Cerebral Palsy ALLIANCE

Cerebral palsy research news

Monday 29 July 2019

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
Macquarie Group Foundation Chair of Cerebral Palsy

Subscribe to CP Research News

Interventions and Management

1. The Impact of Manual Ability Level on Participation of Children with Cerebral Palsy in Life Areas: A Cross-Sectional Study.
Pashmdarfard M, Shervin Badv R.

Iran J Child Neurol. 2019 Summer;13(3):83-91.

OBJECTIVES: Participation is a complex and context-dependent concept, which several factors can influence it. The aim of this study was assessing the relationship between the upper extremity function level of children with cerebral palsy (all type of cerebral palsy and severity) and their participation in different life areas. MATERIALS & METHODS: This cross-sectional study assessed the relationship between the level of upper extremity function of cerebral palsy children and their participation in different life areas. Participants were 274 parents of children with cerebral palsy of the schools of children with special needs and occupational therapy clinics in Tehran, Iran in 2018. They completed the Manual Ability Classification System (MACS) to determine the level of upper extremity function of children with cerebral palsy and Children Participation Assessment Scale-Parent version (CPAS-P) (to determine the participation level of children with cerebral palsy) questionnaires separately. RESULTS: The mean age of children was 8 yr and 8 months old (at least 6 yr and maximum 12 yr). The correlation between the level of upper extremity function and the overall score of each dimension of participation is significant ($P<0.05$) and moderate. CONCLUSION: The upper extremity function of children with cerebral palsy has a moderate and significant relationship with the participation of children with cerebral palsy in different life areas and with different dimensions of participation especially parental satisfaction dimension. Therefore, there is a correlation between upper extremity function and participation in occupations, but this relationship is moderate and is not very strong.

PMID: 31327972

2. Effects of adjustments to wheelchair seat to back support angle on head, neck, and shoulder postures in subjects with cerebral palsy.
Alkhateeb AM, Daher NS, Forrester BJ, Martin BD, Jaber HM.

Assist Technol. 2019 Jul 24:1-7. doi: 10.1080/10400435.2019.1641167. [Epub ahead of print]

A wheelchair is usually a source of mobility for people with moderate to severe cerebral palsy, who are unable to walk. They spend long periods of time sitting in their wheelchair, which can affect their head and neck alignment. Opening the seat to back support angle of the wheelchair can modify realignment of body segments and improve posture. Aims: To examine the effect of seat to back support angle adjustments on head, neck, and shoulder postural alignment in people with cerebral palsy. Methods: Nine participants with cerebral palsy who use a wheelchair for mobility sat in a research wheelchair. Sagittal head angle (SHA), cervical angle (CVA), and shoulder angle (SA) from photographs were examined using the Coach's Eye device during three different seat to back support angles of the wheelchair (90°, 100°, 110°). Results: There were significant

differences in mean SHA and CVA among the different seat to back support angles ($p < .001$). However, there was no significant difference in mean SA. Conclusion: Head (SHA) and (CVA) alignment was closest to neutral posture with seat to back support angles set at 110°. Thus, adjusting the wheelchair back support to a 110º would provide the most appropriate sagittal head and cervical angle for this population.

PMID: 31339811

3. Hip Surveillance is Important to Children with Cerebral Palsy: Stop Waiting, Start Now.
Miller SD, Shore BJ, Mulpuri K.

J Am Acad Orthop Surg Glob Res Rev. 2019 Apr 10;3(4):e021. doi: 10.5435/JAAOSGlobal-D-19-00021. eCollection 2019 Apr.

PMID: 31334474

4. Long-term effects of selective dorsal rhizotomy in children with cerebral palsy: a systematic review.
Tedroff K, Hägglund G, Miller F.

Dev Med Child Neurol. 2019 Jul 24. doi: 10.1111/dmcn.14320. [Epub ahead of print]

AIM: To evaluate the long-term effects of selective dorsal rhizotomy (SDR) 10 years or more after the procedure and complications observed any time after SDR in children with cerebral palsy (CP). METHOD: Embase, PubMed, and the Cochrane Library were searched from their individual dates of inception through 1st June 2018 for full-text original articles in English that described long-term follow-up after SDR in children with CP. The authors independently screened publications to determine whether they met inclusion criteria; thereafter all authors extracted data on patient characteristics, the proportion of the original cohort being followed-up, and the reported outcomes. RESULTS: Of the 199 studies identified, 16 were included in this evaluation: 14 were case series and two studies reported a retrospectively assigned comparison group. Evidence concerning function was limited by study design differences, clinical variability, loss to follow-up, and heterogeneity across trials. INTERPRETATION: At 10 years or more follow-up, available studies generate low-level evidence with considerable bias. No functional improvement of SDR over routine therapy is documented. Furthermore, the long-term effects of SDR with respect to spasticity reduction is unclear, with many studies reporting a high amount of add-on spasticity treatment. More long-term follow-up using robust scientific protocols is required before it can be decided whether the use of SDR as routine therapy for children with CP is to be recommended or not. WHAT THIS PAPER ADDS: Ten years after selective dorsal rhizotomy, available studies supply inconclusive evidence on functional outcomes. The long-term effect on spasticity is uncertain, studies reported a substantial need for add-on treatment. Short- and long-term complications seem frequent but are not reported in a consistent manner.

