Science Infos
Paralysie Cérébrale

N° 33 – FEVRIER 2017

FONDATION PARALYSIE CÉRÉBRALE LA FONDATION MOTRICE

Focus
Enquête E.S.P.a.Ce : la Newsletter

Première enquête nationale sur les soins reçus, besoins perçus, les priorités et améliorations attendues en rééducation motrice, rapportés par les personnes atteintes de paralysie cérébrale et leur famille

E.S.Pa.Ce
Enquête Satisfaction Paralysie Cérébrale

Objectif : Plus de 1200 questionnaires complétés

Merci à tous pour votre mobilisation, nous avons reçus près de 1000 questionnaires !

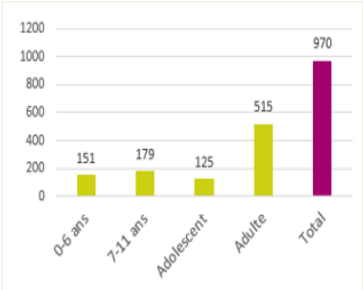
Votre avis est très important !

Il est encore temps de se mobiliser afin d'atteindre l'objectif de 1200 questionnaires complétés AVANT LE 30 JUIN 2017.

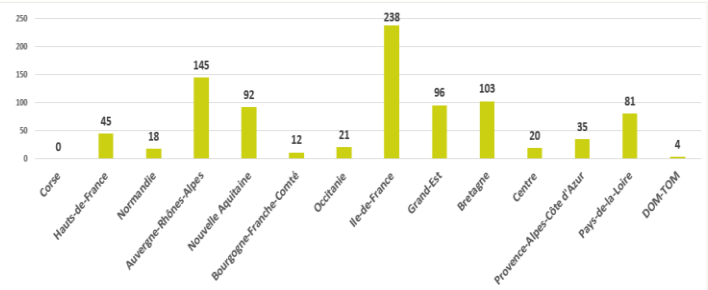
N'hésitez pas à parler de l'enquête auprès de votre entourage. Nous manquons notamment de témoignages d'ADOLESCENTS.

Pour rappel, La Fondation Motrice, en partenariat avec des associations de familles, organise une grande enquête nationale (ESPaCe) afin d'améliorer la rééducation motrice et d'apporter des réponses aux besoins et priorités des enfants et adultes atteints de Paralysie Cérébrale et à leur famille.

Participation par catégorie d'âge



Participation par région



N'oubliez pas de revenir sur votre questionnaire pour le terminer afin que vos réponses soient complètes pour l'analyse !

Les résultats de E.S.Pa.Ce attendus par le Ministère des Affaires sociales et de la Santé

L'enquête E.S.Pa.Ce à reçu le soutien de Mme Ségolène Neuville, secrétaire d'Etat chargée des Personnes handicapées et de la lutte contre l'exclusion (lettre consultable à l'adresse suivante : http://www.fondationparalysiecerebrale.org/sites/default/files/Lettre%20de%20Mme%20Neuville.pdf

Comment compléter le questionnaire?

- via un site Internet sécurisé spécifiquement dédié à l'enquête accessible depuis tout ordinateur à l'adresse suivante: http://www.lafondationmotrice.org
- Sur un questionnaire papier, en en faisant la demande auprès de **Kappa Santé** - 4 rue de Cléry 75002 Paris - ou par mail: **espace@kappasante.com**

N'hésitez pas à revenir vers **Kappa Santé** pour toute question relative à l'enquête ou pour obtenir les documents (brochures, affichettes) pour la relayer.

FONDATION PARALYSIE CÉRÉBRALE LA FONDATION MOTRICE

En partenariat avec: F.F.A.I.M.C.

En collaboration avec: Association Hémiparésie

Sous l'égide des sociétés savantes: sferhe, sfnp, SOFMER

Et avec le soutien financier de: Envoludia, KLESIA, Fondation L'Oréal

NL3_février 2017_v1.1_20170224

Sommaire

Manifestations et congrès

Publications scientifiques

Epidémiologie

Recueil de données

Prévalence- Incidence

Facteurs de risque – Causes

Lésions - Prévention des lesions

Données fondamentales

Données cliniques

Détection – Diagnostic

Données cliniques

Motricité - Mobilité – Posture

Cognition

Traitement - Rééducation motrice et cognitive

Pharmacologie Efficacite Tolérance

Chirurgie

Réadaptation fonctionnelle

Orthèses

Robots – Exosquelette

Stimulation cérébrale - Stimulation neurosensorielle

Réalité virtuelle - Jeux video

Thérapies cellulaires

Autres

Autres Troubles / Troubles concomitants

Troubles musculosquelettiques, des tissus conjonctifs et osseux

Nutrition – Troubles nutritionnels

Sphère bucco-dentaire – Troubles de la déglutition

Troubles visuels

Epilepsie

Troubles du sommeil

Qualité de vie et rapport au monde

Qualité de vie – Retentissement dans la vie quotidienne vie quotidienne

Activité physique

Prise en charge et Accompagnant/Accompagnement

Domotique - Technologie

Manifestations et congrès

Mai 2017

29th Annual EACD Meeting,
17-20 mai 2017
Amsterdam, pays bas
http://www.eacd2017.org/

Juin 2017

Congrès Réseau Breizh - Sferhe – CDI
"La paralysie cérébrale au fil du temps »
26-27 juin 2017
Saint Malo, France
http://www.tmsevents.fr/congres/2017/sferhe/

Octobre 2017

32e congrès de la SOFMER
05-07 octobre 2017
Nancy, France
http://nancy.sofmer2017.com/index.php?pageID=09eb828f52123930a2186e7b5a4db890

European Congress of NeuroRehabilitation (ECNR)
24-27 octobre 2017
Lausanne, Suisse
http://www.ecnr-congress.org/

Juillet 2018

12 th International Society of Physical and Rehabilitation Medicine (ISPRM) World Congress
08-12 juillet 2018
Paris, France
http://www.isprm2018.com/

Publications scientifiques

Méthodologie de la recherche

Le profil de veille a été mis en place sur Pubmed avec le mot clé "Cerebral Palsy" pour des publications majoritairement en français ou en anglais, avec abstract ou full text
Free article indique le lien vers les articles dont le texte intégral est librement disponible

PMID: 28133638 [PubMed]

Epidémiologie

Recueil de données

Development of user-friendly and interactive data collection system for cerebral palsy.
Raharjo I, Burns TG, Venugopalan J, Wang MD.
IEEE EMBS Int Conf Biomed Health Inform. 2016 Feb;2016:406-409. doi: 10.1109/BHI.2016.7455920.

Cerebral palsy (CP) is a permanent motor disorder that appears in early age and it requires multiple tests to assess the physical and mental capabilities of the patients. Current medical record data collection systems, e.g., EPIC, employed for CP are very general, difficult to navigate, and prone to errors. The data cannot easily be extracted which limits data analysis on this rich source of information. To overcome these limitations, we designed and prototyped a database with a graphical user interface geared towards clinical research specifically in CP. The platform with MySQL and Java framework is reliable, secure, and can be easily integrated with other programming languages for data analysis such as MATLAB. This database with GUI design is a promising tool for data collection and can be applied in many different fields aside from CP to infer useful information out of the vast amount of data being collected.
Free PMC Article
DOI: 10.1109/BHI.2016.7455920
PMCID: PMC5267324

Prévalence- Incidence

Risk of cerebral palsy in Chinese children: A N:M matched case control study.
Gao J(, Zhao B, He L, Sun M, Yu X, Wang L.
J Paediatr Child Health. 2017 Jan 30. doi: 10.1111/jpc.13479. [Epub ahead of print]

AIM: To estimate epidemiological risk factors for cerebral palsy (CP) in children.
METHODS: A N:M matched case control study was conducted in 114 persons with CP and 1286 controls. Relevant data were collected using a maternal self-design questionnaire. Univariate logistic regression and multivariate conditional logistic regression analyses were performed using SPSS.
RESULTS: Univariate analysis has yielded 20 significant risk factors for CP. Advanced maternal age (30 years or older) at childbirth (adjusted odds ratio (OR) 1.63, 95% confidence interval (CI) 0.98-2.72), alcohol consumption during pregnancy (adjusted OR 4.17, 95% CI 1.23-14.08), living in the countryside (adjusted OR 1.71, 95% CI 1.18-2.48), father's occupational exposure to harmful substances (adjusted OR 3.34, 95% CI 1.61-6.93) and multiple births (adjusted OR 3.10, 95% CI 1.65-5.84) were found to be risk factors for CP by multivariate analysis. On the other side, high mother's education level (adjusted OR 0.60, 95% CI 0.46-0.76), folic acid supplements (adjusted OR 0.50, 95% CI 0.30-0.82), and high birth hospital level (adjusted OR 0.68, 95% CI 0.52-0.90) were found to be protective factors.
CONCLUSION: Although the important risk factors of CP focus on gestation at birth and perinatal events, the incidence could probably be further lowered, if potential risk factors identified in this study are considered.

DOI: 10.1111/jpc.13479

PMID: 28134474 [PubMed - as supplied by publisher]

The Development of Extremely Premature Infants.
Voss W(1), Hobbiebrunken E, Ungermann U, Wagner M, Damm G.
Dtsch Arztebl Int. 2016 Dec 26;113(51-52):871-878. doi: 10.3238/arztebl.2016.0871.

BACKGROUND: Until now, there has been no comprehensive long-term study in Germany on the development of extremely premature infants up to school age.
METHODS: From October 2004 to September 2008, in the German federal state of Lower Saxony, 437 infants born at a gestational age less than 28 weeks were followed up at the ages of 2 and 5 years, and some at the age of 10 years. The 5-year follow-up data were collated with the peri- and neonatological parameters and compared with the 2- and 10-year follow-up data.
RESULTS: The mortality of extremely premature infants was 25.1%. Among the five-year-olds studied, 14.1% showed cognitive impairment and 17.4% had cerebral palsy. 40.4% manifested abnormalities of speech or language, 33.1% had behavioral abnormalities, and 72.5% received therapeutic interventions. Infants in whom severe brain damage was diagnosed by ultrasonography shortly after birth were more likely to develop cerebral palsy (odds ratio [OR] 38.28, 99% confidence interval [12.55; 116.80]) and to have impaired cognitive development (OR 7.36 [2.52; 21.51]). The likelihood of cognitive impairment was also higher among infants whose mothers had a lower level of education (OR 3.83 [1.68; 8.77]). 73.1% (242 out of 331) of the two-year-olds were in the same category of cognitive function at the 5-year follow-up; 82.4% (65 out of 79) of the 5-year-olds were in the same category of cognitive function at the 10-year follow-up.
CONCLUSION: Many of these extremely premature infants had developmental disturbances, and many required therapeutic interventions. The risk factors revealed by this study may help identify patients who are in particular need of support, enabling targeted measures to be taken at the earliest possible stage in order to improve their cognitive and motor abilities. Nationwide, standardized follow-up at the age of 5 years would be desirable.
Free PMC Article
DOI: 10.3238/arztebl.2016.0871
PMCID: PMC5282475
PMID: 28130919 [PubMed - in process]

Trends in the prevalence of cerebral palsy in children born between 1988 and 2007 in Okinawa, Japan.
Touyama M, Touyama J, Toyokawa S, Kobayashi Y.
Brain Dev. 2016 Oct;38(9):792-9. doi: 10.1016/j.braindev.2016.03.007. Epub 2016 Apr 9.

