
Marneweck M, Kuo HC, Smorenburg ARP, Ferre CL, Flamand VH, Gupta D, Carmel JB, Bleyenheuft Y, Gordon AM, Friel KM.


BACKGROUND: In many children with unilateral spastic cerebral palsy (USCP), the corticospinal tract to the affected hand atypically originates in the hemisphere ipsilateral to the affected hand. Such ipsilateral connectivity is on average a predictor of poor hand function. However, there is high variability in hand function in these children, which might be explained by the complexity of motor representations of both hands in the contralateral hemisphere. OBJECTIVE: To measure the link between hand function and the size and excitability of motor representations of both hands, and their overlap, in the contralateral hemisphere of children with USCP. METHODS: We used single-pulse transcranial magnetic stimulation to measure the size and excitability of motor representations of both hands, and their overlap, in the contralateral hemisphere of 50 children with USCP. We correlated these measures with manual dexterity of the affected hand, bimanual performance, and mirror movement strength. RESULTS: The main and novel findings were (1) the large overlap in contralateral motor representations of the 2 hands and (2) the moderate positive associations of the size and excitability of such shared-site representations with hand function. Such functional associations were not present for overall size and excitability of representations of the affected hand. CONCLUSIONS: Greater relative overlap of the affected hand representation with the less-affected hand representation within the contralateral hemisphere was associated with better hand function. This association suggests that overlapping representations might be adaptively "yoked," such that cortical control of the child's less-affected hand supports that of the affected hand.

PMID: 29303031


BACKGROUND: The sense_assess© kids is a standardised, norm-referenced assessment designed to measure the functional somatosensation capacity of the upper limb of children with cerebral palsy. The objective of the current study was to determine if the sense_assess© kids was clinically acceptable to children and youth. METHODS: A questionnaire was completed by participants following administration of the sense_assess© kids by a trained occupational therapist. Twenty-six children with spastic hemiplegic cerebral palsy (aged 6-15 years six months; mean 10 years eight months; 16 boys) were recruited. Participants responded to questions regarding the administration and level of difficulty of the sense_assess© kids using a Q-Sort of 'like' and 'dislike', Likert scales and short answers. Content analysis was applied. RESULTS: Twenty-one of twenty-six children, indicated that they were 'very happy' or 'happy' with the administration process of the sense_assess© kids. Most participants indicated that they liked the sensation they felt in the hand when tested. CONCLUSION: This study has demonstrated the acceptability of sense_assess© kids for the population for whom it is intended.

PMID: 29282739
3. Piano jacket for perceiving and playing music for patients with cerebral palsy.

Lampe R, Turova V, Alves-Pinto A.


PURPOSE: Patients with cerebral palsy with severe motor disabilities are limited not only in everyday life activities but also in choice of their hobbies. Playing a musical instrument is for the majority not possible, even though music constitutes a central component of many relaxation activities for people with disabilities. To give affected patients the opportunity to make music and to learn piano playing through somatosensory perception, a prototype of piano jacket was developed. METHOD: A cycling jacket was equipped with boxes, each representing a musical note, incorporated into the sleeves. Each box contains vibration motors and LEDs. These can be used to translate the sequences of piano key presses performed at an external E-piano. An additional operation mode allows the user to actively play a melody himself by touching the same boxes that also incorporate touch sensor components. RESULTS: A working prototype of the piano jacket was developed. CONCLUSION: The sensory piano jacket provides patients with cerebral palsy and contractures the possibility to develop sensorimotor skills, motor abilities and participation in music-related activities. The jacket is planned to be used in music lessons. Implications for Rehabilitation The system is suitable even for patients with severe motor disabilities and especially joint contractures. Excellent handling through large easily accessible communication buttons. All building blocks are held in a garment, which allows for easy portability and gripping comfort.

PMID: 29276847

4. Effects of dynamic neuromuscular stabilization on diaphragm movement, postural control, balance and gait performance in cerebral palsy.

Son MS, Jung DH, You JSH, Yi CH, Jeon HS, Cha YJ.


PURPOSE: To determine the effects of a novel dynamic neuromuscular stabilization (DNS) technique on gross motor function, diaphragm movement, and activation of the external oblique (EO) and internal oblique (IO)/transversus abdominal (TrA) muscles in participants with cerebral palsy (CP). METHOD: Fifteen participants with CP (7 females) underwent DNS intervention for 30 minutes/day, 3 days a week for 4 weeks. Gross motor function, diaphragm movement, and muscle activation were determined using a gross motor function measure (GMFM-88), ultrasound, and electromyography measurements, respectively, before and after the DNS core stabilization intervention. Paired t-tests were used at p<0.05. DESIGN: A single-arm, pretest-posttest clinical trial. RESULTS: GMFM scores for standing, walking, and jumping domains were significantly improved after the intervention (P<0.05). Diaphragm descending movement (P=0.0001) and activation of the internal oblique and transversus abdominals were initially undetectable, but remarkably increased after the intervention (P=0.012). CONCLUSIONS: DNS is a promising, effective intervention for facilitating deep core muscle activation of the underactive muscle chain comprising the diaphragm, internal oblique, and transversus abdominals, thereby improving age-appropriate standing, walking, and jumping in participants with spastic diplegic CP.

PMID: 29254112

5. Are postural adjustments during reaching related to walking development in typically developing infants and infants at risk of cerebral palsy?

van Balen LC, Boxum AG, Dijkstra LJ, Hamer EG, Hielkema T, Reinders-Messelink HA, Hadders-Algra M.


BACKGROUND: In typical development, postural adjustments during reaching change in the second half of infancy, including increasing rates of direction-specific adjustments. These changes are absent or different in infants at risk of cerebral palsy (CP). To discover whether these changes are related to acquisition of independent walking, we studied postural adjustments during reaching in infants before and after they learned to walk. METHODS: Ten typically developing (TD) infants and 11 infants at very high risk (VHR) of CP were assessed before and after they learned to walk. Reaching movements were elicited during supported sitting, while surface electromyography was recorded of arm, neck, and trunk muscles. Percentages of direction-specific adjustments (first level of control), and recruitment patterns and anticipatory activation (second level of control) were calculated. RESULTS: In both groups, postural adjustments during reaching were similar before and after acquisition of independent walking. Direction-specificity increased with age in typically developing infants but not in VHR-infants. CONCLUSION: Increasing age rather than the transition to independent walking is associated with increasing direction-specificity of TD-infants during reaching while sitting, while infants at very high risk of CP show no increase in direction-specificity, suggesting that they gradually grow into a postural deficit.

PMID: 29268105


OBJECTIVE: To report current evidence regarding the safety of intramuscular BTI in children with orthopaedic- and neurological-related musculoskeletal disorders under the age of 2 years. DATA SOURCE: PUBMED, The Cochrane Library, and Science Direct, Google Scholar and Web of Science. STUDY SELECTION: Two reviewers independently selected studies based on predetermined inclusion criteria. DATA EXTRACTION: Data relating to the aim were extracted. Methodological quality was graded independently by 2 reviewers using the Physiotherapy Evidence Database assessment scale for randomized controlled trials (RCTs) and the Downs and Black evaluation tool for non-RCTs. Level of evidence was determined using the modified Sackett scale. DATA SYNTHESIS: Data of 473 infants were analysed. Fifty-five infants had cerebral palsy, 112 had obstetric brachial plexus palsy, 257 had clubfoot and 44 had congenital torticollis. No studies reported any severe adverse event that could be attributed to the BTI. The rate of mild to moderate adverse events reported varied from 5 to 25%. Results regarding efficacy were preliminary, dependant on the pathology and limited by the small number of studies and their low levels of evidence. CONCLUSION: BTI is already widely used as an early treatment for this age group. The safety profile of BTI in infants appears similar to that of older children and risks appear more related to the severity of the pathology and the location of the injections than to the toxin itself. With regard to effectiveness, other studies with higher levels of evidence should be carried out for each specific pathology.

PMID: 29288113


Study Design: Observational cohort study. Purpose: To assess the surgical outcomes of posterior decompression and fusion for cervical myelopathy in patients with athetoid cerebral palsy. Overview of Literature: Patients with athetoid cerebral palsy demonstrate involuntary movements and develop severe cervical spondylosis with kyphosis. In these patients, surgery is often performed at an early age because of myelopathy. A few studies have reported about the long-term outcomes of surgical treatment; however, they contain insufficient information. Methods: From 2003 to 2008, 13 patients with cervical myelopathy due to athetoid cerebral palsy underwent posterior fusion surgery and were included in this study. The Japanese Orthopaedic Association (JOA) score, neck disability index (NDI), C2-7 angle on radiography, and need for additional surgical treatment were examined at 1 and 5 years postoperatively. Results: The mean C2-7 angle was -10.5°±21.1° preoperatively and was corrected to -2.9°±13.5° immediately postoperatively. This improvement was maintained for 5 years. The JOA score was 9.5±2.5 preoperatively and 12.2±1.7 at the 5-year follow-up. NDI was 17±6.9 preoperatively and 16±7.5 at the 5-year follow-up. Patient satisfaction with surgery on a 100-point scale was 62.2±22.5 at the 5-year follow-up. Three patients needed additional surgery for loosening of screws. These results demonstrate good surgical outcomes for posterior fusion at 5 years. Conclusions: Posterior decompression and fusion should be considered a viable option for cervical myelopathy in patients with athetoid cerebral palsy.

PMID: 29279748


Holmes C, Brock K, Morgan P.