PMID: 31342516

5. Effects of upper extremity surgery on activities and participation of children with cerebral palsy: a systematic review.
Louwers A, Warnink-Kavelaars J, Daams J, Beelen A.

Dev Med Child Neurol. 2019 Jul 23. doi: 10.1111/dmcn.14315. [Epub ahead of print]

AIM: To evaluate and synthesize the evidence for effects of upper extremity surgery (UES) on activities and participation of children and adolescents with cerebral palsy (CP). METHOD: The databases MEDLINE, Embase, and PsycINFO were searched for publications up to September 2018. Studies included were comparative studies with or without concurrent comparison groups or case series with pretest/posttest outcomes with a minimal sample size of 10 participants; those that reported the effects of UES with a follow-up time of at least 5 months; those including patients diagnosed with CP aged up to 20 years; and those that used a validated activity-based instrument. Risk of bias was assessed using the ROBINS-I (Risk Of Bias In Non-randomised Studies - of Interventions) tool and quality assessment was performed using the Grading of Recommendations Assessment, Development and Evaluation. RESULTS: Twelve studies, involving 310 children and adolescents, were included. The ability and perception of the patient to use the hand(s) and perform activities (measured with the Shriners Hospital Upper Extremity Evaluation, Assisting Hand Assessment, and House Functional Classification) improved significantly after UES. The quality of evidence was very low for each of the activity outcomes of interest. INTERPRETATION: The very low evidence prohibits recommendations on the use of UES to guide clinical practice. More

high-quality comparative studies are needed to obtain better insight into the effects of UES on activities and participation. WHAT THIS PAPER ADDS: Low quality of evidence for effects of upper extremity surgery (UES) on activities and participation. Limited evidence for improvement in activities and participation after UES.

PMID: 31334566

6. Effects of functional power training on gait kinematics in children with cerebral palsy.
Oudenhoven LM, van Vulpen LF, Dallmeijer AJ, de Groot S, Buizer AI, van der Krogt MM.

Gait Posture. 2019 Jul 16;73:168-172. doi: 10.1016/j.gaitpost.2019.06.023. [Epub ahead of print]

BACKGROUND: Muscle weakness is one of the most prevalent symptoms in children with cerebral palsy (CP). Although recent studies show that functional power training can improve strength and functional capacity in young children with CP, effects on specific gait parameters have not previously been reported. RESEARCH QUESTION: What are the effects of functional power training on gait in children with CP? Specifically, we investigated effects of training on gait kinematics and spatiotemporal parameters, and whether these were dependent on walking speed. METHODS: Ten children with CP (age 5-10 years, GMFCS I-II) participated in a functional power training program. At the start and end of the program, children underwent 3D gait analysis on a treadmill at a gradual range of walking speeds (70-175% of their comfortable walking speed). Multilevel (linear mixed model) analysis was used to evaluate effects pre-post training at different walking velocities. RESULTS: Although children's self-chosen comfortable walking speed improved (0.71 ± 0.25 to 0.85 ± 0.25 m/s, $p < .05$), effects on gait kinematics at similar speed were limited and only exceeded statistical and clinically meaningful thresholds when children walked at higher walking speed. At fast speeds, improvements up to 5° were found in knee and hip extension during stance ($p < .01$). SIGNIFICANCE: This study demonstrates that gait kinematics can improve after functional power training, but the magnitude of effects is dependent on walking speed. In this light, improvements are underestimated when evaluating gait at pre-training comfortable walking speed only.

PMID: 31344605

7. Treadmill therapy in cerebral palsy.
Mall V.

Eur J Paediatr Neurol. 2019 Jul;23(4):543. doi: 10.1016/j.ejpn.2019.06.007.

PMID: 31324276

8. Efficacy of the Small Step Program in a Randomized Controlled Trial for Infants under 12 Months Old at Risk of Cerebral Palsy (CP) and Other Neurological Disorders.
Holmström L, Eliasson AC, Almeida R, Furmark C, Weiland AL, Tedroff K, Löwing K.

J Clin Med. 2019 Jul 11;8(7). pii: E1016. doi: 10.3390/jcm8071016.

