient rehabilitation admission to discharge (vascular, 18.7 (9.0); MCD, 20.8 (11.4); $p=0.60$), and pre-operative evaluation to clinic follow-up (vascular, -7.6 (9.7); MCD, -3.6 (19.3); $p=0.61$) did not differ between groups. Conclusion: Quantitative functional and seizure outcomes following FH or AH did not differ significantly between vascular and dysplastic etiologies of CP and MIE in this

study. Hemispheric surgery resulted in minor functional declines from baseline following comprehensive multidisciplinary therapy.

PMID: 37037367

34. Dystonic Cerebral Palsy Phenotype Due to GNAO1 Variant Responsive to Levodopa

Luiz Felipe Vasconcellos, Vinicius Pinheiro Soares, Lucas Leroux de Ricchezza

Case Reports Tremor Other Hyperkinet Mov (N Y). 2023 Apr 3;13:11. doi: 10.5334/tohm.746. eCollection 2023.

Background: Cerebral palsy (CP) should not be considered a diagnosis, but rather a syndrome related to several etiologies, including, but not limited to, neurological sequelae of a perinatal brain injury. Case report: 24-years-old man with dystonia and delayed motor and cognitive development had been previously diagnosed with CP. Molecular genetic testing identified a heterozygosity variant in GNAO 1 gene. A therapeutic trial with levodopa was started, with improvement of dystonia. Discussion: GNAO1 gene variant disorders share similarities with other causes of CP syndrome, and thus investigation of this variant should be included in instances of CP syndrome without a clear history of previous perinatal brain injury. GNAO1 dystonic phenotype (DYT-GNAO1) should be considered as dopa-responsive dystonia in some cases.

PMID: 37034444

35. Lived experiences of pain in children and young people with cerebral palsy

No authors listed

Dev Med Child Neurol. 2023 Apr 8. doi: 10.1111/dmcn.15608. Online ahead of print.

No abstract available

PMID: 37029551