PURPOSE: Non-ambulant adults with cerebral palsy are vulnerable to development of postural asymmetry and associated complications. The primary aim of this scoping review was to identify postural deformities in non-ambulant adults with cerebral palsy. MATERIALS AND METHODS: Comprehensive searches were undertaken in EMBASE, CINAHL, AMED, Cochrane, Psych INFO, and Joanna Briggs (1986-Jan 2017), supplemented by hand searching. Two reviewers independently extracted data using a customised tool focusing on study design, participant characteristics, postural descriptors, measurement tools, and interventions. RESULTS: From 2546 potential records, 17 studies were included. Variability in populations, reporting methodology, and measurement systems was evident. Data suggest more than 30% of this population have hip migration percentage in excess of 30%, more than 75% experience "scoliosis", and more than 40% demonstrate pelvic obliquity. Estimates ranged from 14% to 100% hip and 32% to 87% knee contracture incidence. Conservative interventions were infrequently and poorly described. CONCLUSION: Many non-ambulant adults with cerebral palsy experience postural asymmetry associated with windswept hips, scoliosis, pelvic obliquity, and limb contracture. Options for non-radiographic
monitoring of postural asymmetry should be identified, and conservative interventions formally were evaluated in this population. Implications for rehabilitation The common postural asymmetries of windswept hips, scoliosis, pelvic obliquity, and limb contracture require standardised clinical measurement. Radiography is most commonly used to monitor postural asymmetry in this population, but standardised positioning is not applied and may not be feasible indicating a need for alternate methods and rigorous documentation. The Posture and Postural Ability Scale may be considered for use in the management of body shape in adults with CP.

PMID: 29295638


Cahill PJ, Samdani AF, Brusalis CM, Blumberg T, Asghar J, Bastrom TP, Pasha S, Refakis CA, Pahys JM, Flynn JM; Harms Study Group, Sponseller PD.


BACKGROUND: Series on the learning curve in spinal deformity surgery have been published, but none has addressed neuromuscular spinal deformity, comprised of arguably the most complex cases. We present the first multi-center analysis of the impact of surgeon experience on neuromuscular spinal deformity surgery. METHODS: A multi-center prospective study of spinal deformity surgery for cerebral palsy (CP) with at least 2 years of follow-up provided the dataset for assessment. Surgeons were categorized into one of two groups based on their self-reported first year of practice: an experienced surgeons (ES) group included those with at least 10 years of experience at the time of surgery and a young surgeons (YS) group included those with fewer than 10 years of experience at time of surgery. Groups were compared in multiple pre-operative, operative, and post-operative outcomes. RESULTS: The YS group had 8 surgeons who performed 59 surgeries; the ES group had 13 surgeons who performed 103 cases, with one surgeon's cases distributed in both groups. The YS group had a greater proportion of patients with severe mental retardation (89.7% vs. 68.6%, p = .01). Duration of surgery was greater in the YS group (456 vs. 344 minutes, p < .001). The mean number of levels fused was greater in the ES group (15.9 vs. 15.6, p = .024), caused by increased variation in the upper level of fusion among the ES group. No significant differences were found between groups for estimated blood loss, length of hospitalization, or in percentage of Cobb correction. Years of experience of the operating surgeon was inversely correlated with duration of surgery (rho = -0.476, p < .001). CONCLUSIONS: In performing scoliosis surgery on CP patients, surgeons with fewer than ten years of practice experience demonstrate significantly greater average operative time and decreased mean number of levels fused, yet produce similar clinical outcomes to more experienced surgeons.

PMID: 29287818

10. Management of Moderate to Severe Hip Displacement in Nonambulatory Children with Cerebral Palsy.

Shore BJ, Graham HK.


[No abstract available]

PMID: 29256976


Clutterbuck G, Auld M, Johnston L.


PURPOSE: Evaluate effectiveness of active exercise interventions for improving gross motor activity/participation of school-aged, ambulant/semi-ambulant children with cerebral palsy (CP). METHOD: A systematic review was conducted following PRISMA guidelines. Five databases were searched for papers including school-aged children with CP, participating in active, exercise interventions with gross motor outcomes measured at the Activity/Participation level. Interventions with previous systematic reviews were excluded (e.g. hippotherapy). Evidence Level and conduct were examined by two raters. RESULTS: Seven interventions (34 studies) met criteria. All studies reported on gross motor function, however, a limited number investigated participation outcomes. Strong positive evidence was available for Gross Motor Activity Training (n= 6, Evidence
Level II-IV), and Gross Motor Activity Training with progressive resistance exercise plus additional physiotherapy (n = 3, all Evidence Level II). Moderate positive evidence exists for Gross Motor Activity Training plus additional physiotherapy (n = 2, all Evidence Level II) and Physical Fitness Training (n = 4, Evidence Level II-V). Weak positive evidence was available for Modified Sport (n = 3, Evidence Level IV-V) and Non-Immersive Virtual Reality (n = 12, Evidence Level II-V). There was strong evidence against Gross Motor Activity Training plus progressive resistance exercise without additional physiotherapy (n = 4, all Evidence Level II). INTERPRETATION: Active, performance-focused exercise with variable practice opportunities improves gross motor function in ambulant/semi-ambulant children with CP. Implications for rehabilitation Active exercise interventions improve gross motor function of ambulant/semi-ambulant children with cerebral palsy. Gross Motor Activity Training is the most common and effective intervention. Practice variability is essential to improve gross motor function. Participation was rarely measured and requires further research, particularly in interventions that embed real-world participation opportunities like Modified Sport.

PMID: 29303007

12. Fatigue, quality of life and walking ability in adults with cerebral palsy.

Lundh S, Nasic S, Riad J.


INTRODUCTION: Few studies on fatigue, quality of life and walking ability in adults with cerebral palsy (CP) are available. It is unclear whether these variables are associated. AIM: The aim was to study the influence of CP on fatigue, quality of life, and gait of adult patients. MATERIAL AND METHODS: Three-dimensional gait analysis was performed on 24 women and 26 men, mean age 32.1 (range 21.7-67.2), 23 with unilateral and 27 with bilateral CP. The Gait Profile Score was calculated; Fatigue Severity and EQ Visual Analogue scales were used. RESULTS: Fatigue severity was higher than in controls, mean 3.8 (SD 1.8) vs 3.0 (p = 0.012). Fatigue in the unilateral group was 3.3 (SD 1.8) and in the bilateral 4.2 (SD 1.7), (p = 0.07). EQ Visual Analogue scale in the unilateral group was mean 79.5 (21.9) and in the bilateral 64.0 (20.8), p = 0.007. The group with bilateral CP tended toward crouch gait, decreased balance and low walking speed. Muscle work was shifted from the ankle to hip muscles. Fatigue correlated with the Gait Profile Score, CC = 0.31 (p = 0.038), and with knee flexion deviation, CC = 0.31 (p = 0.037). DISCUSSION: Crouch gait, increased knee flexion in stance, contributes to increased deviation in the lower extremity associated with high fatigue and low quality of life in adults with CP, effects more pronounced in those with bilateral CP. Compensation mechanisms in gait were noted. CONCLUSION: Rational follow-up programs for CP, ideally identifying risk factors early, should be established to prevent development of fatigue and deterioration of gait in adulthood.

PMID: 29277025

13. Long-Term Outcomes of Distal Femoral Extension Osteotomy and Patellar Tendon Advancement in Individuals with Cerebral Palsy.


BACKGROUND: We examined long-term outcomes across the domains of the International Classification of Functioning, Disability and Health for 2 groups of participants with cerebral palsy who demonstrated crouch gait at clinical gait analysis. One group underwent a distal femoral extension osteotomy with patellar tendon advancement (DFEO + PTA). The other group received other treatments (non-DFEO + PTA). METHODS: Fifty-one participants returned for a long-term gait analysis, physical examination, energy consumption test, knee radiographs, and questionnaires (median, 13 years post-DFEO + PTA or post-baseline [range, 8 to 21 years]). A subset of participants in the DFEO + PTA group also had a short-term analysis (9 to 24 months postoperatively). RESULTS: Participants were reasonably well-matched at baseline, although the DFEO + PTA group demonstrated greater crouch: minimum knee flexion, a median of 37° (width of the interquartile range, 12°) compared with 27° (9°); and knee flexion contracture, a median of 15° (10°) compared with 10° (5°). The gait deviation index (GDI) and sagittal plane knee kinematics were most improved at short term for the DFEO + PTA participants, with a subsequent slight decline at long-term analysis. Fewer DFEO + PTA participants were in crouch at long term (37% compared with 65%). At the long-term assessment, group scores for function, mobility, participation, quality of life, and most pain questionnaires were similar. Knee pain and osteoarthritis ratings did not differ between the groups. CONCLUSIONS: At long-term analysis, DFEO + PTA improves stance phase knee extension and knee flexion contracture compared with conventional treatment, but these benefits do not translate to improved activity, participation, or knee pain in early adulthood.

PMID: 29298258
14. Is the Knee the Key to Long-Term Gait Function in Cerebral Palsy?: Commentary on an article by Elizabeth R. Boyer, PhD, et al: "Long-Term Outcomes of Distal Femoral Extension Osteotomy and Patellar Tendon Advancement in Individuals with Cerebral Palsy".

Graham HK, Thomason P, Sangeux M.
[No abstract available]
PMID: 29298270

15. The effect of low-dose intravenous bisphosphonate treatment on osteoporosis in children with quadriplegic cerebral palsy.