AIM: This study aimed to describe trends in CP prevalence among children born between 1988 and 2007 in Okinawa, Japan.
METHOD: This study was conducted during two time periods, Period I (from 1988 to 1997) and Period II (from 1998 to 2007), using data from the local CP registration system. We assessed cerebral palsy gestational age and birth weight specific trends in prevalence and analyzed these with Poisson regression analysis.
RESULTS: Overall crude CP prevalence was 1.88 per 1000 live births. Approximately 70% of children with CP were born preterm or with low birth weight (LBW). Overall CP prevalence increased in Period I and decreased significantly in Period II ($P<0.05$). Additionally, CP prevalence among children born with a birth weight between 1000 and 1999g increased in Period I and decreased significantly in Period II ($P<0.05$). A significant decrease was found among the children born between 1995 and 2007 with a gestational age between 28 and 31weeks ($P<0.01$).
CONCLUSIONS: There was a decrease in CP prevalence from 1998 to 2007, especially among LBW children and preterm infants. The high CP proportions among LBW and preterm infants are unique features of the population of Okinawa, Japan.

DOI: 10.1016/j.braindev.2016.03.007
PMID: 27072917 [PubMed - indexed for MEDLINE]

Facteurs de risque – Causes

Association Between Moderate and Late Preterm Birth and Neurodevelopment and Social-Emotional Development at Age 2 Years.

Cheong JL, Doyle LW, Burnett AC, Lee KJ, Walsh JM, Potter CR, Treyvaud K, Thompson DK, Olsen JE, Anderson PJ, Spittle AJ.

JAMA Pediatr. 2017 Feb 6:e164805. doi: 10.1001/jamapediatrics.2016.4805. [Epub ahead of print]

Importance: Moderate and late preterm (MLPT) births comprise most preterm infants. Therefore, long-term developmental concerns in this population potentially have a large public health influence. While there are increasing reports of developmental problems in MLPT children, detail is lacking on the precise domains that are affected.

Objective: To compare neurodevelopment and social-emotional development between MLPT infants and term-born control infants at age 2 years. Design, Setting, and Participants: This investigation was a prospective longitudinal cohort study at a single tertiary hospital. Participants were MLPT infants (32-36 weeks' completed gestation) and healthy full-term controls (≥37 weeks' gestation) recruited at birth. During a 3-year period between December 7, 2009, and November 7, 2012, MLPT infants were recruited at birth from the neonatal unit and postnatal wards of the Royal Women's Hospital, Melbourne, Australia. The term control recruitment extended to March 26, 2014. The dates of the data developmental assessments were February 23, 2012, to April 8, 2016. Exposure: Moderate and late preterm birth.

Main Outcomes and Measures: Cerebral palsy, blindness, and deafness assessed by a pediatrician; cognitive, language, and motor development assessed using the Bayley Scales of Infant Development-Third Edition (developmental delay was defined as less than -1 SD relative to the mean in controls in any domain of the scales); and social-emotional and behavioral problems assessed by a parent questionnaire (Infant Toddler Social Emotional Assessment). Outcomes were compared between birth groups using linear and logistic regression, adjusted for social risk.

Results: In total, 198 MLPT infants (98.5% of 201 recruited) and 183 term-born controls (91.0% of 201 recruited) were assessed at 2 years' corrected age. Compared with controls, MLPT children had worse cognitive, language, and motor development at age 2 years, with adjusted composite score mean differences of -5.3 (95% CI, -8.2 to -2.4) for cognitive development, -11.4 (95% CI, -15.3 to -7.5) for language development, and -7.3 (95% CI, -10.6 to -3.9) for motor development. The odds of developmental delay were higher in the MLPT group compared with controls, with adjusted odds ratios of 1.8 (95% CI, 1.1-3.0) for cognitive delay, 3.1 (95% CI, 1.8-5.2) for language delay, and 2.4 (95% CI, 1.3-4.5) for motor delay. Overall social-emotional competence was worse in MLPT children compared with controls (t statistic mean difference, -3.6 (95% CI, -5.8 to -1.4), but other behavioral domains were similar. The odds of being at risk for social-emotional competence were 3.9 (95% CI, 1.4-10.9) for MLPT children compared with controls.

Conclusions and Relevance: Moderate and late preterm children exhibited developmental delay compared with their term-born peers, most marked in the language domain. This knowledge of developmental needs in MLPT infants willassist in targeting surveillance and intervention.

DOI: 10.1001/jamapediatrics.2016.4805

PMID: 28152144 [PubMed - as supplied by publisher]

Asymptomatic congenital cytomegalovirus infection with neurological sequelae: A retrospective study using umbilical cord.

Uematsu M, Haginoya K, Kikuchi A, Hino-Fukuyo N, Ishii K, Shiihara T, Kato M, Kamei A, Kure S.

Brain Dev. 2016 Oct;38(9):819-26. doi: 10.1016/j.braindev.2016.03.006. Epub 2016 Apr 8.

BACKGROUND: Congenital cytomegalovirus (CMV) infection causes various neurological sequelae. However, most infected infants are asymptomatic at birth, and retrospective diagnosis is difficult beyond the neonatal period.

OBJECTIVE: This study aimed to investigate the aspects of neurological sequelae associated with asymptomatic congenital CMV infection.

METHODS: We retrospectively analyzed 182 patients who were suspected of having asymptomatic congenital CMV infection with neurological symptoms in Japan. Congenital CMV infection was diagnosed by quantitative polymerase chain reaction amplification of CMV from dried umbilical cord DNA.

RESULTS: Fifty-nine patients (32.4%) who tested positive for CMV were confirmed as having congenital CMV infection. Among 54 congenital CMV patients, major neurological symptoms included intellectual disability (n=51, 94.4%), hearing impairment (n=36, 66.7%) and cerebral palsy (n=21, 38.9%), while microcephaly (n=16, 29.6%) and

epilepsy (n=14, 25.9%) were less common. In a brain magnetic resonance imaging (MRI) study, cortical dysplasia was observed in 27 CMV-positive patients (50.0%), and all patients (100%) had cerebral white matter (WM) abnormality. Intracranial calcification was detected by CT in 16 (48.5%) of 33 CMV-positive patients. Cerebral palsy, cortical dysplasia and a WM abnormality with a diffuse pattern were associated with marked intellectual disability.
CONCLUSIONS: Brain MRI investigations are important for making a diagnosis and formulating an intellectual prognosis. Analysis of umbilical cord tissue represents a unique and useful way to retrospectively diagnose congenital CMV infection.

DOI: 10.1016/j.braindev.2016.03.006
PMID: 27068877 [PubMed - indexed for MEDLINE]

Neurodevelopmental Outcome of Extremely Low Birth Weight Children at Corrected Age of Two Years.
Mukhopadhyay K, Mahajan R, Malhi P, Kumar A.
Indian Pediatr. 2016 May 8;53(5):391-3.

OBJECTIVE: To assess the neurodevelopmental, cognitive and behavioral function of extremely low birth weight babies (ELBW) till corrected age of two years.
METHODS: 79 ELBW babies were enrolled and followed at 1 year (n=50), 18 months (n=47) and 2 years (n=36). Adverse composite outcome was defined as death or moderate-to-severe neurodevelopmental impairment (defined as either cerebral palsy or DQ score <70 or deafness or blindness).
RESULTS: At 1 year, 24% were neurologically abnormal. At 18 months, average score (>85) was seen in 25 (54%) children in motor and 8 (17%) in mental development. Abnormal behavioral score (?12) was seen in 89% children. Adverse composite outcome was present in 28 (35.4%) babies.
CONCLUSIONS: ELBW neonates are at a high risk of neurodevelopmental and behavioral impairment.
Free Article
PMID: 27254046 [PubMed - indexed for MEDLINE]

Primary Human Cytomegalovirus (HCMV) Infection in Pregnancy.
Buxmann H, Hamprecht K, Meyer-Wittkopf M, Friese K.
Dtsch Arztebl Int. 2017 Jan 27;114(4):45-52. doi: 10.3238/arztebl.2017.0045.

BACKGROUND: In 0.5-4% of pregnancies, the prospective mother sustains a primary infection with human cytomegalovirus (HCMV). An HCMV infection of the fetus in the first or second trimester can cause complex post-encephalitic impairment of the infant brain, leading to motor and mental retardation, cerebral palsy, epilepsy, retinal defects, and progressive hearing loss.
METHODS: This review is based on pertinent publications from January 2000 to October 2016 that were retrieved by a selective search in PubMed employing the terms "cytomegalovirus and pregnancy" and "congenital cytomegalovirus."
RESULTS: 85-90% of all neonates with HCMV infection are asymptomatic at birth. The main long-term sequela is hearing impairment, which develops in 8-15% of these affected children. Hygienic measures can lower the risk of primary HCMV infection in pregnancy by 50-85%. The first randomized and controlled trial (RCT) of passive immunization with an HCMV-specific hyper - immune globulin (HIG) preparation revealed a trend toward a lower risk of congenital transmission of the virus (30% versus 44% with placebo, p = 0.13). The effect of HIG was more marked in the initial non-randomized trial (15% versus 40%, p = 0.02). The RCT also showed HIG to be associated with a higher frequency of fetal growth retardation and premature birth (13% versus 2%, p = 0.06). Valaciclovir is a further, non-approved treatment option.
CONCLUSION: In the absence of an active vaccine against HCMV, counseling about hygienic measures may currently be the single most effective way to prevent congenital HCMV infection. Moreover, HCMV serologic testing is recommended in the guideline of the Association of the Scientific Medical Societies in Germany (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften, AWMF). Further randomized trials of treatment with HIG and with valaciclovir are urgently needed so that the options for the prevention and treatment of congenital HCMV infection can be assessed.
Free PMC Article
DOI: 10.3238/arztebl.2017.0045

PMCID: PMC5319378
PMID: 28211317 [PubMed - in process]

Systemic activation of Toll-like receptor 2 suppresses mitochondrial respiration and exacerbates hypoxic-ischemic injury in the developing brain.
Mottahedin A, Svedin P, Nair S, Mohn CJ, Wang X, Hagberg H, Ek J, Mallard C.
J Cereb Blood Flow Metab. 2017 Jan 1:271678X17691292. doi: 10.1177/0271678X17691292. [Epub ahead of print]

Infection and inflammation are known risk factors for neonatal brain injury. Mycoplasma and Gram-positive bacteria, for which Toll-like receptor 2 (TLR2) plays a key role in recognition and inflammatory response, are among the most common pathogens in the perinatal period. Here, we report that systemic activation of TLR2 by Pam3CSK4 (P3C) increases neural tissue loss and demyelination induced by subsequent hypoxia-ischemia (HI) in neonatal mice. High-resolution respirometry of brain isolated mitochondria revealed that P3C suppresses ADP-induced oxidative phosphorylation, the main pathway of cellular energy production. The results suggest that infection and inflammation might contribute to HI-induced energy failure.
DOI: 10.1177/0271678X17691292
PMID: 28139935 [PubMed - as supplied by publisher]