The objective was to evaluate the effects of the Small Step Program on general development in children at risk of cerebral palsy (CP) or other neurodevelopmental disorders. A randomized controlled trial compared Small Step with Standard Care in infants recruited at 4-9 months of corrected age (CA). The 35-week intervention targeted mobility, hand use, and communication during distinct periods. The Peabody Developmental Motor Scales2ed (PDMS-2) was the primary outcome measure. For statistical analysis, a general linear model used PDMS-2 as the main outcome variable, together with a set of independent variables. Thirty-nine infants were randomized to Small Step ($n = 19$, age 6.3 months CA (1.62 SD)) or Standard Care ($n = 20$, age 6.7 months CA (1.96 SD)). Administering PDMS-2 at end of treatment identified no group effect, but an interaction between group and PDMS-2 at baseline was found ($p < 0.02$). Development was associated with baseline assessments in the Standard Care group, while infants in the Small Step group developed independent of the baseline level, implying that Small Step helped the most affected children to catch up by the end of treatment. This result was sustained at 2 years of age for PDMS-2 and the PEDI mobility scale.

PMID: 31336705

9. Effect of Group-Task-Oriented Training on Gross and Fine Motor Function, and Activities of Daily Living in Children with Spastic Cerebral Palsy.
Ko EJ, Sung IY, Moon HJ, Yuk JS, Kim HS, Lee NH.

Phys Occup Ther Pediatr. 2019 Jul 24:1-13. doi: 10.1080/01942638.2019.1642287. [Epub ahead of print]

Aims: To determine the effects of group-task-oriented training (group-TOT) on gross and fine motor function, activities of daily living (ADL) and social function of children with spastic cerebral palsy (CP). Methods: Eighteen children with spastic CP (4-7.5 years, gross motor function classification system level I-III) were randomly assigned to the Group-TOT (9 children received group-TOT for 1 hour, twice a week for 8 weeks) or the comparison group (9 children received individualized traditional physical and occupational therapy). The Gross Motor Function Measure (GMFM)-88, the Bruininks-Oseretsky Test of Motor Proficiency 2nd edition (BOT-2), and the Pediatric Evaluation of Disability Inventory (PEDI) were administered before and after the intervention, and in the Group-TOT, 16 weeks after the intervention. Results: Children in the Group-TOT showed significant improvements in the GMFM-88 standing and walking/running/jumping subscales, the BOT-2 manual dexterity subscale, and the PEDI social function subscale ($p < 0.05$); changes were maintained 16 weeks after the intervention ended. In contrast, the comparison group improved in only the BOT-2 fine motor integration subscale ($p < 0.05$). Conclusions: The findings provide evidence of effectiveness of group-TOT in improving gross and fine motor function, and social function in children with CP.

PMID: 31339403

10. Correction: Balance and mobility training at home using Wii Fit in children with cerebral palsy: a feasibility study.
[No authors listed]

BMJ Open. 2018 Jul 16;8(7). pii: bmjopen-2017-019624corr1. doi: 10.1136/bmjopen-2017-019624corr1. eCollection 2018. [This corrects the article DOI: 10.1136/bmjopen-2017-019624.].

Erratum for Balance and mobility training at home using Wii Fit in children with cerebral palsy: a feasibility study. [BMJ Open. 2018]

PMID: 31329779

11. Feasibility and safety of Robot Suit HAL treatment for adolescents and adults with cerebral palsy.
Ueno T, Watanabe H, Kawamoto H, Shimizu Y, Endo A, Shimizu T, Ishikawa K, Kadone H, Ohto T, Kamada H, Marushima A, Hada Y, Muroi A, Sankai Y, Ishikawa E, Matsumura A, Yamazaki M.

J Clin Neurosci. 2019 Jul 20. pii: S0967-5868(19)30760-X. doi: 10.1016/j.jocn.2019.07.026. [Epub ahead of print]

To investigate whether Robot Suit HAL treatment (HAL-T) is safe and feasible for gait disorders in adolescents and adults with cerebral palsy (CP). We tested HAL-T in adolescents and adults with bilateral spastic CP (four men, four women; mean age: 18.2 years). Three participants were classified as level III under the Gross Motor Function Classification System (GMFCS), and five were classified as level IV. The participants underwent HAL-T twice per week for 4 weeks. The outcome measures, which were assessed before and after HAL-T, included comfortable gait speed (CGS), step length (SL), cadence, and GMFCS level. Adverse events were noted. All participants completed the HAL-T sessions despite some mild adverse events occurring. The mean increases in CGS, SL, and cadence were 0.19 ± 0.14 m/s ($p = 0.006$), 0.09 ± 0.08 m ($p = 0.020$), and 18.0 ± 15.9 steps/min ($p = 0.015$), respectively. HAL-T is safe and feasible for gait disorders in patients with CP. HAL-T can significantly improve CGS, SL, and cadence and may be effective for improving walking ability in adolescents and adults with CP.

PMID: 31337581

12. The Effects of Virtual Reality on Motor Functions and Daily Life Activities in Unilateral Spastic Cerebral Palsy: A Single-Blind Randomized Controlled Trial.
Şahin S, Köse B, Aran OT, Ağce ZB, Kayıhan H.