Moon SJ, An YM, Kim SK, Kwon YS, Lee JE.
Purpose: Quadriplegic children with cerebral palsy are more susceptible to osteoporosis because of various risk factors that interfere with bone metabolism. Pamidronate is effective for pediatric osteoporosis, but there are no guidelines for optimal dosage or duration of treatment in quadriplegic children with osteoporosis. We aimed to evaluate the efficacy of low-dose pamidronate treatment in these patients. Methods: Ten quadriplegic patients on antiepileptic drugs (6 male, 4 female patients; mean age, 10.9±5.76 years), with osteoporosis and gross motor function classification system level V, were treated with pamidronate (0.5-1.0 mg/kg/day, 2 consecutive days) every 3-4 months in a single institution. The patients received oral supplements of calcium and vitamin D before and during treatment. The lumbar spine bone mineral density (BMD) z score and biochemical markers of bone metabolism were measured regularly during treatment. Results: The main underlying disorder was perinatal hypoxic brain damage (40%, 4 of 10). The mean cumulative dose of pamidronate was 4.49±2.22 mg/kg/yr, and the mean treatment period was 10.8±3.32 months. The BMD z score of the lumbar spine showed a significant increase from -4.22±1.24 before treatment to -2.61±1.69 during treatment (P=0.008). Alkaline phosphatase decreased during treatment (P=0.037). Significant adverse drug reactions and new fractures were not reported. Conclusion: Low-dose pamidronate treatment for quadriplegic children with cerebral palsy increased lumbar BMD and reduced the incidence of fracture.
PMID: 29302265


de Almeida Carvalho Duarte N, Collange Grecco LA, Delasta Lazzari R, Pasini Neto H, Galli M, Santos Oliveira C.
PURPOSE: To assess the best electrode position of transcranial direct current stimulation combined with treadmill training in children with unilateral spastic cerebral palsy. METHODS: Thirty children with cerebral palsy were randomly allocated to 3 groups: (1) treadmill training combined with anodal electrode positioned over the primary motor cortex in the region of the dominant hemisphere and the cathode positioned in the supraorbital region contralateral to anode; (2) sham anodal transcranial direct current stimulation over the primary motor cortex and sham cathode over the contralateral supraorbital region combined with treadmill training; (3) treadmill training combined with the anodal electrode positioned over the primary motor cortex in the region of the injured hemisphere and the cathode positioned contralateral to anode over the primary motor cortex. Evaluations of gait, balance, quality of life, and electromyographic activity were performed. DISCUSSION: This is the protocol for an intervention study investigating electrode position to achieve improved function.
PMID: 29252842

17. Commentary on "Number of Synergies Is Dependent on Spasticity and Gait Kinetics in Children With Cerebral Palsy".

Thomas M, Tremper M.
[No abstract available]
PMID: 29252835
18. Number of Synergies Is Dependent on Spasticity and Gait Kinetics in Children With Cerebral Palsy.


PURPOSE: Children with cerebral palsy have motor dysfunctions, which are mainly associated with the loss of motor coordination. For the assessment of motor coordination, muscle synergies calculated by nonnegative matrix factorization have been investigated. However, the characteristics of muscle synergies in children with cerebral palsy are not understood.

METHODS: This study compared the number of muscle synergies during gait between children with cerebral palsy and children with typical development and clarified whether certain clinical parameters differed according to the number of synergies.

RESULTS: Children with cerebral palsy had significantly fewer synergies than children developing typically. The extent of spasticity and gait kinetics differed according to the number of synergies.

CONCLUSION: Increases in the number of synergies are limited by severe spasticity. The muscle synergies calculated by nonnegative matrix factorization have the potential to enable the quantification of motor coordination during gait.

PMID: 29252834


BACKGROUND: The aims of this study were to investigate if patellar tendon shortening (PTS) as a part of SEMLS (single event multilevel surgery) is effective for reduction of flexed knee gait in children with cerebral palsy (CP) and, if PTS leads to stiff knee gait.

METHODS: In a randomized controlled study 22 children with flexed knee gait (age: 10.4 ± 2.6 years, GMFCS Level I-III) were randomized and allocated to two groups (1: SEMLS + PTS; 2: SEMLS no PTS): SEMLS was performed for correction of flexed knee gait either with or without additional PTS. Before and after surgery (follow up: 12.7 ± 1.6 months) kinematics (3-D motion analysis) and clinical parameters were compared.

RESULTS: Two children were lost to follow up. Maximum knee extension improved significantly in both groups after SEMLS while the patients with additional PTS showed much more correction (SEMLS + PTS: 37.6° to 11.4°, p = 0.007; SEMLS no PTS: 35.1° to 21.8°, p = 0.016). After surgery peak knee flexion decreased significantly (14.6°, p = 0.004) in the "SEMLS + PTS" group while there was no relevant change in the other group. There was a trend of increase in anterior pelvic tilt after surgery in both groups, but no statistical significant difference. After surgery knee flexion contracture (15.9°, p < 0.001) and popliteal angle (27.2, p = 0.009) measured on clinical examination only decreased significantly in the "SEMLS + PTS" group.

CONCLUSION: PTS is effective for correction of flexed knee gait and knee flexion contracture leading to superior stance phase knee extension. However, additional PTS may lead to stiff knee gait and a higher increase of anterior pelvic tilt.

PMID: 29277060

20. The Effects of Astym Therapy® on a Child With Spastic Diplegic Cerebral Palsy.


Purpose: Limited research exists regarding use of Astym® therapy with neurologic conditions. The purpose of this case was to describe using Astym therapy in treating spastic diplegic cerebral palsy (CP). Case description: A 6-year-old female was treated more than 9 months (36 sessions) for decreased flexibility, muscle weakness, spasticity, and abnormal gait.

Examination findings: Gait performed with articulated ankle-foot orthoses (75% of the time) or foot orthosis (25%); lack of active dorsiflexion (DF); lack of heel strike during gait; spasticity in hamstrings, gastrocnemius, hip adductors; hamstring flexibility (90/90 test position) 50° right and 60° left; gastrocnemius flexibility neutral bilaterally; and Peabody Developmental Motor Scales, second edition (PDMS-2) age equivalence (in months) 23 locomotion, 25 object manipulation, and 21 stationary tasks. Therapeutic interventions included Astym therapy, stretching, strengthening, neuromuscular reeducation, and gait training.

Outcomes: At 6 months, flexibility improved bilaterally to 10° past neutral in gastrocnemius and 0° in hamstrings. The PDMS-2 age equivalence scores were 27 locomotion, 25 object manipulation, and 28 stationary tasks. At discharge, patient ambulated full-time with foot orthosis, exhibiting improved stride length bilaterally with active ankle DF to initiate heel strike. Spasticity was unchanged. Discussion: Astym therapy was effective in treating a child with spastic diplegic CP, resulting in enhanced strength, flexibility, and gait.

PMID: 29270040
21. Medial gastrocnemius muscle stiffness cannot explain the increased ankle joint range of motion following passive stretching in children with cerebral palsy.


Stretching is often used to increase/maintain joint range of motion (ROM) in children with cerebral palsy (CP) but the effectiveness of these interventions is limited. Therefore, this study aimed to determine the acute changes in muscle-tendon lengthening properties that contribute to increased ROM after a bout of stretching in children with CP. Eleven children with spastic CP (age: 12.1(3)y, 5/6 hemiplegia/diplegia, 7/4 GMFCS level I/II) participated in this study. Each child received 3 sets of 5 × 20 s passive, manual static dorsiflexion stretches separated by 30 s rest, and 60 s rest between sets. Pre- and immediately post-stretching, ultrasound was used to measure medial gastrocnemius fascicle lengthening continuously over the full ROM and an individual common ROM pre- to post-stretching. Simultaneously, 3D motion of two marker clusters on the shank and the foot was captured to calculate ankle angle, and ankle joint torque was calculated from manually applied torques and forces on a 6DoF load cell. After stretching, ROM was increased (9.9° (12.0), P = 0.005). Over a ROM common to both pre and post measurements, there were no changes in fascicle lengthening or torque. The maximal ankle joint torque tolerated by the participants increased (2.9(2.4) Nm, P = 0.003) and at this highest passive torque maximal fascicle length was 2.8(2.4) mm greater (P = 0.009) when compared to before stretching. These results indicate that the stiffness of the muscle fascicles in children with CP remain unaltered by an acute bout of stretching. This article is protected by copyright. All rights reserved.

PMID: 29280208


Lenhart RL, Smith CR, Schwartz MH, Novacheck TF, Thelen DG.


Purpose: The distal femoral extension osteotomy (DFEO) is often used in the treatment of crouch gait to help compensate for knee flexion contractures. The effects of DFEO on skeletal and muscle lengths are incompletely understood, but are important to consider in planning concomitant surgeries such as patellar tendon advancement (PTA). Therefore, the purpose of this study was to quantify the changes in femur, quadriceps, and hamstring lengths with DFEO, and to determine the sensitivity to surgical factors such as wedge location and magnitude. Methods: A musculoskeletal model with six degrees of freedom tibiofemoral and patellofemoral joints was used for analysis. A wedge was removed from the distal femur and the remaining bone segments were plated together to simulate the DFEO. After simulating the knee's post-operative equilibrium, the surgically-induced changes in muscle and bone lengths were analysed. Results: Relative to the pre-operative state, DFEO stretches the hamstrings while shortening the femur and quadriceps. A more posterior wedge apex location (i.e. creation of a cuneiform wedge) diminished the stretch of the hamstrings, but induced greater shortening of the femur and quadriceps. More proximal wedge locations necessitated greater translation of the distal fragment to maintain the knee joint axis. Conclusion: Reduced quadriceps length after DFEO shown in this study is consistent with the need for simultaneous PTA. The induced hamstring stretch also may represent a potential mechanism for post-operative nerve palsies. Overall, the numerical results provide a firmer basis for planning the specifics of DFEO such that desired muscle lengths and joint alignment are achieved.

PMID: 29263761

23. Comparison of calf muscle architecture between Asian children with spastic cerebral palsy and typically developing peers.

Chen Y, He L, Xu K, Li J, Guan B, Tang H.