The association of neonatal morbidity with long-term neurological outcome ininfants who were growth restricted and preterm at birth: secondary analyses from TRUFFLE (Trial of Randomized Umbilical and Fetal Flow in Europe).
Van Wassenaer-Leemhuis AG, Marlow N, Lees C, Wolf H; TRUFFLEinvestigators.
BJOG. 2017 Feb 3. doi: 10.1111/1471-0528.14511. [Epub ahead of print]

OBJECTIVE: To study the relationship between neonatal morbidity (NNM) and two-year neurodevelopmental impairment (NDI) in surviving children after early fetal growth restriction (FGR).
DESIGN: Secondary analysis of a European randomised trial (TRUFFLE) of delivery for very preterm fetuses dependent on venous Doppler or cardiotocographic criteria.
SETTING: Tertiary perinatal centres, participants in TRUFFLE.
POPULATION: 402 surviving children after early FGR.
METHODS: Prospective data were collection from the recognition of FGR until the corrected age of two years. We studied the association between NNM and NDI, retaining trial allocation in all statistical models. NNM included any of bronchopulmonary dysplasia, brain injury, sepsis or necrotising enterocolitis. NDI was a composite of Bayley cognitive score < 85, cerebral palsy or severe sensory impairment.
MAIN OUTCOME MEASURE: NDI in relation to NNM.
RESULTS: NNM occurred in 104 cases (26%) and was more frequent in 17 of 39 infants with NDI (44%) than in the 87 of 363 infants with normal outcome (24%) [odds ratio 2.5 (95% CI, 1.3-4.8); P = 0.01]. In 22 of 39 NDI cases (56%) there was no preceding NNM. NNM was inversely related to gestational age, but NDI did not vary by gestational age. In multivariable analyses, cerebral ultrasound abnormalities were most strongly associated with NDI, together with trial group allocation, birthweight ratio, infant sex and Apgar score.
CONCLUSIONS: With the exception of cerebral ultrasound abnormalities, commonly used NNMs are poor markers of later NDI and should not be used as surrogate outcomes for NDI.
TWEETABLE ABSTRACT: Neonatal morbidities cannot be used as surrogate outcomes for neurodevelopmental impairment.

DOI: 10.1111/1471-0528.14511
PMID: 28158932 [PubMed - as supplied by publisher]

Lésions - Prévention des lesions

Données fondamentales

Effects of progesterone on hyperoxia-induced damage in mouse C8-D1A astrocytes.
Weber F, Endesfelder S, Bührer C, Berns M
Brain Behav. 2016 Feb 1;6(3):e00435. doi: 10.1002/brb3.435. eCollection 2016.

INTRODUCTION: The birth of most mammals features a dramatic increase in oxygen while placenta-derived hormones such as β-estradiol and progesterone plummet. In experimental newborn animals, transiently elevated oxygen concentrations cause death of neurons, astrocytes, and oligodendrocyte precursors. High oxygen has been associated with cerebral palsy in human preterm infants while progesterone is being used to prevent preterm delivery and investigated as a neuroprotective agent.
METHODS: In this study, we investigated the effects of hyperoxia (80% O2 for 24, 48, and 72 h) on cultured C8-D1A astrocytes in the presence or absence of progesterone at concentrations ranging from 10(-9) to 10(-5) mol/L.
RESULTS: Hyperoxia measured by methytetrazolium assay (MTT) reduced cell viability, increased release of lactate dehydrogenase (LDH), reduced carboxyfluorescein diacetate succinimidyl ester (CFSE)-assessed cell proliferation, and downregulated Cylin D2 expression. Progesterone did not affect any of these hyperoxia-mediated indicators of cell death or malfunctioning. Real-time PCR analysis showed that hyperoxia caused downregulation of the progesterone receptors PR-AB und PR-B.
CONCLUSIONS: Our experiments showed that there was no protective effect of progesterone on hyperoxia-inducted cell damage on mouse C8-D1A astrocytes. Down regulation of the progesterone receptors might be linked to the lack of protective effects.
Free PMC Article
DOI: 10.1002/brb3.435
PMCID: PMC4831416
PMID: 27099799 [PubMed - indexed for MEDLINE]

Human iPSC-Derived Immature Astroglia Promote Oligodendrogenesis by Increasing TIMP-1 Secretion.
Jiang P, Chen C, Liu XB, Pleasure DE, Liu Y, Deng W
Cell Rep. 2016 May 10;15(6):1303-15. doi: 10.1016/j.celrep.2016.04.011. Epub 2016 Apr 28.

Astrocytes, once considered passive support cells, are increasingly appreciated as dynamic regulators of neuronal development and function, in part via secreted factors. The extent to which they similarly regulate oligodendrocytes or proliferation and differentiation of oligodendrocyte progenitor cells (OPCs) is less understood. Here, we generated astrocytes from human pluripotent stem cells (hiPSC-Astros) and demonstrated that immature astrocytes, as opposed to mature ones, promote oligodendrogenesis in vitro. In the PVL mouse model of neonatal hypoxic/ischemic encephalopathy, associated with cerebral palsy in humans, transplanted immature hiPSC-Astros promoted myelinogenesis and behavioral outcome. We further identified TIMP-1 as a selectively upregulated component secreted from immature hiPSC-Astros. Accordingly, in the rat PVL model, intranasal administration of conditioned medium from immature hiPSC-Astros promoted oligodendrocyte maturation in a TIMP-1-dependent manner. Our findings suggest stage-specific developmental interactions between astroglia and oligodendroglia and have important therapeutic implications for promoting myelinogenesis.

Free PMC Article
DOI: 10.1016/j.celrep.2016.04.011
PMCID: PMC4864503
PMID: 27134175 [PubMed - indexed for MEDLINE]

Microglial migration and interactions with dendrimer nanoparticles are altered in the presence of neuroinflammation.
Zhang F, Nance E, Alnasser Y(3), Kannan R, Kannan S
J Neuroinflammation. 2016 Mar 22;13(1):65. doi: 10.1186/s12974-016-0529-3.

BACKGROUND: Microglial cells have been implicated in neuroinflammation-mediated injury in the brain, including neurodevelopmental disorders such as cerebral palsy (CP) and autism. Pro-inflammatory activation of microglial cells results in the impairment of their neuroprotective functions, leading to an exaggerated, ongoing immune dysregulation that can persist long after the initial insult. We have previously shown that dendrimer-mediated delivery of an anti-inflammatory agent can attenuate inflammation in a rabbit model of maternal inflammation-induced CP and significantly improve the motor phenotype, due to the ability of the dendrimer to selectively localize in activated microglia.
METHODS: To elucidate the interactions between dendrimers and microglia, we created an organotypic whole-hemisphere brain slice culture model from newborn rabbits with and without exposure to inflammation in utero. We

then used this model to analyze the dynamics of microglial migration and their interactions with dendrimers in the presence of neuroinflammation.
RESULTS: Microglial cells in animals with CP had an amoeboid morphology and impaired cell migration, demonstrated by decreased migration distance and velocity when compared to cells in healthy, age-matched controls. However, this decreased migration was associated with a greater, more rapid dendrimer uptake compared to microglial cells from healthy controls.
CONCLUSIONS: This study demonstrates that maternal intrauterine inflammation is associated with impaired microglial function and movement in the newborn brain. This microglial impairment may play a role in the development of ongoing brain injury and CP in the offspring. Increased uptake of dendrimers by the "impaired" microglia can be exploited to deliver drugs specifically to these cells and modulate their functions. Host tissue and target cell characteristics are important aspects to be considered in the design and evaluation of targeted dendrimer-based nanotherapeutics for improved and sustained efficacy. This ex vivo model also provides a rapid screening tool for evaluation of the effects of various therapies on microglial function.
Free PMC Article
DOI: 10.1186/s12974-016-0529-3
PMCID: PMC4802843
PMID: 27004516 [PubMed - indexed for MEDLINE]

Données cliniques

Age-Specific Dynamics of Corpus Callosum Development in Children and its Peculiarities in Infantile Cerebral Palsy.
Krasnoshchekova EI, Zykin PA, Tkachenko LA, Aleksandrov TA, Sereda VM, Yalfimov AN
Bull Exp Biol Med. 2016 Oct;161(6):853-857. Epub 2016 Oct 25.

The age dynamics of corpus callosum development was studied on magnetic resonance images of the brain in children aged 2-11 years without neurological abnormalities and with infantile cerebral palsy. The areas of the total corpus callosum and its segments are compared in the midsagittal images. Analysis is carried out with the use of an original formula: proportion of areas of the anterior (genu, CC2; and anterior part, CC3) and posterior (isthmus, CC6 and splenium, CC7) segments: kCC=(CC2+CC3)×CC6/CC7. The results characterize age-specific dynamics of the corpus callosum development and can be used for differentiation, with high confidence, of the brain of children without neurological abnormalities from the brain patients with infantile cerebral palsy.
DOI: 10.1007/s10517-016-3528-6
PMID: 27783284 [PubMed - indexed for MEDLINE]

[Neuroprotection for preterm infants with antenatal magnesium sulphate]. [Article in French]
Marret S, Ancel PY.
J Gynecol Obstet Biol Reprod (Paris). 2016 Dec;45(10):1418-1433. doi: 10.1016/j.jgyn.2016.09.028. Epub 2016 Oct 28.

OBJECTIVE: To evaluate in preterm born children the neuroprotective benefits and the risks, at short- and long-term outcome, of the antenatal administration of magnesium sulphate (MgSO4) in women at imminent risk of preterm delivery.
MATERIAL AND METHODS: Computer databases Medline, the Cochrane Library and the recommendations of various international scientific societies.
RESULTS: Given the demonstrated benefit of antenatal MgSO4 intravenous administration on the reduction of cerebral palsy rates and the improvement of motor development in children born preterm, it is recommended for all women whose imminent delivery is expected or programmed before 32 weeks of gestation (WG) (grade A). The analysis of the literature finds no argument for greater benefit of antenatal MgSO4 administration in sub-groups of gestational age, or depending on the type of pregnancy (single or multiple pregnancy) or with the cause of preterm birth (NP2). Its administration is recommended before 32 WG, if single or multiple pregnancy, whatever the cause of prematurity (grade B). It is recommended 4g loading dose (professional consensus). With a loading dose of 4g intravenous (IV) in 20min, the serum magnesium is lower than with intramuscular suggesting a preference for the IV route (professional consensus). It is proposed to use a maintenance dose of 1g/h until delivery with a maximum recommended duration of 12 hours without exceeding a cumulative dose of 50g (professional consensus). These doses are without severe adverse maternal side effects or adverse effects in newborns at short- and medium-term outcome (NP1).

CONCLUSION: It is recommended to administer magnesium sulfate to the women at high risk of imminent preterm birth before 32 WG, whether expected or planned (grade A), with a 4g IV loading dose followed by a maintenance dose of 1g/h for 12hours (professional consensus), the pregnancy is single or multiple, whatever the cause of prematurity (professional consensus).