Games Health J. 2019 Jul 23. doi: 10.1089/g4h.2019.0020. [Epub ahead of print]

Aim: This study was designed to investigate the effects of virtual reality (VR) through Kinect on both gross and fine motor functions and independence in daily living activities in children with unilateral spastic cerebral palsy (USCP). Materials and Methods: This study was designed as a single-blind, randomized, controlled trial. Sixty children with USCP were randomized and split equally between the VR intervention group (10 females and 20 males with a mean age of 10.5 ± 3.62 years) and the traditional occupational therapy (TOT) intervention group (13 females and 17 males with a mean age of 10.06 ± 3.24 years). Both groups were evaluated in terms of motor functioning via the Bruininks-Oseretsky Test of Motor Proficiency-Short Form (BOTMP-SF) and were assessed in accordance with independence in daily activities via the WeeFunctional Independence Measure (WeeFIM). Interventions were conducted for 8 weeks with the main objective of improving motor functions and independence in daily activities. Results: Total motor functions and total independence in daily lives in both groups improved after 8 weeks of intervention. A comparison between groups revealed significantly greater improvements in both gross and fine motor functions and daily activities in the VR group than in the TOT group ($P < 0.001$). Conclusion: The Kinect-based VR intervention approach is important to improving motor functions and independence in daily activities of children with USCP.

PMID: 31335174

13. Rehabilitation for Children With Dystonic Cerebral Palsy Using Haptic Feedback in Virtual Reality: Protocol for a Randomized Controlled Trial.
McNish RN, Chembrammel P, Speidel NC, Lin JJ, López-Ortiz C.

JMIR Res Protoc. 2019 Jan 14;8(1):e11470. doi: 10.2196/11470.

BACKGROUND: Cerebral palsy (CP) is the most common developmental motor disorder in children. Individuals with CP demonstrate abnormal muscle tone and motor control. Within the population of children with CP, between 4% and 17% present dystonic symptoms that may manifest as large errors in movement tasks, high variability in movement trajectories, and undesired movements at rest. These symptoms of dystonia typically worsen with physical intervention exercises. OBJECTIVE: The aim of this study is to establish the effect of haptic feedback in a virtual reality (VR) game intervention on movement outcomes of children with dystonic CP. METHODS: The protocol describes a randomized controlled trial that uses a VR game -based intervention incorporating fully automated robotic haptic feedback. The study consists of face-to-face assessments of movement before, after, and 1 month following the completion of the 6-session game-based intervention. Children with dystonic CP, aged between 7 and 17 years, will be recruited for this study through posted fliers and laboratory websites along with a group of typically developing (TD) children in the same age range. We anticipate to recruit a total of 68 participants, 34 each with CP and TD. Both groups of children will be randomly allocated into an intervention or control group using a blocked randomization method. The primary outcome measure will be the smoothness index of the interaction force with the robot and of the accelerometry signals of sensors placed on the upper limb segments. Secondary outcomes include a battery of clinical tests and a quantitative measure of spasticity. Assessors administering clinical measures will be blinded. All sessions will be administered on-site by research personnel. RESULTS: The trial has not started and is pending local institutional review board approval. CONCLUSIONS: Movement outcomes will be examined for changes in muscle activation and clinical measures in children with dystonic CP and TD children. Paired t tests will be conducted on movement outcomes for both groups of children independently. Positive and negative results will be reported and addressed. TRIAL REGISTRATION: ClinicalTrials.gov NCT03744884; https://clinicaltrials.gov/ct2/show/NCT03744884 (Archived by WebCite at http://www.webcitation.org/74RSvmbZP). INTERNATIONAL REGISTERED REPORT IDENTIFIER (IRRID): PRR1-10.2196/11470.

PMID: 31344678

14. High-risk follow-up: Early intervention and rehabilitation.
Novak I, Morgan C.

Handb Clin Neurol. 2019;162:483-510. doi: 10.1016/B978-0-444-64029-1.00023-0.

Early detection of childhood disability is possible using clinically available tools and procedures. Early detection of disability enables early intervention that maximizes the child's outcome, prevents the onset of complications, and supports parents. In this chapter, first we summarize the best-available tools for accurately predicting major childhood disabilities early, including autism spectrum disorder, cerebral palsy, developmental coordination disorder, fetal alcohol spectrum disorder, intellectual disability, hearing impairment, and visual impairment. Second, we provide an overview of the preclinical and clinical evidence for inducing neuroplasticity following brain injury. Third, we describe and appraise the evidence base for: (a) training-based interventions that induce neuroplasticity, (b) rehabilitation interventions not focused on inducing neuroplasticity, (c) complementary and alternative interventions, (d) environmental enrichment interventions in the neonatal intensive care and community settings, and (e) parent-child interaction interventions in the neonatal intensive care and community settings.

Fourth, we explore emergent treatment options at clinical trial, designed to induce brain repair following injury. In conclusion, early diagnosis enables early intervention, which improves child and parent outcomes. We now know which interventions provide the biggest gains and the information can be used to help inform parental decision making when designing treatment plans for their children.