OBJECTIVE: To compare the muscle thickness, fascicle length, and pennation angle of the gastrocnemius, soleus, and tibialis anterior between Asian children with spastic cerebral palsy (CP) and typically developing (TD) peers. METHODS: This cross-sectional study involved a total of 72 children with hemiplegic CP (n = 24), and diplegic CP (n = 24) and their TD peers (n = 24). Muscle architecture was measured at rest using ultrasound. Clinical measures included gross motor function and a modified Ashworth scale. RESULTS: The thicknesses of the tibialis anterior and medial gastrocnemius muscles were smaller in the affected calf of children with CP (p<0.05) than in those of their TD peers. Additionally, the lengths of the lateral gastrocnemius and soleus fascicle were shorter (p<0.05) in children with diplegic CP than in their TD peers. The fascicle length was shorter in the affected calf of children with CP (p<0.05) than in the calves of their TD peers or the unaffected calf of children with hemiplegic CP. However, the length of the lateral gastrocnemius fascicle was similar between the two legs of children with hemiplegic CP. The pennation angles of the medial gastrocnemius and soleus muscles were larger (p<0.05) in the affected calf in children with hemiplegic CP than in the calves of their TD peers. The fascicle length of the lateral
gastrocnemius and the thickness of the soleus muscle were positively correlated with gross motor function scores in children with CP (p<0.05). CONCLUSIONS: Muscle thickness and fascicle length were lower in the affected tibialis anterior, gastrocnemius, and soleus in children with spastic CP. These changes may limit the ability to stand and walk, and indicate a need to strengthen the affected muscle.

PMID: 29304114

24. The relationship between lower limb muscle volume and body mass in ambulant individuals with bilateral cerebral palsy.

Noble JJ, Chruscikowski E, Fry NRD, Lewis AP, Gough M, Shortland AP.


BACKGROUND: Individuals with cerebral palsy have smaller muscle volumes normalised to body mass than their typically developing peers. The aim of this study is to investigate the relationship between lower limb muscle volume and body mass in young people with bilateral cerebral palsy and their typically developing peers. METHODS: Twenty-five participants with bilateral cerebral palsy (aged 14.7±3.0 years, GMFCS level I-III) and 25 of their typically developing peers (aged 16.8±3.3 years) took part in this study. None of the participants had undergone orthopaedic surgery, botulinum toxin injections, or serial casting in the previous year. All participants underwent magnetic resonance imaging of both lower limbs. Nine major muscles of each lower limb were individually manually segmented and the muscle volumes calculated. RESULTS: Body mass and total lower limb muscle volume were significantly linearly related in both the cerebral palsy (R² = 0.75, p<0.001) and typically developing (R² = 0.77, p<0.001) groups. The slope of the relationship between muscle volume and body mass was significantly shallower in the cerebral palsy group compared to the typically developing group (p=0.007). CONCLUSIONS: This cross-sectional study suggests that the increase in size of lower limb muscles relative to body mass is reduced in adolescents and young adults with cerebral palsy. Longitudinal studies are required to further investigate altered muscle growth trajectories in this group and their impact on long-term mobility.

PMID: 29284423

25. Factors associated with anterior open bite in children with developmental disabilities.

de Castilho LS, Abreu MHNG, Pires E Souza LGA, Romualdo LTA, Souza E Silva ME, Resende VLS.


AIM: To investigate factors associated with anterior open bite in individuals aged from 2 to 33 years with developmental disabilities. DESIGN: This is a cross-sectional study. A total of 271 dental records were examined. The anterior open bite analyzed was determined based on clinic exam. These variables were also analyzed: gender, age, education level of mother, International Code of Diseases (ICD), mouth breathing, use of anticonvulsant drugs, hyperkinesis, pacifier use, thumb sucking, seizure, and involuntary movements. For the purposes of analysis, the individuals were categorized as being with and without anterior open bite. Variables with a p-value of < 0.25 in the bivariate analysis were incorporated into the logistic regression models. RESULTS: Mouth breathers had a 2.60-fold (95% CI: 1.35-5.01) greater chance of exhibiting anterior open bite than nasal breathers. Pacifier users are more likely to have an anterior open bite (3.32-fold, 95% CI: 1.62-6.77). Individuals with reported involuntary movements had a 2.66-fold (95% CI: 1.26-5.63) greater chance of exhibiting anterior open bite. Users of anticonvulsants drugs had a 3.05 (95% CI: 1.57-5.92) greater chance of showing anterior open bite. CONCLUSION: Involuntary movements, mouth breathing, using anticonvulsant drugs, and using pacifier are factors associated with anterior open bite in patients with developmental disabilities.

PMID: 29278267


Mishra A, Sheppard JJ, Kantarcigil C, Gordon AM, Malandraki GA.


Purpose: The purpose of this study is to examine (a) the reliability of newly developed measures of mealtime duration and (b) their relationship to clinical feeding/swallowing performance in children with spastic cerebral palsy (SCP). Method: Seventeen self-feeding children (9 boys, 8 girls) with SCP (age range = 5;1 [years;months] to 17;6, Gross Motor Function Classification System range = I-IV) were assessed during mealtimes using the Dysphagia Disorder Survey (DDS; Sheppard, Hochman, &
Baer, 2014). Children were divided into 2 groups, children with primarily unilateral or bilateral brain involvement. Duration measures included mealtime duration and total sip/bite duration for each bolus type (liquid and solid). Results: Excellent intra- and inter-rater reliability for all duration measures was observed (intraclass correlation coefficient [ICC] = 1.00 and 0.955, respectively, for mealtime duration; ICC = 1.00 and 0.963, respectively, for solid/bite duration; ICC = 1.00 and 0.957, respectively, for liquid/sip duration). Positive correlations were found between total mealtime duration and DDS Part 1, rs = .514 [.045-.797], p = .035; Part 2, rs = .528 [.064-.804], p = .029; and total scores, rs = .665 [.271-.868], p = .004, and between total solid/bite duration and DDS Part 1, rs = .579 [.137-.828], p = .015; Part 2, rs = .620 [.199-.847], p = .007; and total scores, rs = .762 [.444-.909], p < .001. Children with unilateral brain involvement exhibited significantly lower DDS total (p = .049) and Part 2 scores (p = .026), indicating better feeding/swallowing performance/skills. They also had shorter mealtime duration (p = .019) and solid/bite duration (p = .025) compared with children with bilateral involvement. Conclusions: Our new mealtime duration measures are reliable and correlate with feeding/swallowing performance in a sample of self-feeding children with SCP. Therefore, they may be useful supplements to feeding/swallowing assessments for this population.

PMID: 29273816

27. Extreme prematurity, treated retinopathy, bronchopulmonary dysplasia and cerebral palsy are significant risk factors for ophthalmological abnormalities at 6.5 years of age.


AIM: This study evaluated the contributions of various prenatal and postnatal predictive factors to a documented high prevalence of ophthalmological abnormalities in children aged 6.5 years who were born extremely preterm. METHODS: We carried out a prospective population-based study of all children born in Sweden at a gestational age of 22+0 to 26+6 weeks based on the Extremely Preterm Infants in Sweden Study. The main outcome measures were a combined score of visual impairment, refractive errors and strabismus at 6.5 years of age. Models of univariate and multivariable regression were used to analyse potential prenatal and postnatal predictive factors at different clinically relevant time-points from one minute after birth to 30 months. RESULTS: We focused on 399 known extremely preterm survivors and compared them to 300 full-term controls. Significant antecedents for ophthalmological abnormalities included prematurity per se, retinopathy of prematurity that required treatment, severe bronchopulmonary dysplasia and cerebral palsy. Severe intraventricular haemorrhage was no longer a significant risk factor when we adjusted it for the 30-month cognitive and neuromotor development outcomes. CONCLUSION: This time-course risk analysis model showed a changing panorama of significant risk factors for ophthalmological abnormalities in children aged 6.5 years who were born extremely preterm. This article is protected by copyright. All rights reserved.

PMID: 29281748


Bartlett D, Dyszuk E, Galuppi B, Gorter JW.


PURPOSE: To examine the relationship among the Gross Motor Function Classification System (GMFCS), the Manual Ability Classification System (MACS), and the Communication Function Classification System (CFCS) in children with cerebral palsy (CP) and to determine the average number and effect of health conditions. METHODS: Participants were 671 children with CP aged 2 to 12 years from Canada and the United States. Cross-tabulation of functional classifications and averages were computed for the number and impact of health conditions and comparisons among groups. RESULTS: A total of 78 of the 125 possible classification combinations were recorded. Most frequent were GMFCS I, MACS I, CFCS I; GMFCS I, MACS II, CFCS I; and GMFCS II, MACS II, CFCS I. With lower levels of function, the average number and average impact of associated health conditions increased. CONCLUSIONS: The use of functional profiles across classification systems, with data on the associated health conditions, provides a more comprehensive picture of CP than any single classification or measure.

PMID: 29252828
29. Prediction of three year outcomes using the Bayley-III for surgical, cardiac and healthy Australian infants at one year of age.

Fairbairn N, Galea C, Loughran-Fowlds A, Hodge A, Badawi N, Walker K.