DOI: 10.1016/j.jgyn.2016.09.028
PMID: 28166926 [PubMed - in process]

Role of Antioxidants in Neonatal Hypoxic-Ischemic Brain Injury: New Therapeutic Approaches.
Arteaga O, Álvarez A, Revuelta M, Santaolalla F, Urtasun A, Hilario E.
Int J Mol Sci. 2017 Jan 28;18(2). pii: E265. doi: 10.3390/ijms18020265.

Hypoxic-ischemic brain damage is an alarming health and economic problem in spite of the advances in neonatal care. It can cause mortality or detrimental neurological disorders such as cerebral palsy, motor impairment and cognitive deficits in neonates. When hypoxia-ischemia occurs, a multi-faceted cascade of events starts out, which can eventually cause cell death. Lower levels of oxygen due to reduced blood supply increase the production of reactive oxygen species, which leads to oxidative stress, a higher concentration of free cytosolic calcium and impaired mitochondrial function, triggering the activation of apoptotic pathways, DNA fragmentation and cell death. The high incidence of this type of lesion in newborns can be partly attributed to the fact that the developing brain is particularly vulnerable to oxidative stress. Since antioxidants can safely interact with free radicals and terminate that chain reaction before vital molecules are damaged, exogenous antioxidant therapy may have the potential to diminish cellular damage caused by hypoxia-ischemia. In this review, we focus on the neuroprotective effects of antioxidant treatments against perinatal hypoxic-ischemic brain injury, in the light of the most recent advances.
DOI: 10.3390/ijms18020265
PMID: 28134843 [PubMed - in process]

Détection – Diagnostic

Données cliniques

Cranial ultrasound findings in preterm infants predict the development of cerebral palsy.
Skovgaard AL, Zachariassen G.
Dan Med J. 2017 Feb;64(2). pii: A5330.

INTRODUCTION: Our aim was to evaluate any association between gestational age, birth weight and findings on cranial ultrasounds during hospitalisation in very preterm infants and mortality and neurological outcome in childhood.
METHOD: This study was a retrospective cohort study based on a patient record review. The cohort consisted of very preterm born children (gestational age ≤ 32 + 0) born from 2004 to 2008. For each infant, we obtained results from all cranial ultrasounds performed during hospitalisation. In 2014, patient records were evaluated for cerebral palsy, Gross Motor Function Classification System, blindness and deafness.
RESULTS: A total of 249 infants were included. The mortality rate was 9.2%. In all, 217 children were evaluated at 5-9 years of age. Four children were diagnosed with germinal matrix haemorrhage - intraventricular haemorrhage grade 3 (GMH-IVH3) and periventricular haemorrhagic infarction (PVHI), of whom two developed cerebral palsy. Nine children were diagnosed with periventricular leukomalacia (PVL), of whom six developed cerebral palsy. Cerebral palsy was detected in 14 children (6.4%), and one (0.5%) child was in need of a hearing assistive device. Severe brain injury (GMH-IVH3, PVHI or PVL) (p = 0.000) and being of male gender (p = 0.03) were associated with cerebral palsy in childhood.
CONCLUSION: Severe brain injuries detected by neonatal cranial ultrasound in very preterm infants is associated with development of cerebral palsy in childhood.
FUNDING: none. TRAIL REGISTRATION: not relevant.
PMID: 28157062 [PubMed - in process]

Prognostic Accuracy of Electroencephalograms in Preterm Infants: A Systematic Review.

Fogtmann EP, Plomgaard AM, Greisen G, Gluud C.
Pediatrics. 2017 Feb;139(2). pii: e20161951. doi: 10.1542/peds.2016-1951.

CONTEXT: Brain injury is common in preterm infants, and predictors of neurodevelopmental outcome are relevant.
OBJECTIVE: To assess the prognostic test accuracy of the background activity of the EEG recorded as amplitude-integrated EEG (aEEG) or conventional EEG early in life in preterm infants for predicting neurodevelopmental outcome.
DATA SOURCES: The Cochrane Library, PubMed, Embase, and the Cumulative Index to Nursing and Allied Health Literature.
STUDY SELECTION: We included observational studies that had obtained an aEEG or EEG within 7 days of life in preterm infants and reported neurodevelopmental outcomes 1 to 10 years later.
DATA EXTRACTION: Two reviewers independently performed data extraction with regard to participants, prognostic testing, and outcomes.
RESULTS: Thirteen observational studies with a total of 1181 infants were included. A meta-analysis was performed based on 3 studies (267 infants). Any aEEG background abnormality was a predictor of abnormal outcome. For prediction of a developmental quotient <70 points, cerebral palsy, or death, the pooled sensitivity was 0.83 (95% confidence interval, 0.69-0.92) and specificity 0.83 (95% confidence interval, 0.77-0.87).
LIMITATIONS: All studies were at high risk of bias. Heterogeneity was evident among the studies with regard to the investigated aEEG and EEG variables, neurodevelopmental outcomes, and cutoff values.
CONCLUSIONS: aEEG or EEG recorded within the first 7 days of life in preterm infants may have potential as a predictor for later neurodevelopmental outcome. We need high-quality studies to confirm these findings. Meanwhile, the prognostic value of aEEG and EEG should be used only as a scientific tool.

DOI: 10.1542/peds.2016-1951
PMID: 28143915 [PubMed - in process]

Recent advances in the neuroimaging and neuropsychology of cerebral palsy.
Gosling A.
Appl Neuropsychol Child. 2017 Jan-Mar;6(1):55-63. doi: 10.1080/21622965.2015.1074914. Epub 2016 Mar 17.

This article reviews the recent advances in understanding of cerebral palsy (CP) and outlines how these advances could inform pediatric neuropsychological rehabilitation. Three main areas are discussed: the improved delineation of differing presentations resulting from more advanced imaging techniques with emerging links to function; a brief review of research examining neuropsychological functioning of children with CP and their quality of life and participation; and lastly, some of the evidence for efficacious interventions and the extent to which these interventions are derived from neuropsychological theory and practice. Advances and gaps in knowledge in addition to suggestions of areas for future focus in research and practice are discussed throughout the article.
DOI: 10.1080/21622965.2015.1074914
PMID: 26985833 [PubMed - indexed for MEDLINE]

Volumetric Magnetic Resonance Imaging Study of Brain and Cerebellum in Children with Cerebral Palsy.
Kułak P, Maciorkowska E, Gościk E
Biomed Res Int. 2016;2016:5961928. doi: 10.1155/2016/5961928. Epub 2016 Aug 4.

Introduction. Quantitative magnetic resonance imaging (MRI) studies are rarely used in the diagnosis of patients with cerebral palsy. The aim of present study was to assess the relationships between the volumetric MRI and clinical findings in children with cerebral palsy compared to control subjects.
Materials and Methods. Eighty-two children with cerebral palsy and 90 age- and sex-matched healthy controls were collected. Results. The dominant changes identified on MRI scans in children with cerebral palsy were periventricular leukomalacia (42%) and posthemorrhagic hydrocephalus (21%). The total brain and cerebellum volumes in children with cerebral palsy were significantly reduced in comparison to controls. Significant grey matter volume reduction was found in the total brain in children with cerebral palsy compared with the control subjects. Positive correlations between the age of the children of both groups and the grey matter volumes in the total brain were found. Negative relationship between width of third ventricle and speech development was found in the patients. Positive correlations were noted between the ventricles enlargement and motor dysfunction and mental

retardation in children with cerebral palsy. Conclusions. By using the voxel-based morphometry, the total brain, cerebellum, and grey matter volumes were significantly reduced in children with cerebral palsy.
Free PMC Article
DOI: 10.1155/2016/5961928
PMCID: PMC4989055
PMID: 27579318 [PubMed - indexed for MEDLINE]

Motricité - Mobilité – Posture

Comparison of the psychometric properties of two balance scales in children with cerebral palsy.
Jeon YJ, Kim GM
J Phys Ther Sci. 2016 Dec;28(12):3432-3434. doi: 10.1589/jpts.28.3432. Epub 2016 Dec 27.

[Purpose] The purpose of this study was to compare the item difficulty degree between the Pediatric Balance Scale and Fullerton Advanced Balance scale for children with cerebral palsy.
[Subjects and Methods] Forty children with cerebral palsy (male=17, female=23) voluntarily participated in the study. Item difficulty was expressed in the Rasch analysis using a logit value, with a higher value indicative of increasing item difficulty.
[Results] Among the 24 items of the combined Pediatric Balance Scale and Fullerton Advanced Balance scale, the most difficult item was "Walk with head turns", whereas, the easiest item was "Sitting with back unsupported and feet supported on the floor". Among the 14 items of the Pediatric Balance Scale, 9 items (item 1, 2, 3, 4, 5, 6, 7, 11, and 12) had negative logit values, whereas for the Fullerton Advanced Balance scale, only 1 item (item 1) had a negative logit value. [Conclusion] The Fullerton Advanced Balance scale is a more appropriate tool to assess balance ability than the Pediatric Balance Scale in in a group of higher functioning children with cerebral palsy.
Free PMC Article
DOI: 10.1589/jpts.28.3432
PMCID: PMC5276776
PMID: 28174467 [PubMed - in process]

Correlation between visual gait analysis and functional aspects in cerebral palsy.
Folle MR, Tedesco AP, Nicolini-Panisson RD.
Acta Ortop Bras. 2016 Sep-Oct;24(5):259-261. doi: 10.1590/1413-785220162405162986.

OBJECTIVE: To verify the correlation between visual gait analysis (VGA) by the Edinburgh visual gait score (EVGS) and functional aspects using the Timed Up and Go Test (TUG) and Gross Motor Function Classification System (GMFCS) in individuals with cerebral palsy (CP).
METHODS: Retrospective cross sectional study of 35 patients with CP. The mean age 12.61 years old, 94.3% were spastic; 34.4% hemiplegic, 54.3% diplegic, 11.4% triplegic; 45.7% were level II GMFCS, 42.9% level I, 5.7% level III and 5.7% level IV. VGA was analyzed by the Edinburgh visual gait score (EVGS), functional mobility was assessed by TUG and functionality through GMFCS. The Spearman correlation was used for statistical analysis.
RESULTS: The mean EVGS score was 18.97. The mean TUG was 13.71sec. EVGS showed moderate correlation with TUG (r=0.46, p=0.03) and GMFCS (r=0.45, p=0.00).
CONCLUSION: Worse VGA scores correlate to worse functionality and mobility performance. Due to the observed correlation, it is possible to assert that VGA is a useful tool on evaluation of CP patients. Level of Evidence III, Retrospective Comparative Study.
Free PMC Article
DOI: 10.1590/1413-785220162405162986
PMCID: PMC5266657
PMID: 28149192 [PubMed]

Environmental needs in childhood disability analysed by the WHO ICF, Child and Youth Version.
Illum NO, Bonderup M, Gradel KO.
Dan Med J. 2016 Jun;63(6). pii: A5238.