PMID: 31324326

15. Prevalence of drooling, swallowing, and feeding problems in cerebral palsy across the lifespan: a systematic review and meta-analyses.
Speyer R, Cordier R, Kim JH, Cocks N, Michou E, Wilkes-Gillan S.

Dev Med Child Neurol. 2019 Jul 22. doi: 10.1111/dmcn.14316. [Epub ahead of print]

AIM: To determine the prevalence of drooling, swallowing, and feeding problems in persons with cerebral palsy (CP) across the lifespan. METHOD: A systematic review was conducted using five different databases (AMED, CINAHL, Embase, MEDLINE, and PubMed). The selection process was completed by two independent researchers and the methodological quality of included studies was assessed using the STROBE and AXIS guidelines. Meta-analyses were conducted to determine pooled prevalence estimates of drooling, swallowing, and feeding problems with stratified group analyses by type of assessment and Gross Motor Function Classification System level. RESULTS: A total of 42 studies were included. Substantial variations in selected outcome measures and variables were observed, and data on adults were limited. Pooled prevalence estimates determined by meta-analyses were as high as 44.0% (95% confidence interval [CI] 35.6-52.7) for drooling, 50.4% (95% CI 36.0-64.8) for swallowing problems, and 53.5% (95% CI 40.7-65.9) for feeding problems. Group analyses for type of assessments were non-significant; however, more severely impaired functioning in CP was associated with concomitant problems of increased drooling, swallowing, and feeding. INTERPRETATION: Drooling, swallowing, and feeding problems are very common in people with CP. Consequently, they experience increased risks of malnutrition and dehydration, aspiration pneumonia, and poor quality of life. WHAT THIS PAPER ADDS: Drooling, swallowing, and feeding problems are very common in persons with cerebral palsy (CP). The prevalence of drooling, swallowing, and feeding problems is 44.0%, 50.4%, and 53.5% respectively. There are limited data on the prevalence of drooling, swallowing, and feeding problems in adults. Higher Gross Motor Function Classification System levels are associated with higher prevalence of drooling, swallowing, and feeding problems. There is increased risk for malnutrition, dehydration, aspiration pneumonia, and poor quality of life in CP.

PMID: 31328797

16. [Efficiency of the differentiated use of physiobalneotherapy for borderline mental disorders in mothers of children with cerebral palsy].
Kradinova EA, Moshkova ED, Nazarova EV.

Vopr Kurortol Fizioter Lech Fiz Kult. 2019;96(3):16-24. doi: 10.17116/kurort20199603116. [Article in Russian; Abstract available in Russian from the publisher]

BACKGROUND: Child disability, especially as a result of nervous system diseases, affects all aspects of family life, causing extreme emotional and physical exhaustion in parents. However, today there is not enough scientific evidence on the features of development of nonpsychotic mental disorders in parents raising children with cerebral palsy and on the possibilities of using modern physiotherapy methods to correct these conditions and comorbidities. Considering that sanatorium-resort rehabilitation in children with cerebral palsy is accompanied by their parents, it is urgent to optimize clinical and functional approaches to treating mothers with borderline mental disorders with the simultaneous rehabilitation of children in sanatorium-resort conditions. AIM: To study the efficiency of sanatorium-resort treatment aimed at the psychological correction of mothers accompanying children with cerebral palsy to a sanatorium. MATERIAL AND METHODS: The study enrolled 151 mothers who had borderline mental disorders and raised children with cerebral palsy. A study group included 103 women aged 33.2±0.6 years; a comparison group consisted of 48 mothers aged 31.8±0.5 years. The examination was conducted before sanatorium-resort treatment and after a therapy cycle. The mothers underwent clinical and psychodiagnostic examinations via the standardized Minnesota Multiphasic Personality Inventory (a short form) MMPI-mini (adapted by L.N. Sobchik, 2000); emotional and motivational sphere study the WAM (well-being, activity, mood) questionnaire, the Spielberger-Khanin Inventory, and the Depression Rating Scale (adapted by T.I. Balashova). The patients of both groups received combination treatment: the comparison group (n=48) had a general sanatorium-resort therapeutic complex and group psychotherapy; the study group (n=103) additionally took valerian-bromine baths based on sodium chloride water with a mineralization of 20 g/dm3), and a transcranial magnetic therapy cycle. RESULTS: The general sanatorium-and-resort complex with psychotherapy predominantly affected the quality of night sleep ($p<0.01$) and reduced personality disorders according to the hypochondria scale (from 74.60±7.52 to 52.91±4.04 scores, $p<0.01$). The additional use of transcranial magnetic therapy and valerian-

bromine baths based on sodium chloride water in the mothers had a psychocorrecting effect recorded according to basic (hysteria, psychopathy, psychasthenia) scales. Reduced depression was noted in 36.4% of the mothers (7% in the comparison group). CONCLUSION: Transcranial magnetic therapy used in combination with valerian-bromine baths based on sodium chloride water and with psychotherapy in mothers with borderline mental disorders, by taking into account psychological dysregulation, contributed to increases in the body's clinical and functional reserves within 6-8 months and to the preservation of psychological adaptation in 54.7% of cases. Incorporation of a maternal psychocorrective complex into the sanatorium-resort treatment of a child with cerebral palsy is a promising method for improving the quality of treatment outcomes in a sanatorium.