BACKGROUND: Previous predictive research has predominantly focussed on infants who are preterm, low birth weight, who have a specific condition or who have undergone a specific procedure. AIM: This study investigated the ability of outcomes at one year of age to predict outcomes at three years using the Bayley-III for infants who have undergone early major cardiac surgery (CS) or non-cardiac (NC) surgery and their healthy peers. STUDY DESIGN: Participants who were part of the Development After Infant Surgery (DAISy) study who had complete Bayley-III assessments at one and three years of age were included in the analyses. This included 103 infants who had undergone CS, 158 who had NC surgery and 160 controls. RESULTS: Bayley-III outcomes at one, although statistically significantly associated with three year outcomes in all domains were weak predictors of those outcomes for CS, NC surgical and healthy infants. Specificity for three year outcomes was good for cognitive, receptive language and fine motor domains for infants who had undergone CS and NC surgery. Sensitivity for <-1 SD at three years was poor for cognitive, expressive and receptive language, and fine motor outcomes for CS and NC surgical participants. CONCLUSION: It remains difficult to predict how performance at one year on the Bayley-III predicts performance at three on the Bayley-III for infants who have undergone early major CS or NC surgery and for healthy Australian infants.

PMID: 29288912

30. What is the current practice of therapists in the measurement of somatosensation in children with cerebral palsy and other neurological disorders?

Walmsley C, Taylor S, Parkins T, Carey L, Girdler S, Elliott C.


BACKGROUND/AIM: Somatosensation is the ability to detect and recognise body sensations such as touch, vibration, pressure, pain, temperature and proprioception. Cerebral palsy is a neurological disorder that is often accompanied by impairments in somatosensation. Current somatosensory assessments have limited psychometrics established for use with these children. The aim of this study was to identify therapists' current practice and perspectives related to the assessment of somatosensation in children with neurological disorders. METHODS: A cross-sectional questionnaire was used to identify the somatosensory assessments currently used in clinical practice, time allocated to assessment, and therapists' satisfaction and confidence using the available assessments of somatosensation. The questionnaire was adapted from a previously utilised questionnaire that identified therapists’ use of somatosensory assessments with adults post-stroke. RESULTS: A total of 135 therapists responded to the questionnaire. Seventy-nine (92%) occupational therapists and 44 (89.7%) physiotherapists indicated that they currently assessed or treated children with somatosensory deficits. Sixty-four (82.1%) occupational therapists and 38 (86.3%) physiotherapists regarded assessment of somatosensation in children with neurological disorders as important to very important. However, only seven (8.8%) occupational therapists and seven (15.9%) physiotherapists reported confidence in their ability to do so. The methods with which therapists detect and measure somatosensory impairment in children with neurological disorders are variable, with non-standardised and/or informal assessments most frequently used. CONCLUSION: Despite there being recommendations of best practice for the assessment of specific domains of somatosensation in children with cerebral palsy, current practice does not yet mirror these recommendations. Additionally, therapists have low satisfaction and confidence with what they are currently using, highlighting the need for a comprehensive and standardised assessment of somatosensation for use in children with neurological disorders.

PMID: 29284178

31. Development of an inventory of goals using the International Classification of Functioning, Disability and Health in a population of non-ambulatory children and adolescents with cerebral palsy treated with botulinum toxin A.

Nguyen L, Mesterman R, Gorter JW.


BACKGROUND: In the management of hypertonicity in children with cerebral palsy (CP), goals should be clearly identified in order to evaluate the effectiveness of botulinum toxin A (BoNT-A) treatment, specifically in non-ambulatory children and adolescents, Gross Motor Function Classification System (GMFCS), level IV or V. A retrospective chart review (Mesterman et al., 2013) identified the need for the development of a set of specific and meaningful goals linked to the International Classification of Functioning, Disability and Health (ICF) for future goal setting and evaluation in this population. Our objective is to create an inventory of goals based on the ICF framework that captures the needs and values of families with children with CP. METHODS: This cross-sectional observational study recruited parents of twenty children and youths with
CP in GMFCS levels IV or V (mean age 11.2 years, SD 4.3, 13 males) who were assessed for BoNT-A treatment at the Spasticity Management Clinic at McMaster Children's Hospital (Hamilton, ON). A previous inventory of goals was developed by a group of experts at a national botulinum toxin conference held in January 2014 (Montreal, Canada). The inventory of goals was further refined by asking the parents to select goals from the inventory list that they would like their child to accomplish after receiving BoNT-A treatment, and asking healthcare professionals for clarity and phrasing of goals in the inventory list. RESULTS: All parents identified body structure and function goals, with more than 75% of parents selecting reduction in muscle tone and increased range of movements in the upper and lower extremities. More than 50% of parents identified activity goals related to ease of caregiving. Two activity goals and three participation goals were missing from the inventory. Participation goals were identified by less than 5% of parents. CONCLUSION: The inventory may be a helpful tool to facilitate a discussion about goal setting between healthcare professionals and families in the context of BoNT-A treatment. A future study is needed to conduct qualitative interviews to better understand the information that families may require about setting goals during BoNT-A treatment and to evaluate the usefulness of the inventory.

PMID: 29301539

32. Youth Engagement in Pediatric Rehabilitation: Service Providers' Perceptions in a Real-Time Study of Solution-Focused Coaching for Participation Goals.

King G, Schwellnus H, Keenan S, Chiarello LA.


AIM: Client engagement is assumed to affect therapy outcomes. This study examined service providers' perceptions of youth engagement in solution-focused coaching sessions focusing on participation-oriented goals for youth with cerebral palsy.

METHOD: Service providers completed the Pediatric Rehabilitation Intervention Measure of Engagement-Service Provider version (PRIME-SP) at the end of each session of the brief solution-focused coaching intervention (3-5 sessions) for 10 youth.

RESULTS: Youth engagement was high yet fluctuated over the sessions. Service providers noted a range of components of engagement/disengagement (affective, cognitive, and behavioral) and related factors, including client states, components of behavior change (success or nonsuccess between therapy sessions, and pleasure with success), and service provider strategies. Four preliminary patterns involving engagement, client-reported success, and goal difficulty (personally achievable or dependent on others) appeared to be meaningfully related to quantitative measures of youth outcomes. CONCLUSIONS: The study provides insights into the highly engaging nature of solution-focused coaching and the relational, co-constructed nature of the therapeutic interaction. The study indicates the utility of the PRIME-SP as a tool for recording observations of components of engagement and related factors that may be useful for clinical decisions about the use of engagement strategies and for general reflections on practice.

PMID: 29303397

33. Self-concept of children with cerebral palsy measured using the population-specific myTREEHOUSE Self-Concept Assessment.

Cheong SK, Lang CP, Johnston LM.


Self-concept is an individual's perception of him/herself. Research into the self-concept of children with cerebral palsy (CP) has been sparse due to the lack of a population-specific self-concept instrument. Using the new myTREEHOUSE Self-Concept Assessment, this study investigated the self-concept of children with CP in relation to age, gender, motor, communication and cognitive function. Children with CP aged 8-12 years (n = 50; 29 males; mean 10 years 2 months; GMFCS-E&R I = 36, II = 8, III = 5, IV = 1) completed myTREEHOUSE and a standardised intelligence measure. Most children reported positive self-concept from all three myTREEHOUSE Performance Perspectives and over half (60%) fell within the Low range for the Personal Concern Score. Self-concept was not associated with age, gender, motor function, or communication function. However, for cognitive function, associations were observed for Social Skills (Below Average > Average cognitive function; Cohen's d = 1.07) and Learning Skills (Above Average > Average cognitive function; Cohen's d = 0.95) domains when rated from a Personal Performance Perspective. As the first study of the self-concept of children with CP using a CP-specific assessment, this study offers important insights into what children with CP think about themselves. Generally, the self-concept of children with CP was sound. Future research on environmental facilitators and barriers to robust self-concept development is recommended.

PMID: 29277013
34. Commentary on "Facilitators and Barriers in Performing Activities and Participation in Children With Cerebral Palsy: Caregivers' Perspective".

Gannotti ME, Gorton GE 3rd.


[No abstract available]

PMID: 29252833

35. Facilitators and Barriers to Performing Activities and Participation in Children With Cerebral Palsy: Caregivers' Perspective.

Earde PT, Praipruk A, Rodpradit P, Seanjumla P.


PURPOSE: To investigate contextual factors that were facilitators and barriers to performing activity and participation for children with cerebral palsy from the caregivers' perspective. METHODS: Qualitative in-depth interview with primary caregivers of children with cerebral palsy aged 4 to 12 years was conducted in the metropolitan area of Thailand. Semistructured questions related to environmental and personal factors were recorded. Interviews were transcribed verbatim and analyzed for main themes on the basis of the International Classification of Functioning, Disability, and Health-Children and Youth Version (ICF-CY) classification. RESULTS: Twenty-seven caregivers participated. Facilitators were appropriateness of assistive devices, support and acceptance from family, friends, and society, health services, willingness, and self-acceptance. Barriers were inappropriate design and facilities, overprotection of family, nonacceptance from family, friends, and society, inconvenient transportation, financial problems, limited health services, limited access to education, frustration, and being an introvert. CONCLUSIONS: Contextual factors that can be facilitators and barriers to perform activities and participation should be considered for improving lives of children with cerebral palsy.

PMID: 29252832


Gillies MB, Bowen JR, Patterson JA, Roberts CL, Torvaldsen S.


AIM: To identify a cohort of children with cerebral palsy (CP) from hospital data; determine the proportion that participated in standardized educational testing and attained a score within the normal range; and describe the relationship between test results and motor symptoms. METHOD: This population-based retrospective cohort study used data from New South Wales, Australia. We linked hospital data for children younger than 16 years of age admitted between 1st July 2000 and 31st March 2014 to education data from 2009 to 2014. Hospital diagnosis codes were used to identify a cohort of children with CP (n=3944) and describe their motor symptoms. Educational outcomes in the CP cohort were compared with those among children without CP. RESULTS: Of those with educational data (n=1770), 46% were exempt from reading assessment because of intellectual or functional disability, 7% were absent or withdrawn from testing and 47% participated in testing. About 30% of all children with educational data had test scores in the normal range. The proportion was greatest among those with hemiplegia (>40%) and lowest among those with tetraplegia (<10%). INTERPRETATION: One-third of children with CP participated in standardized testing and achieved a result in the normal range. The proportions were lower in children with more severe motor symptoms. WHAT THIS PAPER ADDS: From 2009 to 2014, most Australian children with cerebral palsy (CP) attended a mainstream school. The rate of disability-related exemption from standardized educational testing was almost 50%. Thirty per cent of children with CP achieved educational scores in the normal range.