INTRODUCTION: The WHO has launched a common classification for disabilities in children, the International Classification of Functioning, Disability and Health, Child and Youth Version (ICF-CY). We wanted to determine whether cat-egories of the environmental (e) and the body functions (b) components of the classification could address environmental needs in children with different disorders and various disability severities.
METHODS: A set of 16 e categories and 47 b categories were selected and worded to best enable parents to describe children's everyday support needs and environmental influences through interviews in their own homes.
RESULTS: Of the 367 invited parents, 332 (90.5%) participated, providing data on children with spina bifida, spinal muscular atrophy, muscular disorders, cerebral palsy, visual impairments, hearing impairments, mental disability and disabilities following brain tumour treatment. The mean age of children across disabilities was 9.4 years (range: 1.0-15.9). The mean e code score was 35.7 (range: 4.0-64.0), and the mean b code score was 32.2 (range: 0.0-159.0). The most urgent needs as detected by qualifier 4 environmental categories scores were common among children with complex disorders and issues related to health professionals, legal services and health services.
CONCLUSIONS: Parents understand the environmental and body function components in a meaningful manner and the codes seem to be valid. Special emphasis should be given to environmental issues for children with more complex disabilities. There was no correlation between the severity of a disability and environmental issues, indicating that each child's needs were basically met, irrespective of disability severity.
FUNDING: partnership project § 16, 21, 31 administered by the Danish Health
Authority.
TRIAL REGISTRATION: not relevant.
PMID: 27264942 [PubMed - indexed for MEDLINE]

Eye movements show similar adaptations in temporal coordination to movement planning conditions in both people with and without cerebral palsy.
Payne AR, Plimmer B, McDaid A, Davies TC
Exp Brain Res. 2017 Feb 20. doi: 10.1007/s00221-017-4891-x. [Epub ahead of print]

The effects of cerebral palsy on movement planning for simple reaching tasks are not well understood. Movement planning is complex and entails many processes which could be affected. This study specifically sought to evaluate integrating task information, decoupling movements, and adjusting to altered mapping. For a reaching task, the asynchrony between the eye onset and the hand onset was measured across different movement planning conditions for participants with and without cerebral palsy. Previous research shows people without cerebral palsy vary this temporal coordination for different planning conditions. Our measurements show similar adaptations in temporal coordination for groups with and without cerebral palsy, to three of the four variations in planning condition tested. However, movement durations were still longer for the participants with cerebral palsy. Hence for simple goal-directed reaching, movement execution problems appear to limit activity more than movement planning deficits.
DOI: 10.1007/s00221-017-4891-x
PMID: 28220201 [PubMed - as supplied by publisher]

Factors influencing the evaluation and management of neuromuscular scoliosis: Areview of the literature.
Roberts SB, Tsirikos AI.
J Back Musculoskelet Rehabil. 2016 Nov 21;29(4):613-623.

Neuromuscular scoliosis (NMS) is the second most prevalent spinal deformity (after idiopathic scoliosis) and is usually first identified during early childhood. Cerebral palsy (CP) is the most common cause of NMS, followed by Duchenne muscular dystrophy (DMD). Progressive spinal deformity causes difficulty with daily care, walking and sitting, and can lead to back and rib pain, cardiac and pulmonary complications, altered seizure thresholds, and skin compromise. Early referral to specialist spinal services and early diagnosis of NMS is essential to ensure appropriate multidisciplinary patient management. The most important goals for patients are preservation of function, facilitation of daily care, and alleviation of pain. Non-operative management includes observation or bracing for less severe and flexible deformity in young patients as a temporising measure to provide postural support. Surgical correction and stabilisation of NMS is considered for patients with a deformity >40-50°, but may be performed for less severe deformity in patients with DMD. Post-operative intensive care, early mobilisation and nutritional supplementation aim to minimise the rate of post-surgical complications, which are relatively common in this

patient group. However, surgical management of NMS is associated with good long-term outcomes and high satisfaction rates for patients, their relatives and carers.
DOI: 10.3233/BMR-160675
PMID: 26966821 [PubMed - indexed for MEDLINE]

How to develop a phenomenological model of disability.
Martiny KM
Med Health Care Philos. 2015 Nov;18(4):553-65. doi: 10.1007/s11019-015-9625-x.

During recent decades various researchers from health and social sciences have been debating what it means for a person to be disabled. A rather overlooked approach has developed alongside this debate, primarily inspired by the philosophical tradition called phenomenology. This paper develops a phenomenological model of disability by arguing for a different methodological and conceptual framework from that used by the existing phenomenological approach. The existing approach is developed from the phenomenology of illness, but the paper illustrates how the case of congenital disabilities, looking at the congenital disorder called cerebral palsy (CP), presents a fundamental problem for the approach. In order to understand such congenital cases as CP, the experience of disability is described as being gradually different from, rather than a disruption of, the experience of being abled, and it is argued that the experience of disability is complex and dynamically influenced by both intrinsic and extrinsic factors. Different experiential aspects of disability-pre-reflective, attuned and reflective aspects-are described, demonstrating that the experience of disability comes in different degrees. Overall, this paper contributes to the debates about disability by further describing the personal aspects and experience of persons living with disabilities.
DOI: 10.1007/s11019-015-9625-x
PMID: 25652147 [PubMed - indexed for MEDLINE]

Impairments, activity limitations, and participation restrictions of the international classification of functioning, disability, and health model in children with ambulatory cerebral palsy.
Mutlu A, Büğüşan S, Kara ÖK.
Saudi Med J. 2017 Feb;38(2):176-185. doi: 10.15537/smj.2017.2.16079.

OBJECTIVES: To examine the impairments, activity limitations, and participation restrictions in children with spastic unilateral and bilateral cerebral palsy (CP). We investigated the relationship between these factors according to the international classification of functioning, disability, and health (ICF) model. Methods: This prospective cross sectional study included 60 children aged between 4-18 years with spastic CP (30 unilateral, 30 bilateral involvement) classified as Levels I and II on the gross motor function classification system. Children had been referred to the Pediatric Rehabilitation Unit in the Department of Physiotherapy and Rehabilitation, Hacettepe University, Ankara, Turkey between March 2014 and March 2015. The Physician Rating scale was used to assess body functions and structures. The Gillette Functional Assessment Questionnaire 22-item skill set, Pediatric Functional Independence Measure, and Pediatric Outcomes Data Collection Instrument were used to assess activity and participation levels. Results: There was a significant positive correlation between impairments and activity limitations (r=0.558; p=0.000), as well as between activity limitations and participation restrictions (r=0.354, p=0.005). Conclusion: These results show that activity limitations in children with unilateral and bilateral ambulatory CP may be related to their impairments and participation restrictions, although the sample size of our study is not large enough for generalizations. Overall, our study highlights the need for up-to-date, practical evaluation methods according to the ICF model.
Free Article
DOI: 10.15537/smj.2017.2.16079
PMID: 28133691 [PubMed - in process]

Influence of External Visual Focus on Gait in Children With Bilateral Cerebral Palsy.
Bartonek A, Lidbeck CM, Gutierrez-Farewik EM.
Pediatr Phys Ther. 2016 winter;28(4):393-399.
Comment in Pediatr Phys Ther. 2016 Winter;28(4):400.

PURPOSE: To explore whether focusing a target influenced gait in children with cerebral palsy (CP) and typical development (TD).

METHODS: Thirty children with bilateral CP (Gross Motor Function Classification System [GMFCS] I-III) and 22 with TD looked at a light at walkway end (Gaze Target) while walking and returned (No Target).
RESULTS: During Gaze versus No Target, children with TD reduced temporal-spatial parameters and movements in the sagittal (SPM) and transverse planes. In comparison, during Gaze Target, children in CP1 (GMFCS I) had larger trunk SPM, children in CP2 (GMFCS II) larger neck (SPM), and children in CP3 (GMFCS III) greater head and neck frontal plane movements, and reduced cadence and single support.
CONCLUSIONS: Focusing a target altered gait in children with CP. Children in CP1 reduced movements similar to children with TD, children in CP2 behaved nearly unchanged, whereas children in CP3 reduced movements and temporal-spatial
parameters, potentially as a consequence of lack of sensory information from
lower limbs.
DOI: 10.1097/PEP.0000000000000282
PMID: 27428574 [PubMed - indexed for MEDLINE]

Inter- and intrarater clinician agreement on joint motion patterns during gait in children with cerebral palsy.
Nieuwenhuys A, Papageorgiou E, Molenaers G, Monari D, de Laet T, Desloovere K.
Dev Med Child Neurol. 2017 Feb 22. doi: 10.1111/dmcn.13404. [Epub ahead of print]

AIM: This study aimed to quantify the inter- and intrarater clinician agreement on joint motion patterns in children with spastic cerebral palsy (CP), which were recently specified by a Delphi consensus study. It also examined whether experience with three-dimensional gait analysis (3DGA) is a prerequisite for using the patterns.
METHOD: The experimental group consisted of 82 patients with CP (57 males, 25 females; uni-/bilateral CP [n=27/55]; Gross Motor Function Classification System levels I to III; mean age 9y 5mo [range 4y-18y]). Thirty-two clinicians were split into 'experienced' and 'inexperienced' rater groups. Each rater was asked to classify 3DGA reports of 27 or 28 patients twice. Inter- and intrarater agreement on 49 joint motion patterns was estimated using percentage of agreement and kappa statistics.
RESULTS: Twenty-eight raters completed both classification rounds. Intrarater agreement was 'substantial' to 'almost perfect' for all joints ($0.64<\kappa<0.91$). Interrater agreement reached similar results ($0.63<\kappa<0.86$), except for the knee patterns during stance ($\kappa=0.49$, 'moderate agreement'). Experienced raters performed significantly better on patterns of the knee during stance and ankle during swing.
INTERPRETATION: Apart from some specific knee patterns during stance and ankle patterns during swing, the results suggested that clinicians could use predefined joint motion patterns in CP with good confidence, even in case of limited experience with 3DGA.

DOI: 10.1111/dmcn.13404
PMID: 28224608 [PubMed - as supplied by publisher]

Interarticulator coordination in children with and without cerebral palsy.
Nip IS.
Dev Neurorehabil. 2017 Jan;20(1):1-13. doi: 10.3109/17518423.2015.1022809. Epub 2015 Apr 23.

The current study investigates how interarticulator coordination changes across speaking tasks varying in articulatory and linguistic demands for children with CP and their typically-developing peers. Articulatory movements from 12 children with spastic CP (7M, 5F, 4-15 years of age) and 12 typically-developing age- and sex-matched peers were cross-correlated to determine the degree of spatial and temporal coupling between the upper lip and jaw, lower lip and jaw, and upper and lower lips. Spatial and temporal coupling were also correlated with intelligibility. Results indicated that children with CP have reduced spatial coupling between the upper and lower lips and reduced temporal coupling between all articulators as compared to their typically-developing peers. For all participants, sentences were produced with the greatest degree of interarticulator coordination when compared to the diadochokinetic and syllable repetition tasks. Measures of interarticulator coordination were correlated with intelligibility for the speakers with CP.
DOI: 10.3109/17518423.2015.1022809
PMID: 25905558 [PubMed - indexed for MEDLINE]

Kinesthetic deficits after perinatal stroke: robotic measurement in hemiparetic children.

Kuczynski AM, Semrau JA, Kirton A, Dukelow SP.
J Neuroeng Rehabil. 2017 Feb 15;14(1):13. doi: 10.1186/s12984-017-0221-6.