PMID: 31329185

17. Correlation between Sleep Disorders and Function in Children with Spastic Cerebral Palsy.
Ghorbanpour Z, Hosseini SA, Akbarfahimi N, Rahgozar M.

Iran J Child Neurol. 2019 Summer;13(3):35-44.

OBJECTIVES: The aim of the present study was to explain the correlation between sleep disorders and function in children with spastic cerebral palsy (4-12 year). MATERIALS & METHODS: This cross-sectional study was carried out on 62 children with spastic CP (8.98±1.46 yr) recruited from rehabilitation clinics of Tehran, Iran in 2017. The Activities Scale for Kids, The Sleep Disturbance Scale for Children and the cerebral palsy Quality of Life questionnaire for Children were utilized in this study. Data were analyzed using SPSS software. RESULTS: Children with sleep disorder and arousal disorders had lower family health, lower quality of life and lower level of independence in their activities ($P< 0.05$). CONCLUSION: These results emphasize on the necessity of more attention about sleep disorders and family health problems in children with cerebral palsy.

PMID: 31327967

18. Narcolepsy - clinical spectrum, aetiopathophysiology, diagnosis and treatment.
Bassetti CLA, Adamantidis A, Burdakov D, Han F, Gay S, Kallweit U, Khatami R, Koning F, Kornum BR, Lammers GJ, Liblau RS, Luppi PH, Mayer G, Pollmächer T, Sakurai T, Sallusto F, Scammell TE, Tafti M, Dauvilliers Y.

Nat Rev Neurol. 2019 Jul 19. doi: 10.1038/s41582-019-0226-9. [Epub ahead of print]

Narcolepsy is a rare brain disorder that reflects a selective loss or dysfunction of orexin (also known as hypocretin) neurons of the lateral hypothalamus. Narcolepsy type 1 (NT1) is characterized by excessive daytime sleepiness and cataplexy, accompanied by sleep-wake symptoms, such as hallucinations, sleep paralysis and disturbed sleep. Diagnosis is based on these clinical features and supported by biomarkers: evidence of rapid eye movement sleep periods soon after sleep onset; cerebrospinal fluid orexin deficiency; and positivity for HLA-DQB1*06:02. Symptomatic treatment with stimulant and anticataplectic drugs is usually efficacious. This Review focuses on our current understanding of how genetic, environmental and immune-related factors contribute to a prominent (but not isolated) orexin signalling deficiency in patients with NT1. Data supporting the view of NT1 as a hypothalamic disorder affecting not only sleep-wake but also motor, psychiatric, emotional, cognitive, metabolic and autonomic functions are presented, along with uncertainties concerning the 'narcoleptic borderland', including narcolepsy type 2 (NT2). The limitations of current diagnostic criteria for narcolepsy are discussed, and a possible new classification system incorporating the borderland conditions is presented. Finally, advances and obstacles in the symptomatic and causal treatment of narcolepsy are reviewed.

PMID: 31324898

19. Neurodevelopmental outcomes in infants treated with intravitreal bevacizumab versus laser.
Raghuram K, Isaac M, Yang J, AlAli A, Mireskandari K, Ly LG, Kelly E, Banihani R, Shah PS, Tehrani N.

J Perinatol. 2019 Jul 24. doi: 10.1038/s41372-019-0420-z. [Epub ahead of print]

OBJECTIVE: To compare neurodevelopmental and visual outcomes in preterm infants treated with intravitreal bevacizumab (IVB) to laser ablation at 18-24 months corrected age. STUDY DESIGN: A retrospective study was performed. The primary outcome was neurodevelopmental impairment (NDI). Secondary neurodevelopmental outcomes were significant NDI (sNDI),

cerebral palsy, hearing loss, and composite scores of the Bayley Scales of Infant Development, Third edition. Visual outcomes included structural and refractive outcomes. Adjusted odds ratios (AOR) were calculated controlling for GA, sex, and ROP severity and confounding baseline characteristics using a cutoff of $p < 0.20$. RESULTS: Thirty-four (60 eyes) infants receiving IVB and 30 (51 eyes) laser were included. No significant differences were identified in NDI (AOR 1.77, 95% CI 0.46, 6.73) or sNDI (AOR 2.31, 95% CI 0.75, 7.14). There were no other differences in outcomes. CONCLUSIONS: Larger randomized trials are required to establish long-term efficacy and safety of IVB in preterm neonates.