PMID: 29278268

37. Personality traits and quality of life of mothers who have children with cerebral palsy.

Naletilić M, Tomić V, Ostojić L, Damjanović VM, Grabovac M.


BACKGROUND: The quality of life (QOL) of mothers who have children with cerebral palsy (CP) is significantly worse than in mothers with typically developing children. In available literature we have not found an approach which analyzes the
correlation of mothers' personality traits with their QOL and health related quality of life (HrQOL). SUBJECTS AND METHODS: The study included 101 mothers of children with CP, aged 4 to 18 years. Mothers' personalities have been assessed by Eysenck EPQ - R questionnaire that determines three personality traits: neuroticism/emotional stability, extroversion/introversion and psychoticism. Maternal HrQOL was assessed by SF-36 questionnaire, Short Form, and their emotional well-being by WHO 5 well-being index. In addition, the influence of mothers' religiosity was also analyzed, using DUREL Religiosity Questionnaire. Motor assessment of children was performed using Gross Motor Function Classification System. The control group consisted of mothers of typically developing children of the same age. RESULTS: Participants with high levels of extraversion had better QOL and HrQOL, as opposed to those with high levels of neuroticism and psychoticism, who had worse physical and mental health. The degree of children's motor impairment and mothers' religiosity did not influence QOL. Regression analysis distinguishes the following predictors for better mothers' QOL: better their mental health, greater level of their vitality, extraversion, living with a partner, a lesser degree of children's motor impairment and better their QOL. CONCLUSIONS: It is vital to identify the factors that affect QOL of a mother and a child with CP. We consider it justified to regularly conduct mothers' professional monitoring and treatment simultaneously with children's treatment and we propose the protocol for the individual and targeted approach.

PMID: 29278626

38. Mobile applications in children with cerebral palsy.
[Article in English, Spanish]
Rodriguez Mariblanca M, Cano de la Cuerda R.

INTRODUCTION: Cerebral palsy (CP) is one of the most common developmental disorders. Technological development has enabled a transformation of the healthcare sector, which can offer more individualised, participatory, and preventive services. Within this context of new technology applied to the healthcare sector, mobile applications, or apps, constitute a very promising tool for the management of children with CP. OBJECTIVE: The purpose of this article is to perform a systematic review of the information published about various mobile applications either directly related to CP or with potential to be useful in the context of the disease, and to describe, analyse, and classify these applications. MATERIAL AND METHODS: A literature search was carried out to gather articles published in English or Spanish between 2011 and 2017 which presented, analysed, or validated applications either specifically designed for or potentially useful for CP. Furthermore, a search for mobile applications was conducted in the main mobile application markets. CONCLUSIONS: A total of 63 applications were found in biomedical databases and mobile application markets, of which 40 were potentially useful for CP and 23 were specifically designed for the condition (11 for information, 3 for evaluation, and 9 for treatment). There are numerous mobile applications either specifically designed for or with potential to be useful in the field of CP. However, despite the existing scientific evidence, the low methodological quality of scientific articles makes it impossible to generalise the use of these tools.

PMID: 29275969

39. The challenges of describing rehabilitation services: A discussion paper.

To apply the Classification of Service Organization in Rehabilitation (ICSO-R) classification of services to different target groups, include the user perspective, identify missing categories, and propose standardized descriptors for the categories from a Norwegian perspective. Expert-based consensus conferences with user involvement. Health professionals, stakeholders and users. Participants were divided into 5 panels, which applied the ICSO-R to describe the habilitation and rehabilitation services provided to children with cerebral palsy and people with Huntington's disease, acquired brain injuries (traumatic brain injuries and stroke) and painful musculoskeletal conditions. Based on the Problem/Population, Intervention, Comparison, Outcome (PICO) framework, the services were described according to the ICSO-R. Missing categories were identified. The ICSO-R was found to be feasible and applicable for describing a variety of services provided to different target groups in Norway, but the user perspective was lacking, categories were missing, and a need for standardized description of the categories was identified. The present work supports the need to produce an updated version of the ICSO-R and to encourage national and international discussion of the framework. The ICSO-R has the potential to become a tool for the standardized assessment of rehabilitation services. For such purposes, more standardized descriptions of subcategories are necessary.

PMID: 29260837
40. Identification of a candidate enhancer for DMRT3 involved in spastic cerebral palsy pathogenesis.

Cerebral palsy (CP) is a major neuronal disease and the most common movement disorder in children. Although environmental factors leading to CP have been greatly investigated, the genetic mechanism underlying CP is not well understood. Here we focused on two clinical reports that characterized a deletion involving the KANK1 gene locus in the 9p24.3 region. One report shows spastic CP and the other shows no spastic CP phenotype. Based on the epigenetic status and evolutionary conservation, we first found a functional genomic element at the noncoding region that was deleted only in patients with spastic CP. This element contains the retinoic acid receptor/retinoid X receptor (RAR/RXR) complex-binding motif that is widely conserved among placental mammals. RAR/RXR ChIP-seq data from mouse F9 embryonal carcinoma cells that were treated with trans-retinoic acids showed that the element has a binding ability. In addition, data regarding chromosome conformation capture from mouse neural progenitor and ES cells suggested that the element spatially interacts with the Doublesex and mab-3 related transcription factor 3 (Dmrt3) gene promoter that is located approximately 120 kb downstream of the RAR/RXR-binding site. Dmr3 is detected in the developing mouse forebrain and in some interneurons in the spinal cord, and it works as a locomotion coordinator in horses and mice. Thus, the deletion of the cis-regulatory element for DMRT3 in humans may cause impaired development of the forebrain and gait abnormalities, resulting in spastic CP. In conclusion, this study provides new mechanistic insights into the genetic basis of CP.

PMID: 29305858

41. Neurodevelopmental Outcomes of Infants Born at <29 Weeks of Gestation Admitted to Canadian Neonatal Intensive Care Units Based on Location of Birth.

OBJECTIVE: To compare mortality and neurodevelopmental outcomes of outborn and inborn preterm infants born at <29 weeks of gestation admitted to Canadian neonatal intensive care units (NICUs). STUDY DESIGN: Data were obtained from the Canadian Neonatal Network and Canadian Neonatal Follow-up Network databases for infants born at <29 weeks of gestation admitted to NICUs from April 2009 to September 2011. Rates of death, severe neurodevelopmental impairment (NDI), and overall NDI were compared between outborn and inborn infants at 18-21 months of age, corrected for prematurity. RESULTS: Of 2951 eligible infants, 473 (16%) were outborn. Mean birth weight (940 ± 278 g vs 897 ± 237 g), rates of treatment with antenatal steroids (53.9% vs 92.9%), birth weight small for gestational age (5.3% vs 9.4%), and maternal college education (43.7% vs 53.9%) differed between outborn and inborn infants, respectively (all P values <.01). The median Score for Neonatal Acute Physiology II (P = .01) and Apgar score at 5 minutes (P < .01) were higher in inborn infants. Severe brain injury was more common among outborn infants (25.3% vs 14.7%, P < .01). Outborn infants had higher odds of death or severe NDI (aOR 1.7, 95% CI 1.3-2.2), death or overall NDI (aOR 1.6, 95% CI 1.2-2.2), death (aOR 2.1, 95% CI 1.5-3.0), and cerebral palsy (aOR 1.9, 95% CI 1.1-3.3). CONCLUSIONS: The composite outcomes of death or neurodevelopmental impairment were significantly higher in outborn compared with inborn infants admitted to Canadian NICUs. Adverse outcomes were mainly attributed to increased mortality and cerebral palsy in outborn neonates.

PMID: 29305231

42. Persistent pulmonary hypertension of the newborn in extremely preterm infants: a Japanese cohort study.

OBJECTIVE: To investigate the characteristics of persistent pulmonary hypertension of the newborn (PPHN) in extremely preterm infants and its impact on neurodevelopmental outcomes at 3 years of age. DESIGN: A retrospective multicentre cohort study. SETTINGS: 202 tertiary perinatal centres registered in the Neonatal Research Network of Japan (NRNJ). PATIENTS: Infants born at <28 weeks of gestational age (GA), between 2003 and 2012, were extracted from tertiary perinatal centres participating in NRNJ. MAIN OUTCOME MEASURES: Demographic characteristics, morbidity, interventions and mortality were compared for infants with and without PPHN. Multivariable logistic analysis was performed to evaluate the impact of PPHN on long-term neurodevelopmental outcomes (the prevalence rate of cerebral palsy, need for home oxygen therapy, and...
visual, hearing and cognitive impairment) at 3 years of age. RESULTS: The prevalence of PPHN among the 12 954 extremely preterm infants enrolled was 8.1% (95% CI 7.7% to 8.6%), with the trend increasing annually, and a higher proportion as GA decreased: 18.5% (range, 15.2% to 22.4%) for infants born at 22 weeks compared with 4.4% (range, 3.8% to 5.2%) for those born at 27 weeks. Clinical chorioamnionitis and premature rupture of membranes were associated with PPHN. On multivariate analysis of the data from 5923 infants followed up for 3 years, PPHN was a significant independent risk factor for visual impairment (adjusted OR, 1.42, 95% CI 1.03 to 1.97). CONCLUSIONS: The prevalence of PPHN in extremely preterm infants has been increasing over the past decade in Japan. Clinicians should be aware of visual impairments as a neurodevelopmental abnormality among infants with PPHN.