BACKGROUND: While sensory dysfunction is common in children with hemiparetic cerebral palsy (CP) secondary to perinatal stroke, it is an understudied contributor to disability with limited objective measurement tools. Robotictechnology offers the potential to objectively measure complex sensorimotor function but has been understudied in perinatal stroke. The present study aimed to quantify kinesthetic deficits in hemiparetic children with perinatal stroke and determine their association with clinical function.
METHODS: Case-control study. Participants were 6-19 years of age. Stroke participants had MRI confirmed unilateral perinatal arterial ischemic stroke or periventricular venous infarction, and symptomatic hemiparetic cerebral palsy. Participants completed a robotic assessment of upper extremity kinesthesia using a robotic exoskeleton (KINARM). Four kinesthetic parameters (response latency, initial direction error, peak speed ratio, and path length ratio) and their variabilities were measured with and without vision. Robotic outcomes were compared across stroke groups and controls and to clinical measures of sensorimotor function.
RESULTS: Forty-three stroke participants (23 arterial, 20 venous, median age 12 years, 42% female) were compared to 106 healthy controls. Stroke cases displayed significantly impaired kinesthesia that remained when vision was restored. Kinesthesia was more impaired in arterial versus venous lesions and correlated with clinical measures.
CONCLUSIONS: Robotic assessment of kinesthesia is feasible in children with perinatal stroke. Kinesthetic impairment is common and associated with stroke type. Failure to correct with vision suggests sensory network dysfunction.
DOI: 10.1186/s12984-017-0221-6
PMID: 28202036 [PubMed - in process]

Motor impairment and skeletal mineralization in children with cerebral palsy.
Akhter N, Khan AA, Ayyub A.
J Pak Med Assoc. 2017 Feb;67(2):200-203.

OBJECTIVE: To evaluate the bone mineral density and the effect of motor impairment on bone mineral density in children with cerebral palsy.
METHODS: The cross-sectional study was conducted at the Armed Forces Institute of Rehabilitation Medicine, Rawalpindi, Pakistan, from January 2013 to January 2015. Children diagnosed with cerebral palsy were sampled by non-probability purposive sampling from the Cerebral Palsy clinic. On the basis of Gross Motor Function Classification level of motor impairment, the children were divided into mild Cerebral Palsy (level 1 & 2) and moderate to severe Cerebral Palsy (level 3-5) groups. Bone mineral density z-score was measured at lumbar spine with Dual Energy X-Ray Absorptiometry at L1-L4 lumbar vertebra. Data was analysed using SPSS 20.
RESULTS: Of the total 108 children selected, 18(16.6%) had to be excluded due to poor nutrition status or deranged serum chemistry, while in 4(3.7%) children Dual Energy X-ray Absorptiometry scan was not done on technical grounds. Of the remaining 86(79.6%) children, 39(45.3%) were males and 47(54.7%) were females. The overall mean age was 6.08±2.89 years and mean bone mineral density z-score was -2.16±0.62. Statistically significant difference was found in bone mineral density z-scores of moderate to severe compared to mild Cerebral Palsy group ($p<0.05$). Significant difference in bone mineral density z-scores was also found among different levels of Gross Motor Function Classification system of motor impairment ($p<0.05$).
CONCLUSIONS: Cerebral Palsy children had low bone mineral density z-score, especially those who were non-ambulatory.
Free Article
PMID: 28138171 [PubMed - in process]

Motor Learning Abilities Are Similar in Hemiplegic Cerebral Palsy Compared to Controls as Assessed by Adaptation to Unilateral Leg-Weighting during Gait: Part I.
Damiano DL, Stanley CJ, Bulea TC, Park HS.
Front Hum Neurosci. 2017 Feb 8;11:49. doi: 10.3389/fnhum.2017.00049. eCollection 2017.

Introduction: Individuals with cerebral palsy (CP) demonstrate high responsevariability to motor training insufficiently accounted for by age or severity. We propose here that differences in the inherent ability to learn new motor tasks may explain some of this variability. Damage to motor pathways involving the cerebellum, which may be

a direct or indirect effect of the brain injury for many with CP, has been shown to adversely affect the ability to learn new motor tasks and may be a potential explanation. Classic adaptation paradigms that evaluate cerebellar integrity have been utilized to assess adaptation to gait perturbations in adults with stroke, traumatic brain injury and other neurological injuries but not in children with CP. Materials and Methods: A case-control study of 10 participants with and 10 without hemiplegic CP within the age range of 5-20 years was conducted. Mean age of participants in the CP group was slightly but not significantly higher than controls. Step length and swing time adaptation, defined as gradual accommodation to a perturbation, and aftereffects, or maintenance of the accommodation upon removal of the perturbation, to unilateral leg weighing during treadmill gait were quantified to assess group differences in learning. Results: Adaptation and aftereffects were demonstrated in step length across groups with no main effect for group. In CP, the dominant leg had a greater response when either leg was weighted. Swing time accommodated immediately (no adaptation) in the weighted leg only, with the non-dominant leg instead showing a more pronounced response in CP. Discussion: This group of participants with unilateral CP did not demonstrate poorer learning or retention similar to reported results in adult stroke. Deficits, while not found here, may become evident in those with other etiologies or greater severity of CP. Our data further corroborate an observation from the stroke literature that repeated practice of exaggerating the asymmetry (error augmentation), in this case by weighting the more involved or shorter step leg, vs. minimizing it by weighting the less involved or longer step leg (error reduction) may be a useful training strategy to improve step symmetry in unilateral CP.
DOI: 10.3389/fnhum.2017.00049
PMCID: PMC5296333
PMID: 28228720 [PubMed - in process]

Plantar flexor muscle weakness may cause stiff-knee gait.
Apti A, Akalan NE, Kuchimov S, Özdinçler AR, Temelli Y, Nene A.
Gait Posture. 2016 May;46:201-7. doi: 10.1016/j.gaitpost.2016.03.010. Epub 2016 Mar 28.

AIM: The iterative simulation studies proclaim that plantar flexor (PF) muscle weakness is one of the contributors of stiff knee gait (SKG), although, whether isolated PF weakness generates SKG has not been validated in able-bodied people or individuals with neuromuscular disorders. The aim of the study was to investigate the effects of isolated PF muscle weakness on knee flexion velocity and SKG in healthy individuals.
METHOD: Twenty able-bodied young adults (23±3 years) participated in this study. Passive stretch (PS) protocol was applied until the PF muscle strength dropped 33.1% according to the hand-held dynamometric measurement. Seven additional age-matched able-bodies were compared with participants' to discriminate the influence of slow-walking. All participants underwent 3D gait analysis before and after the PS. Peak knee flexion angle, range of knee flexion between toe-off and peak knee flexion, total range of knee-flexion, and time of peak knee flexion in swing were selected to describe SKG pattern.
RESULTS: After PS, the reduction of plantar flexor muscle strength (33.14%) caused knee flexion velocity drop at toe-off (p=0.008) and developed SKG pattern by decreasing peak knee flexion (p=0.0001), range of knee flexion in early swing (p=0.006), and total knee flexion range (p=0.002). These parameters were significantly correlated with decreased PF velocity at toe-off (p=0.015, p=0.0001, p=0.005, respectively). The time of peak knee flexion was not significantly different between before and after stretch conditions (p=0.130).
CONCLUSIONS: These findings verified that plantar flexor weakness cause SKG pattern by completing three of SKG parameters. Any treatment protocol that weakens the plantar flexor muscle might impact the SKG pattern.

DOI: 10.1016/j.gaitpost.2016.03.010
PMID: 27131202 [PubMed - indexed for MEDLINE]

Progression of Hip Displacement during Radiographic Surveillance in Patients with Cerebral Palsy.
Park JY, Choi Y, Cho BC, Moon SY, Chung CY, Lee KM, Sung KH, Kwon SS, Park MS
J Korean Med Sci. 2016 Jul;31(7):1143-9. doi: 10.3346/jkms.2016.31.7.1143. Epub 2016 May 19.

Progression of hip displacement is common in patients with cerebral palsy (CP). We aimed to investigate the rate of progression of hip displacement in patients with CP by assessing changes in radiographic indices according to Gross Motor Function Classification System (GMFCS) level during hip surveillance. We analyzed the medical records of patients with CP aged < 20 years who underwent at least 6 months interval of serial hip radiographs before any surgical hip intervention, including reconstructive surgery. After panel consensus and reliability testing, radiographic

measurements of migration percentage (MP), neck-shaft angle (NSA), acetabular index (AI), and pelvic obliquity (PO) were obtained during hip surveillance. For each GMFCS level, annual changes in radiographic indices were analyzed and adjusted for affecting factors, such as sex, laterality, and type of CP. A total of 197 patients were included in this study, and 1,097 radiographs were evaluated. GMFCS classifications were as follows: 100 patients were level I-III, 48 were level IV, and 49 were level V. MP increased significantly over the duration of hip surveillance in patients with GMFCS levels I-III, IV, and V by 0.3%/year ($P < 0.001$), 1.9%/year ($P < 0.001$), and 6.2%/year ($P < 0.001$), respectively. In patients with GMFCS level IV, NSA increased significantly by 3.4°/year ($P < 0.001$). Our results suggest that periodic monitoring and radiographic hip surveillance is warranted for patients with CP, especially those with GMFCS level IV or V. Furthermore, physicians can predict and inform parents or caregivers regarding the progression of hip displacement in patients with CP.

Free PMC Article

DOI: 10.3346/jkms.2016.31.7.1143
PMCID: PMC4901009
PMID: 27366015 [PubMed - indexed for MEDLINE]

Relationship Between Central Hypotonia and Motor Development in Infants Attending a High-Risk Neonatal Neurology Clinic.

Segal I, Peylan T, Sucre J, Levi L, Bassan H.

Pediatr Phys Ther. 2016 fall;28(3):332-6. doi: 10.1097/PEP.0000000000000265. Comment in Pediatr Phys Ther. 2016 Fall;28(3):337.

PURPOSE: To study the relationship between central hypotonia and motor development, and to determine the relative contribution of nuchal, truncal, and appendicular hypotonia domains to motor development.
METHODS: Appendicular, nuchal, and truncal tones of high-risk infants were assessed, as was their psychomotor developmental index (PDI). Infants with peripheral hypotonia were excluded.
RESULTS: We included 164 infants (mean age 9.6 ± 4 months), 36 with normal tone in all 3 domains and 128 with central hypotonia. Twenty-six of the latter had hypotonia in 1 domain and 102 had multiple combinations of 3 domains. Hypotonia domains were distributed as follows: truncal (n = 115), appendicular (n = 93), and nuchal (n = 70). Each domain was significantly associated with PDI scores ($P < .001$) but not with a later diagnosis of cerebral palsy. On linear regression, nuchal hypotonia had the strongest contribution to PDI scores (β = -0.6 [nuchal], -0.45 [appendicular], and -0.4 [truncal], $P < .001$).
CONCLUSIONS: Central hypotonia, especially nuchal tone, is associated with lowered motor development scores.

DOI: 10.1097/PEP.0000000000000265
PMID: 27027244 [PubMed - indexed for MEDLINE]

Reliability and Responsiveness of the Timed Up and Go Test in Children With Cerebral Palsy.