PMID: 31341226

20. Outcome in preterm infants with seizures.
Pisani F, Spagnoli C.

Handb Clin Neurol. 2019;162:401-414. doi: 10.1016/B978-0-444-64029-1.00019-9.

Most neonatal seizures in preterm newborns are of acute symptomatic origin with a prevalence higher than in full-term infants. To date, recommendations for management of seizures in preterm newborns are scarce and do not differ from those in full-term newborns. Mortality in preterm newborns with seizures has significantly declined over the last decades, from figures of 84%-94% in the 1970s and 1980s to 22%-45% in the last years. However, mortality is significantly higher in those with a birth weight<1000g and a gestational age<28 weeks. Seizures are a strong predictor of unfavorable outcomes, including not only cerebral palsy, epilepsy, and intellectual disability, but also vision, hearing impairment, and microcephaly. The majority of patients with developmental delay are severely affected and this is usually associated with cerebral palsy. Furthermore, the incidence of epilepsy after neonatal seizures seems to be lower in preterm than in full-term infants but the risk is approximately 40 times greater than in the general population. Clinical studies cannot disentangle the specific and independent contributions of seizure-induced functional changes and the role of etiology and brain damage severity in determining the long-term outcomes in these newborns.

PMID: 31324322

21. Congenital and perinatal infections.
Ostrander B, Bale JF.

Handb Clin Neurol. 2019;162:133-153. doi: 10.1016/B978-0-444-64029-1.00006-0.

Congenital and perinatal infections represent major causes of permanent disability among children worldwide. Linked together by the acronym TORCH, denoting Toxoplasma gondii, rubella virus, cytomegalovirus, and herpes virus, congenital infections can result from only a modest number of human pathogens that cross the placenta and infect the fetus. Although congenital rubella syndrome has been eliminated in the Americas by immunization, several pathogens discussed in this chapter cannot currently be prevented by vaccines or effectively treated with the available antimicrobial drugs. Due to the immaturity of the immune system, newborn infants are at risk for postnatally acquired infections with certain viruses and several bacteria. This chapter summarizes the epidemiology, pathogenesis, clinical manifestations, diagnosis, treatment, and prevention of selected pathogens that can damage the developing nervous system. As emphasized by the persisting challenges of preventing congenital cytomegalovirus infection and the emergence of severe brain damage associated with congenital Zika syndrome, these pathogens remain important causes of cerebral palsy, epilepsy, and intellectual disability.

PMID: 31324308

22. Characterisation and monitoring of postoperative respiratory depression: current approaches and future considerations.
Ayad S, Khanna AK, Iqbal SU, Singla N.

Br J Anaesth. 2019 Jul 19. pii: S0007-0912(19)30502-1. doi: 10.1016/j.bja.2019.05.044. [Epub ahead of print]

Respiratory depression is common in patients recovering from surgery and anaesthesia. Failure to recognise and lack of timely institution of intervention can lead to catastrophic cardiorespiratory arrest, anoxic brain injury, and mortality. Opioid-induced respiratory depression (OIRD) is a common and often under-diagnosed cause of postoperative respiratory depression. Other

causes include residual anaesthesia, residual muscle paralysis, concurrent use of other sedatives, splinting from inadequate pain control, and obstructive sleep apnoea. Currently used methods to identify and monitor respiratory safety events in the post-surgical setting have serious limitations leading to lack of universal adoption. New tools and technologies currently under development are expected to improve the prediction of respiratory depression especially in patients requiring opioids to alleviate acute postoperative pain. In this narrative review, we discuss the various causes of postoperative respiratory depression, and highlight the advances in monitoring and early recognition of patients who develop this condition with an emphasis on OIRD.

PMID: 31331649

23. There is more to individuals with dyskinetic cerebral palsy than meets the eye.
Himmelmann K.

Eur J Paediatr Neurol. 2019 Jul;23(4):541. doi: 10.1016/j.ejpn.2019.06.005.

PMID: 31324274

24. Becoming a young adult with cerebral palsy.
Pizzighello S, Pellegri A, Vestri A, Sala M, Piccoli S, Flego L, Martinuzzi A.

Res Dev Disabil. 2019 Jul 19;92:103450. doi: 10.1016/j.ridd.2019.103450. [Epub ahead of print]

AIMS: This paper aims to describe the functioning profile of a clinical sample of patients with Cerebral Palsy at the time of transition. METHODS AND PROCEDURE: For this retrospective observational study, we considered data concerning 389 patients born from 1967 to 1997 with a diagnosis of CP and discharged at the age of 18 ± 3 from "La Nostra Famiglia" Children Care Centres. We reported data concerning: identifiable risk factors, the type of CP, the level of motor, manual and communication abilities, the occurrence of associated impairments and environmental factors, and examine the trends over the decades. OUTCOME AND RESULTS: The disorder was mainly bilateral (86%): 57% of patients had quadriplegia and 43% had diplegia. Most of patients had a spastic disorder (86%). Comorbidities were frequent, mainly intellectual developmental disorder (63.5%). One fifth of patients showed a severe impairment of motor, manual and communicative skills in addition to a severe intellectual development disorder. Over decades, the outcome as expressed by the motor functioning profile improved but the outcome as expressed by the global functioning profile worsened because of the growing number of severe multi-disabilities. CONCLUSION AND IMPLICATION: Knowledge about the functioning profile of young adults with cerebral palsy can support health services in the provision of developmentally appropriate care.