PMID: 29298856

43. Caffeine prevents bilirubin-induced cytotoxicity in cultured newborn rat astrocytes.

Deliktaş M, Ergin H, Demiray A, Akça H, Özdemir ÖMA, Özdemir MB.

OBJECTIVE: Unconjugated bilirubin (UCB) may cause neurotoxicity in preterm neonates due to immaturity of UGT1A1 leading to bilirubin accumulation in the brain. Caffeine used in the treatment of apnea of prematurity was reported to decrease mechanical ventilation requirement, the frequencies of bronchopulmonary dysplasia, patent ductus arteriosus, cerebral palsy and neurodevelopmental disorders in very low birth weight infants. However, the effect of caffeine on hyperbilirubinemia was not yet clarified. METHODS: We used astrocyte cell cultures obtained from 2-day-old Wistar albino rats via modified Cole and de Vellis method. UCB concentration toxic to 50% of astrocytes, and caffeine concentration increasing cell viability 100% were used in experiments. While no medication was applied to the control group, UCB (50 μM) and caffeine (100 μM) were applied to the bilirubin and caffeine groups for 24 h. Prophylactic and therapeutic caffeine groups were treated with caffeine 4 h before and after UCB exposure. The effects of caffeine were investigated in rat astrocytes exposed to UCB in terms of cell viability, apoptosis, antioxidant defense, proinflammatory cytokines, and Toll-like receptor (TLR)s. RESULTS: Compared to the control group, UCB increased apoptosis, malondialdehyde (MDA), tumor necrosis factor-α (TNF-α), interleukin (IL)-1β, IL-6, total nitrate/nitrite, and TLR4 levels, and decreased cell viability, catalase (CAT), glutathione peroxidase (GPx), superoxide dismutase (SOD) activities, glutathione, and TLR9 levels (for all p < .001). Conversely, prophylactic and therapeutic caffeine improved the detrimental effects of UCB. CONCLUSIONS: Caffeine seems encouraging for the prevention and treatment of bilirubin neurotoxicity in rats by means of its antiapoptotic, antioxidant, anti-inflammatory, anti-nitrosative, and anti-TLR-4 properties.

PMID: 29295636

44. Neonatal erythropoietin mitigates impaired gait, social interaction and diffusion tensor imaging abnormalities in a rat model of prenatal brain injury.


Children who are born preterm are at risk for encephalopathy of prematurity, a leading cause of cerebral palsy, cognitive delay and behavioral disorders. Current interventions are limited and none have been shown to reverse cognitive and behavioral impairments, a primary determinant of poor quality of life for these children. Moreover, the mechanisms of perinatal brain injury that result in functional deficits and imaging abnormalities in the mature brain are poorly defined, limiting the potential to target interventions to those who may benefit most. To determine whether impairments are reversible after a prenatal insult, we investigated a spectrum of functional deficits and diffusion tensor imaging (DTI) abnormalities in young adult animals. We hypothesized that prenatal transient systemic hypoxia-ischemia (TSHI) would induce multiple functional deficits concomitant with reduced microstructural white and gray matter integrity, and tested whether these abnormalities could be ameliorated using postnatal erythropoietin (EPO), an emerging neurorestorative intervention. On embryonic day 18 uterine arteries were transiently occluded for 60min via laparotomy. Shams underwent anesthesia and laparotomy for 60min. Pups were born and TSHI pups were randomized to receive EPO or vehicle via intraperitoneal injection on postnatal days 1 to 5. Gait, social interaction, olfaction and open field testing was performed from postnatal day 25-35 before brains underwent ex vivo DTI to measure fractional anisotropy, axial diffusivity and radial diffusivity. Prenatal TSHI injury causes hyperactivity, impaired gait and poor social interaction in young adult rats that mimic the spectrum of deficits observed in children born preterm. Collectively, these data show for the first time in a model of encephalopathy of prematurity that postnatal EPO treatment mitigates impairments in social interaction, in addition to gait deficits. EPO also normalizes TSHI-induced microstructural abnormalities in fractional anisotropy and radial diffusivity in multiple regions, consistent with improved structural integrity and recovery of myelination. Taken together, these results show behavioral and memory deficits from perinatal brain injury are reversible. Furthermore, resolution of DTI abnormalities may predict responsiveness to emerging interventions, and serve as a biomarker of CNS injury and recovery.

PMID: 29288070
45. Neurobehavioral Assessments in a Mouse Model of Neonatal Hypoxic-ischemic Brain Injury.


We performed unilateral carotid artery occlusion on CD-1 mice to create a neonatal hypoxic-ischemic (HI) model and investigated the effects of neonatal HI brain injury by studying neurobehavioral functions in these mice compared to non-operated (i.e., normal) mice. During the study, Rice-Vannucci's method was used to induce neonatal HI brain damage in postnatal day 7–10 (P7–10) mice. The HI operation was performed on the pups by unilateral carotid artery ligation and exposure to hypoxia (8% O2 and 92% N2 for 90 min). One week after the operation, the damaged brains were evaluated with the naked eye through the semi-transparent skull and were categorized into subgroups based on the absence ("no cortical injury" group) or presence ("cortical injury" group) of cortical injury, such as a lesion in the right hemisphere. On week 6, the following neurobehavioral tests were performed to evaluate the cognitive and motor functions: passive avoidance task (PAT), ladder walking test, and grip strength test. These behavioral tests are helpful in determining the effects of neonatal HI brain injury and are used in other mouse models of neurodegenerative diseases. In this study, neonatal HI brain injury mice showed motor deficits that corresponded to right hemisphere damage. The behavioral test results are relevant to the deficits observed in human neonatal HI patients, such as cerebral palsy or neonatal stroke patients. In this study, a mouse model of neonatal HI brain injury was established and showed different degrees of motor deficits and cognitive impairment compared to non-operated mice. This work provides basic information on the HI mouse model. MRI images demonstrate the different phenotypes, separated according to the severity of brain damage by motor and cognitive tests.

PMID: 29286442

46. Are Structural Magnetic Resonance Imaging and General Movements Assessment Sufficient for Early, Accurate Diagnosis of Cerebral Palsy?


[No abstract available]

PMID: 29279893

47. Are Structural Magnetic Resonance Imaging and General Movements Assessment Sufficient for Early, Accurate Diagnosis of Cerebral Palsy?-Reply.


[No abstract available]

PMID: 29279897

48. Trajectory of inflammatory and microglial activation markers in the postnatal rabbit brain following intrauterine endotoxin exposure.


BACKGROUND: Maternal infection is a risk factor for periventricular leukomalacia and cerebral palsy (CP) in neonates. We have previously demonstrated hypomyelination and motor deficits in newborn rabbits, as seen in patients with cerebral palsy, following maternal intrauterine endotoxin administration. This was associated with increased microglial activation, primarily involving the periventricular region (PVR). In this study we hypothesized that maternal intrauterine inflammation leads to a pro-inflammatory environment in the PVR that is associated with microglial activation in the first 2 postnatal weeks. METHODS: Timed pregnant New Zealand white rabbits underwent laparotomy on gestational day 28 (G28). They were randomly divided to receive lipopolysaccharide (LPS; 20μg/kg in 1mL saline) (Endotoxin group) or saline (1mL) (control saline, CS group), administrated along the wall of the uterus. The PVR from the CS and Endotoxin kits were harvested at G29 (1day post-injury), postnatal day1 (PND1, 3day post-injury) and PND5 (7days post-injury) for real-time PCR, ELISA and immunohistochemistry.
Kits from CS and Endotoxin groups underwent longitudinal MicroPET imaging, with [11C]PK11195, a tracer for microglial activation. RESULTS: We found that intrauterine endotoxin exposure resulted in pro-inflammatory microglial activation in the PVR of rabbits in the first postnatal week. This was evidenced by increased TSPO (translocator protein) expression co-localized with microglia/macrophages in the PVR, and changes in the microglial morphology (ameboid soma and retracted processes). In addition, CD11b level significantly increased with a concomitant decline in the CD45 level in the PVR at G29 and PND1. There was a significant elevation of pro-inflammatory cytokines and iNOS, and decreased anti-inflammatory markers in the Endotoxin kits at G29, PND1 and PND5. Increased [11C]PK11195 binding to the TSPO measured in vivo by PET imaging in the brain of Endotoxin kits was present up to PND14-17. CONCLUSIONS: Our results indicate that a robust pro-inflammatory microglial phenotype/brain milieu commenced within 24h after LPS exposure and persisted through PND5 and in vivo TSPO binding was found at PND14-17. This suggests that there may be a window of opportunity to treat after birth. Therapies aimed at inducing an anti-inflammatory phenotype in microglia might promote recovery in maternal inflammation induced neonatal brain injury.

PMID: 29274431

49. Chorioamnionitis, IL-17A, and fetal origins of neurologic disease.


The Centers for Disease Control and Prevention estimate that 1 in 323 infants have cerebral palsy. Highly correlated to intrauterine infection and inflammation, the incidence of cerebral palsy has remained constant over the last few decades despite significant advances in neonatal intensive care including improved ventilator techniques, surfactant therapy, maternal steroid administration, and use of intrapartum empiric antimicrobials. Recent advances in our understanding of immune responses to infection and inflammation have identified the cytokine IL-17A as a crucial component of early pro-inflammatory mediators that cause brain injury associated with neurologic impairment. Remarkably, maternal inflammatory responses to in utero inflammation and infection can also lead to potentially debilitating neurologic conditions in the offspring, which often become clinically apparent during childhood and/or early adulthood. This review details the role of IL-17A in fetal and maternal proinflammatory responses that lead to fetal brain injury and neurologic sequelae, including cerebral palsy. Recent findings regarding the role of maternal inflammatory responses in the development of childhood and adult neurologic conditions, such as autism, schizophrenia, and multiple sclerosis, will also be highlighted.