Carey H, Martin K, Combs-Miller S, Heathcock JC.

Pediatr Phys Ther. 2016 winter;28(4):401-8. doi: 10.1097/PEP.0000000000000301. Comment in Pediatr Phys Ther. 2016 Winter;28(4):408.

PURPOSE: The purpose of this study was to determine the absolute reliability and responsiveness of the Timed Up and Go (TUG) test, as measured using minimal detectable change (MDC) and minimal clinical important difference (MCID) values.
METHODS: Prospective observational study of children aged 3 to 10 years with cerebral palsy (CP) in Gross Motor Function Classification System levels I-III who completed the TUG test. Minimal detectable change estimates were calculated using baseline data. MCID estimates for each Gross Motor Function Classification System (GMFCS) level were calculated using distribution- and anchor-based methods.
RESULTS: Minimal detectable change values ranged from 1.40 to 8.74 seconds and MCID estimates ranged from 0.22 to 5.31 seconds.
CONCLUSIONS: The TUG test is a reliable and responsive measure of balance and mobility for children with CP between 3 and 10 years of age in GMFCS levels I-III. Study results support improved use of the TUG test in clinical and research settings by providing reliability values and estimates of meaningful change.
VIDEO ABSTRACT: For more insights from the authors, see Supplemental Digital Content 1, available at http://links.lww.com/PPT/A117.

DOI: 10.1097/PEP.0000000000000301

PMID: 27661230 [PubMed - indexed for MEDLINE]

Reliability and validity of the Japanese version of the selective control assessment of the lower extremity tool among patients with spastic cerebral palsy.
Kusumoto Y, Hanao M, Takaki K, Matsuda T, Nitta O.
J Phys Ther Sci. 2016 Dec;28(12):3316-3319. doi: 10.1589/jpts.28.3316. Epub 2016 Dec 27.

[Purpose] The aim of this study was to translate the Selective Control Assessment of the Lower Extremity (SCALE) tool from English to Japanese and to assess the reliability and validity of the Japanese version of the SCALE (SCALE-J) tool in Japanese patients with spastic cerebral palsy.
[Subjects and Methods] The SCALE tool was translated into Japanese in accordance with the published guidelines. In total, 55 patients with spastic cerebral palsy were enrolled in the present study. Reliability by internal consistency (Cronbach's α), intrarater reliability, inter-rater reliability, and convergent validity by comparing Gross otor Function Classification System (GMFCS) scores were examined.
[Results] The Cronbach's α value of the SCALE-J tool was 0.97-0.98, whereas that of the intrarater and inter-rater reliability ranged from 0.93 to 0.96. The Spearman correlation coefficient revealed a good relationship between the SCALE tool and the GMFCS.
[Conclusion] The SCALE-J tool was found to be reliable and valid;therefore, the SCALE tool may be useful for evaluation in clinical practice.
Free PMC Article
DOI: 10.1589/jpts.28.3316
PMCID: PMC5276752
PMID: 28174443 [PubMed - in process]

Sensory tractography and robot-quantified proprioception in hemiparetic children with perinatal stroke.
Kuczynski AM, Carlson HL, Lebel C, Hodge JA, Dukelow SP, Semrau JA, Kirton A.
Hum Brain Mapp. 2017 Feb 8. doi: 10.1002/hbm.23530. [Epub ahead of print]

Perinatal stroke causes most hemiparetic cerebral palsy, resulting in lifelong disability. We have demonstrated the ability of robots to quantify sensory dysfunction in hemiparetic children but the relationship between such deficits and sensory tract structural connectivity has not been explored. It was aimed to characterize the relationship between the dorsal column medial lemniscus (DCML) pathway connectivity and proprioceptive dysfunction in children with perinatal stroke. Twenty-nine participants (6-19 years old) with MRI-classified, unilateral perinatal ischemic stroke (14 arterial, 15 venous), and upper extremity deficits were recruited from a population-based cohort and compared with 21 healthy controls. Diffusion tensor imaging (DTI) defined DCML tracts and five diffusion properties were quantified: fractional anisotropy (FA), mean, radial, and axial diffusivities (MD, RD, AD), and fiber count. A robotic exoskeleton (KINARM) tested upper limb proprioception in an augmented reality environment. Correlations between robotic measures and sensory tract diffusion parameters were evaluated. Lesioned hemisphere sensory tracts demonstrated lower FA and higher MD, RD, and AD compared with the non-dominant hemisphere of controls. Dominant (contralesional) hemisphere tracts were not different from controls. Both arterial and venous stroke groups demonstrated impairments in proprioception that correlated with lesioned hemisphere DCML tract diffusion properties. Sensory tract connectivity is altered in the lesioned hemisphere of hemiparetic children with perinatal stroke. A correlation between lesioned DCML tract diffusion properties and robotic proprioceptive measures suggests clinical relevance and a possible target for therapeutic intervention. Hum Brain Mapp, 2017. © 2017 Wiley Periodicals, Inc. © 2017 Wiley Periodicals, Inc.
Free Article
DOI: 10.1002/hbm.23530
PMID: 28176425 [PubMed - as supplied by publisher]

Swan-Neck Deformity in Cerebral Palsy.
Chiu L, Adams NS, Luce PA.
Eplasty. 2017 Jan 30;17:ic3. eCollection 2017.
Free PMC Article
PMCID: PMC5287134
PMID: 28197298 [PubMed - in process]

The impact of walking devices on kinematics in patients with spastic bilateral cerebral palsy.
Krautwurst BK, Dreher T, Wolf SI.
Gait Posture. 2016 May;46:184-7. doi: 10.1016/j.gaitpost.2016.03.014. Epub 2016 Mar 26.

Increased anterior pelvic and trunk tilt is a common finding in patients with bilateral cerebral palsy especially during walking with assistive devices. As previous studies demonstrate various gait alterations when using assistive devices, the assessment of surgical interventions may be biased when the patients become independent of (or dependent on) assistive devices after therapy. Furthermore, some of these patients in fact are able to walk without devices even though in daily life they prefer to use them. Consequently, for such patients the classification into GMFCS level II or III may be ambiguous. The specific aim of this study was therefore to assess the influence of the use of forearm crutches and posterior walker during walking and to set this influence in relation to outcome effects of surgical intervention studies. 26 ambulatory patients with spastic bilateral CP (GMFCS II-III) were included who underwent 3D gait analysis. All patients used forearm crutches or posterior walkers in everyday life even though they were able to walk without assistive devices for short distances. Independent of the type of assistive devices, the patients walk on average with more anterior trunk tilt and pelvic tilt (7°±6° and 3°±2°) and with a maximum ankle dorsiflexion decreased by 2° (±3°) when walking with assistive devices, enhancing the mal-positioning present without device. Oppositely, the knees on average are more extended by 6° (±4°) when using the assistive devices. These effects have to be taken into account when assessing gait patterns or when monitoring the outcome after intervention as assistive devices may partially hide or exaggerate therapeutic effects.

DOI: 10.1016/j.gaitpost.2016.03.014
PMID: 27131199 [PubMed - indexed for MEDLINE]

Validation of Accelerometer Cut-Points in Children With Cerebral Palsy Aged 4 to 5 Years.
Keawutan P, Bell KL, Oftedal S, Davies PS, Boyd RN.
Pediatr Phys Ther. 2016 winter;28(4):427-34. doi: 10.1097/PEP.0000000000000291.
Comment in Pediatr Phys Ther. 2016 Winter;28(4):434.

PURPOSE: To derive and validate triaxial accelerometer cut-points in children with cerebral palsy (CP) and compare these with previously established cut-points in children with typical development.
METHODS: Eighty-four children with CP aged 4 to 5 years wore the ActiGraph during a play-based gross motor function measure assessment that was video-taped for direct observation. Receiver operating characteristic and Bland-Altman plots were used for analyses.
RESULTS: The ActiGraph had good classification accuracy in Gross Motor Function Classification System (GMFCS) levels III and V and fair classification accuracy in GMFCS levels I, II, and IV. These results support the use of the previously established cut-points for sedentary time of 820 counts per minute in children with CP aged 4 to 5 years across all functional abilities.
CONCLUSIONS: The cut-point provides an objective measure of sedentary and active time in children with CP. The cut-point is applicable to group data but not for individual children.
DOI: 10.1097/PEP.0000000000000291
PMID: 27661235 [PubMed - indexed for MEDLINE]

What do the relationships between functional classification systems of children with cerebral palsy tell us?
Mutlu A, Pistav-Akmese P, Yardımcı BN, Ogretmen T.
J Phys Ther Sci. 2016 Dec;28(12):3493-3498. doi: 10.1589/jpts.28.3493. Epub 2016 Dec 27.

[Purpose] To examine the distribution of and relationship between the Gross Motor Function, Manual Ability, and Communication Function Classification Systems in different limbs of children with spastic cerebral palsy. We also investigated whether the four predicting variables of gender, age, manual ability, and gross motor classifications could significantly predict effective and non-effective communicator groups in communication function. [Subjects and Methods] This retrospective cross-sectional study included 327 children with a mean age of 10.13 ± 4.09 years. Classifications were performed by an experienced pediatric physiotherapist. [Results] Gross motor function levels showed a strong correlation with manual ability levels (rs=0.78). Manual ability level was strongly correlated with communication function levels (rs=0.73), particularly in quadriplegic children (rs=0.78). Gross motor function levels

were moderately correlated with communication function levels (rs=0.71). Effective communicators in communication function showed more functional levels of manual ability and were determined by Gross Motor Function classifications. The variables were better at predicting ineffective communicators (91% correct) compared with effective communicators (85% correct). [Conclusion] Further studies are needed to relate these functional performance systems to the activity and participation levels as well as the quality of life, desires, and participation of the subjects.

Free PMC Article

DOI: 10.1589/jpts.28.3493
PMCID: PMC5276790
PMID: 28174481 [PubMed - in process]

Cognition

Working memory and fine motor skills predict early numeracy performance of children with cerebral palsy.

Van Rooijen M, Verhoeven L, Steenbergen B

Child Neuropsychol. 2016;22(6):735-47. doi: 10.1080/09297049.2015.1046426. Epub 2015 Jun 12.

Early numeracy is an important precursor for arithmetic performance, academic proficiency, and work success. Besides their apparent motor difficulties, children with cerebral palsy (CP) often show additional cognitive disturbances. In this study, we examine whether working memory, non-verbal intelligence, linguistic skills, counting and fine motor skills are positively related to the early numeracy performance of 6-year-old children with CP. A total of 56 children (M = 6.0, SD = 0.61, 37 boys) from Dutch special education schools participated in this cross-sectional study. Of the total group, 81% of the children have the spastic type of CP (33% unilateral and 66% bilateral), 9% have been diagnosed as having diskinetic CP, 8% have been diagnosed as having spastic and diskinetic CP and 2% have been diagnosed as having a combination of diskinetic and atactic CP. The children completed standardized tests assessing early numeracy performance, working memory, non-verbal intelligence, sentence understanding and fine motor skills. In addition, an experimental task was administered to examine their basic counting performance. Structural equation modeling showed that working memory and fine motor skills were significantly related to the early numeracy performance of the children ($\beta = .79$ and $p < .001$, $\beta = .41$ and $p < .001$, respectively). Furthermore, counting was a mediating variable between working memory and early numeracy ($\beta = .57$, $p < .001$). Together, these findings highlight the importance of working memory for early numeracy performance in children with CP and they warrant further research into the efficacy of intervention programs aimed at working memory training.