PMID: 31330443

25. A Cross-sectional Study of the Clinical Profile of Children With Cerebral Palsy in Benin, a West African Low-Income Country.
Sogbossi ES, Houekpetodji D, Kpadonou TG, Bleyenheuft Y.

J Child Neurol. 2019 Jul 24:883073819864516. doi: 10.1177/0883073819864516. [Epub ahead of print]

Cerebral palsy is a common cause of pediatric motor disability. Although there are increasing amounts of data on the clinical profile of children with cerebral palsy in high-income countries, corresponding information about low-income countries and developing countries is lacking. Therefore, we aimed to describe the clinical spectrum of cerebral palsy in children in Benin, a representative West African low-income country. Our cross-sectional observational study included 114 children with cerebral palsy recruited from community-based rehabilitation centers and teaching hospitals (median age: 7 years, range 2-17; sex: 66% male). Data were collected through review of medical records and interviews with children's mothers. Assessment included risk factors, clinical subtypes according to the Surveillance of CP in Europe criteria, severity of motor outcome scored by the Gross Motor Function Classification System (GMFCS) and Manual Ability Classification System, comorbidities, and school attendance. We recorded a high prevalence of intrapartum adverse events. Seventeen percent of children had postneonatal cerebral palsy, with cerebral malaria being the most common cause. Most children were severely affected (67.5% as bilateral spastic; 54.4% as GMFCS IV or V), but severity declined substantially with age. Only 23% of the children with cerebral palsy had attended school. Poor motor outcomes and comorbidities were associated with school nonattendance. These results suggest that intrapartum risk factors and postnatal cerebral malaria in infants are opportune targets for prevention of cerebral palsy in

Sub-Saharan low-income countries.

PMID: 31339409

26. 13-year diagnostic delay as cerebral palsy of an Iraqi patient with NBIA type 4.
Hadi AS, Saadi NW, Fahad QA.

Neurol Clin Pract. 2019 Jun;9(3):e22-e24. doi: 10.1212/CPJ.0000000000000622.

PMID: 31341721

Prevention and Cure

27. Enhancement of Motor Function Recovery after Spinal Cord Injury in Mice by Delivery of Brain-Derived Neurotrophic Factor mRNA.
Crowley ST, Fukushima Y, Uchida S, Kataoka K, Itaka K.

Mol Ther Nucleic Acids. 2019 Jun 29;17:465-476. doi: 10.1016/j.omtn.2019.06.016. [Epub ahead of print]

Spinal cord injury (SCI) is a debilitating condition that can cause impaired motor function or full paralysis. In the days to weeks following the initial mechanical injury to the spinal cord, inflammation and apoptosis can cause additional damage to the injured tissues. This secondary injury impairs recovery. Brain-derived neurotrophic factor is a secreted protein that has been shown to improve a variety of neurological conditions, including SCI, by promoting neuron survival and synaptic plasticity. This study treated a mouse model of contusion SCI using a single dose of brain-derived neurotrophic factor (BDNF) mRNA nanomicelles prepared with polyethylene glycol polyamino acid block copolymer directly injected into the injured tissue. BDNF levels in the injured spinal cord tissue were approximately doubled by mRNA treatment. Motor function was monitored using the Basso Mouse Scale and Noldus CatWalk Automated Gait Analysis System for 6 weeks post-injury. BDNF-treated mice showed improved motor function recovery, demonstrating the feasibility of mRNA delivery to treat SCI.

PMID: 31344657

28. The placenta.
Ravishankar S, Redline RW.

Handb Clin Neurol. 2019;162:57-66. doi: 10.1016/B978-0-444-64029-1.00003-5.

Examination of the placenta provides a unique opportunity to explore and understand the intrauterine environment, as well as providing a record of events that may be associated with adverse pregnancy outcomes, one of the most devastating of which is central nervous system (CNS) injury. A number of placental lesions have been described in association with various forms of neurologic injury. They can be divided into four major categories: sentinel events, inflammatory lesions, vascular lesions, and "biomarker" lesions, which are not themselves causative, but are often found in association with other lesions that are causative. The purpose of this review is to outline these placental lesions and summarize the types of CNS injury that have been described in association with each. Finally, one of the most important of all risk factors for CNS injury is the finding of multiple independent placental lesions. The effects of these lesions may be synergistic, particularly when metachronous, with an earlier lesion leaving the CNS more vulnerable to the effects of a later lesion.

PMID: 31324328