PMID: 29271527

50. Placental pathologic lesions with a significant recurrence risk - what not to miss!


Here, we review three important placental pathologies with significant clinical implications and recurrence risks. They are, in order of most to least frequently seen, villitis of unknown etiology, chronic histiocytic intervillositis, and massive perivillous fibrin deposition (also known as maternal floor infarction). These entities occur in both preterm and term gestations and are observed more frequently with maternal and obstetric disorders including prior pregnancy loss, hypertension/preeclampsia, and autoimmune disease. They are associated with, and probably the cause of, significant perinatal morbidity and mortality including intrauterine growth restriction, fetal and neonatal demise, and fetal/neonatal neurocompromise (seizures and cerebral palsy). All three entities have high recurrence risks, with recurrence rates ranging from 34 to 100%. The histologic features of villitis of unknown etiology, chronic histiocytic intervillositis, and massive perivillous fibrin deposition are described herein. We discuss the clinical associations and suggest the subsequent clinical and pathological evaluation. Hypotheses as to the biology of these lesions are reviewed.

PMID: 29271494
51. A poor long-term neurological prognosis is associated with abnormal cord insertion in severe growth-restricted fetuses.


OBJECTIVE: To clarify and compare if the neurological outcomes of fetal growth restriction (FGR) cases with abnormal cord insertion (CI) are associated with a higher risk of a poor neurological outcome in subjects aged 3 years or less versus those with normal CI. METHODS: A multicenter retrospective cohort study was conducted among patients with a birth weight lower than the 3rd percentile, based on the standard reference values for Japanese subjects after 22 weeks' gestation, who were treated at a consortium of nine perinatal centers in Japan between June 2005 and March 2011. Patients whose birth weights were less than the 3rd percentile and whose neurological outcomes from birth to 3 years of age could be checked from their medical records were analyzed. The relationship between abnormal CI and neurological outcomes was analyzed. Univariate and multivariate models of multivariate logistic regression were employed to estimate the raw and odds ratio (OR) with 95% confidence intervals comparing marginal (MCI) and velamentous cord insertion (VCI) to normal CI. RESULTS: Among 365 neonates, 63 cases of MCI and 14 cases of VCI were observed. After excluding 24 cases with neonatal or infant death from the total FGR population, the assessment of the outcomes of the infants aged 3 years or younger showed the following rates of neurological complications: 7.3% (n=25) for cerebral palsy, 8.8% (n=30) for developmental disorders, 16.7% (n=57) for small-for-gestational-age short stature (SGA), 0.6% (n=2) for impaired hearing, 0.9% (n=3) for epilepsy, 1.2% (n=4). The ORs (95% confidence intervals) based on multivariate analysis were as follows: cerebral palsy=10.1 (2.4-41.5) in the VCI group and 4.3 (1.6-11.9) in the MCI group, developmental disorders=6.7 (1.7-26) in the VCI group and 3.9 (1.1-14.2) in the single umbilical artery (SUA) group, 5.1 (1.4-18.7) for birth weight <1000 g and 2.8 (1.2-6.7) for placental weight <200 g. CONCLUSIONS: The present results indicate that growth-restricted fetuses diagnosed with a birth weight below the 3rd percentile exhibiting abnormal umbilical CI are at a high risk for poor neurological outcomes, including cerebral palsy and/or developmental disorders.

PMID: 29267174

52. Long-term impact of intrauterine neuroinflammation and treatment with magnesium sulphate and betamethasone: Sex-specific differences in a preterm labor murine model.


Preterm infants are at significantly increased risk for lifelong neurodevelopmental disability with male offspring disproportionately affected. Corticosteroids (such as betamethasone) and magnesium sulphate (MgSO4) are administered to women in preterm labor to reduce neurologic morbidity. Despite widespread use of MgSO4 in clinical practice, its effects on adult offspring are not well known nor have sex-specific differences in therapeutic response been explored. The objective of our study was to examine the long-term effects of perinatal neuroinflammation and the effectiveness of prenatal MgSO4/betamethasone treatments between males and females in a murine model via histologic and expression analyses. Our results demonstrate that male but not female offspring exposed to intrauterine inflammation demonstrated impaired performance in neurodevelopmental testing in early life assessed via negative geotaxis, while those exposed to injury plus treatment fared better. Histologic analysis of adult male brains identified a significant reduction in hippocampal neural density in the injured group compared to controls. Evaluation of key neural markers via qRT-PCR demonstrated more profound differences in gene expression in adult males exposed to injury and treatment compared to female offspring, which largely showed resistance to injury. Prenatal treatment with MgSO4/betamethasone confers long-term benefits beyond cerebral palsy prevention with sex-specific differences in response.

PMID: 29263436

53. γδ T cells but not αβ T cells contribute to sepsis-induced white matter injury and motor abnormalities in mice.


BACKGROUND: Infection and sepsis are associated with brain white matter injury in preterm infants and the subsequent development of cerebral palsy. METHODS: In the present study, we used a neonatal mouse sepsis-induced white matter injury model to determine the contribution of different T cell subsets (αβ T cells and γδ T cells) to white matter injury and consequent
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behavioral changes. C57BL/6j wild-type (WT), T cell receptor (TCR) δ-deficient (Tcrδ-/-, lacking γδT cells), and TCRα-deficient (Tcrα-/-, lacking αβT cells) mice were administered with lipopolysaccharide (LPS) at postnatal day (PND) 2. Brain myelination was examined at PNDs 12, 26, and 60. Motor function and anxiety-like behavior were evaluated at PND 26 or 30 using DigiGait analysis and an elevated plus maze. RESULTS: White matter development was normal in Tcrδ-/- and Tcrα-/- compared to WT mice. LPS exposure induced reductions in white matter tissue volume in WT and Tcrα-/- mice, but not in the Tcrδ-/- mice, compared with the saline-treated groups. Neither LPS administration nor the T cell deficiency affected anxiety behavior in these mice as determined with the elevated plus maze. DigiGait analysis revealed motor function deficiency after LPS-induced sepsis in both WT and Tcrα-/- mice, but no such effect was observed in Tcrδ-/- mice. CONCLUSIONS: Our results suggest that γδT cells but not αβT cells contribute to sepsis-induced white matter injury and subsequent motor function abnormalities in early life. Modulating the activity of γδT cells in the early stages of preterm white matter injury might represent a novel therapeutic strategy for the treatment of perinatal brain injury.

PMID: 29262837

54. Neuroprotective effect of tanshinone IIA weakens spastic cerebral palsy through inflammation, p38MAPK and VEGF in neonatal rats.
Zhang WL, Cao YA, Xia J, Tian L, Yang L, Peng CS.
As one of main active ingredients of salvia miltiorrhizae, which is a traditional Chinese medicine, tanshinone IIA is the basis of its pharmacological activities. In the present study, the effect of tanshinone IIA on weakening spastic cerebral palsy (SCP) in neonatal rats was investigated. Radial arm water maze and holding tests were used to measure the alterations of spastic cerebral palsy, inflammation was measured using an ELISA kit, and western blot analysis was used to analyze the protein expression of p-p38 mitogen-activated protein kinase (MAPK) and vascular endothelial growth factor (VEGF). The central mechanisms involved in the mediation or modulation of inflammation, p-p38 MAPK and VEGF were also investigated. Treatment with tanshinone IIA effectively inhibited spastic cerebral palsy, and the activities of interleukin (IL)-1β, IL-6, tumor necrosis factor-α, monocyte chemoattractant protein 1, cyclooxygenase-2 and prostaglandin E2 in a neonatal rat model of SCP. Tanshinone IIA effectively suppressed the protein expression of inducible nitric oxide synthase (NOS), phosphorylated (p-) nuclear factor (NF)-κB, p-p38MAPK and VEGF, and activated the phosphorylation of inhibitor of NF-κB and the protein expression of neuronal NOS in the SCP rat model. These results suggested that the neuroprotective effect of tanshinone IIA weakened SCP through inflammation, p38MAPK and VEGF in the neonatal rats.

PMID: 29257210

55. The use of clinical examination and cranial ultrasound in the diagnosis and management of post-hemorrhagic ventricular dilation in extremely premature infants.
Obeid R, Chang T, Bluth E, ForSYthe C, Jacobs M, Bulas D, Oluigbo C, Penn A.
OBJECTIVES: The objective of this study is to describe clinical and ultrasound changes in a cohort of premature newborns with post-hemorrhagic ventricular dilation (PHVD), and to correlate these changes with outcome. STUDY DESIGN: Premature newborns ≤29 weeks gestational age (GA) and ≤1,500 g birth weight with intraventricular hemorrhage were retrospectively reviewed. Clinical signs and cranial ultrasound (CUS) findings between time after birth and time before first cerebrospinal fluid temporizing intervention were compared with GA-equivalent newborns without interventions. White matter injury was assessed on brain magnetic resonance imaging. RESULTS: Between 2011 and 2014, 64 newborns met inclusion criteria; 23% had PHVD. The growth rates of the ventricles on CUS and the head circumference (HC) were higher in newborns with PHVD (p < 0.01 and p = 0.04, respectively) and correlated inversely with white matter injury (p = 0.006 and p < 0.001, respectively). CONCLUSION: Progression of PHVD in premature newborns as demonstrated by CUS and the HC correlated with outcome. Consistent measurement of these simple parameters will allow for much needed treatment comparisons, to define optimal protocols that decrease the risk of cerebral palsy in extremely preterm populations.

PMID: 29255191