DOI: 10.1080/09297049.2015.1046426
PMID: 26070109 [PubMed - indexed for MEDLINE]

Traitement - Rééducation motrice et cognitive

Pharmacologie Efficacite Tolérance

An algorithmic approach to the management of unrecognized hydrocephalus in pediatric candidates for intrathecal baclofen pump implantation.

Hanak BW(1), Tomycz L(2), Oxford RG(1), Hooper E(3), Apkon SD(3), Browd SR(4).

Surg Neurol Int. 2016 Dec 20;7:105. doi: 10.4103/2152-7806.196236. eCollection 2016.

BACKGROUND: Complications of intrathecal baclofen (ITB) pump implantation for treatment of pediatric patients with spasticity and dystonia associated with cerebral palsy remain unacceptably high. To address the concern that some patients may have underlying arrested hydrocephalus, which is difficult to detect clinically because of a low baseline level of neurological function, and may contribute to the high rates of postoperative cerebrospinal fluid leak, wound breakdown, and infection associated with ITB pump implantation, the authors implemented a standardized protocol including mandatory cranial imaging and assessment of intracranial pressure (ICP) by lumbar puncture prior to ITB pump implantation.

METHODS: A retrospective case series of patients considered for ITB pump implantation between September 2012 and October 2014 at Seattle Children's Hospital is presented. All patients underwent lumbar puncture under general

anesthesia prior to ITB pump implantation and, if the opening pressure was greater than 21 cmH2O, ITB pump implantation was aborted and alternative management options were presented to the patient's family.
RESULTS: Eighteen patients were treated during the study time period. Eight patients (44.4%) who had ICPs in excess of 21 cmH2O on initial LP were identified. Eleven patients (61.1%) ultimately underwent ITB pump implantation (9/10 in the "normal ICP" group and 2/8 in the "elevated ICP" group following ventriculoperitoneal shunt placement), without any postoperative complications.
CONCLUSIONS: Given the potentially high rate of elevated ICP and arrested hydrocephalus, the authors advocate pre-implantation assessment of ICP under controlled conditions and a thoughtful consideration of the neurosurgical management options for patients with elevated ICP.
Free PMC Article
DOI: 10.4103/2152-7806.196236
PMCID: PMC5223398
PMID: 28168091 [PubMed - in process]

Botulinum toxin and safety issues in cerebral palsy.
Yiannakopoulou E.
Dev Med Child Neurol. 2017 Mar;59(3):245. doi: 10.1111/dmcn.13326. Epub 2016 Nov 7.
DOI: 10.1111/dmcn.13326
PMID: 28145586 [PubMed - in process]

Comparative study of therapeutic response to baclofen vs tolperisone in spasticity.
Agarwal S, Patel T, Shah N, Patel BM
Biomed Pharmacother. 2017 Mar;87:628-635. doi: 10.1016/j.biopha.2017.01.005. Epub 2017 Jan 10.

BACKGROUND: Spasticity from the upper motor neuron syndrome can result from a variety of conditions affecting the cortex or spinal cord. Some of the more common conditions associated with spasticity include spinal cord injury, cerebral palsy, and post-stroke syndrome. In this study we compared the efficacy and safety of baclofen vs tolperisone in spasticity. One hundred fifty patients with cerebral palsy or post stroke or spinal cord injury associated spasticity were enrolled in present study. Group I comprised of Seventy-five patients receiving baclofen and group II comprised of 75 patients receiving tolperisone. For efficacy measurement 4 evaluation methods were used, 1) Modified Ashworth Scale for muscle tone, 2) Medical research council scale for muscle strength and 3) Barthel Index for functional outcome 4) Coefficient of efficacy. In efficacy evaluation, both groups showed significant improvement in muscle tone, muscle strength and functional outcome at week 6 (Group I, 1.55±0.053, 2.79+0.032, 59.31±1.32; Group II, 1.57±0.053, 3.04±0.032, 73±1.32 respectively). In between the group analysis, there was no significant difference in muscle tone improvement in both the groups after 6 weeks (Group I, 1.055±0.053 vs Group II, 1.57±0.053, p>0.05). Group II showed non-significant but greater improvement in muscle strength (Week 6; Group I, 2.79±0.032 vs Group II, 3.04±0.032, p>0.07). Improvement in functional outcomes was greater in group II as compared to group I (Group I, 59.31±1.32 vs Group II, 73±1.32, p<0.05). Overall efficacy coefficient was greater for group II (3.6) as compared to group I (2.3). Baclofen showed more side effects compared to tolperisone in, asthenia being the most frequent. Tolperisone offers greater improvement in activities of daily living compared to baclofen. Tolperisone is more tolerable drug as compared to baclofen.

DOI: 10.1016/j.biopha.2017.01.005
PMID: 28086137 [PubMed - indexed for MEDLINE]

Comparison between an Ascenda and a silicone catheter in intrathecal baclofen therapy in pediatric patients: analysis of complications.
Motta F, Antonello CE
J Neurosurg Pediatr. 2016 Oct;18(4):493-498. Epub 2016 Jun 24.

OBJECTIVE In this single-center study the authors investigated the complications occurring before and after the introduction of the new Ascenda intrathecal catheter (Medtronic Inc.) in pediatric patients treated with intrathecal baclofen therapy (ITB) for spasticity and/or dystonia. METHODS This was a retrospective review of 508 children who had received ITB, 416 with silicone catheters in the 13 years between September 1998 and September 2011 and 92 with Ascenda catheters in the 3 years between September 2011 and August 2014. The authors evaluated major complications such as infections, CSF leaks treated, and problems related to the catheter or pump, and they

compared the 2 groups of patients who had received either a silicone catheter or an Ascenda catheter implant. RESULTS One hundred twenty patients in the silicone group (29%) and 1 patient in the Ascenda group (1.1%; p < 0.001) had a major complication. In the silicone group 23 patients (5.5%) were affected by CSF leakage and 75 patients (18%) experienced 82 catheter-related events, such as occlusion, dislodgment, disconnection, or breakage, which required catheter replacement. In the Ascenda group, only 1 patient (1.1%) was affected by CSF leakage. CONCLUSIONS To the authors' knowledge, this study is the first in the literature to compare the performance of the new Ascenda catheter, introduced in 2011, with the traditional silicone catheter for intrathecal drug infusion. In their analysis, the authors found that the Ascenda catheter can reduce major complications related to the catheter after ITB pump implantation. Further investigation is necessary to expand on and confirm their results.
DOI: 10.3171/2016.4.PEDS15646
PMID: 27341610 [PubMed - indexed for MEDLINE]

Image-guided intrathecal baclofen pump catheter implantation: a technical noteand case series.
Robinson S, Robertson FC, Dasenbrock HH, O'Brien CP, BerdeC, Padua H
J Neurosurg Spine. 2017 Feb 3:1-7. doi: 10.3171/2016.8.SPINE16263. [Epub ahead ofprint]

OBJECTIVE Medically refractory spasticity and dystonia are often alleviated with intrathecal baclofen (ITB) administration through an indwelling catheter inserted the lumbar spine. In patients with cerebral palsy, however, there is a high incidence of concomitant neuromuscular scoliosis. ITB placement may be technically challenging in those who have severe spinal deformity or who have undergone prior instrumented thoracolumbar fusion. Although prior reports have described drilling through the lumbar fusion mass with a high-speed bur, as well as IT catheter implantation at the foramen magnum or cervical spine, these approaches have notable limitations. To the authors' knowledge, this is the first report of ITB placement using cone beam CT (CBCT) image guidance to facilitate percutaneous IT catheterization.
METHODS Data were prospectively collected on patients treated between November 2012 and June 2014. In the interventional radiology suite, general anesthesia was induced and the patient was positioned prone. Imaging was performed to identify the optimal trajectory. Percutaneous puncture was performed at an entry site with image-guided placement of a sheathed needle. CBCT provided real-time 2D projections and 3D reconstructions for detailed volumetric imaging. A biopsy drill was passed through the sheath, and subsequently a Tuohy needle was advanced intrathecally. The catheter was threaded cephalad under fluoroscopic visualization. After tip localization and CSF flow were confirmed, the stylet was replaced, the external catheter tubing was wrapped sterilely in a dressing, and the patient was transported to the operating room. After lateral decubitus positioning of the patient, the IT catheter was exposed and connected to the distal abdominal tubing with typical pump placement.
RESULTS Of 15 patients with Gross Motor Function Classification System Levels IV and V cerebral palsy and instrumented thoracolumbar fusion, 8 had predominantly spasticity, and 7 had mixed spasticity and dystonia. The mean age of patients was 20.1 years (range 13-27 years). Nine patients underwent initial catheter and pump placement, and 6 underwent catheter replacement. The procedure was technically successful, with accurate spinal catheter placement in all patients. The median hospital stay was 4 days (IQR 3-5 days). One patient had an early postoperative urinary tract infection. With a mean follow-up of 25.8 months (median 26, range 18-38 months), no CSF leakage or catheter failure occurred. One late infection due to Pseudomonas aeruginosa (requiring pump explantation) occurred at 4 months, probably secondary to recurrent urinary tract infections.
CONCLUSIONS Image-guided CBCT navigation resulted in accurate percutaneous placement of the IT catheter for ITB pumps in patients with prior instrumented thoracolumbar fusion. The multimodality approach is an alternate technique that may be used for IT catheter insertion in patients with complex lumbar spine anatomy, extending the potential to provide safe, durable ITB therapy in this population.
DOI: 10.3171/2016.8.SPINE16263
PMID: 28156208 [PubMed - as supplied by publisher]

Improvement of upper trunk posture during walking in hemiplegic patients after injections of botulinum toxin into the arm.
Hefter H, Rosenthal D.
Clin Biomech (Bristol, Avon). 2017 Jan 26;43:15-22. doi: 10.1016/j.clinbiomech.2017.01.018. [Epub ahead of print]

BACKGROUND: It has been hypothesized that altered trunk movements during gait in post-stroke patients or children with cerebral palsy are compensatory to lower limb impairment. Improvement of trunk movements and

posture after injections of botulinum toxin into the affected arm would be at variance with this hypothesis and hint towards a multifactorial trunk control deficit.
PATIENTS AND METHODS: Clinical gait analysis was performed in 11 consecutively recruited hemiplegic patients immediately before and 4weeks after a botulinum toxin type A-injection into the affected arm. Kinematic data were collected using an 8 camera optical motion-capturing system and reflective skin-markers were attached according to a standard plug-in-gait model. Deviation of the trunk in lateral and forward direction and the trajectory of the C7-marker in a sacrum-fixed horizontal plane were analyzed in addition to classical gait parameters. The Wilson-signed-rank test was used for pre/post-botulinum toxin comparisons.
FINDINGS: After botulinum toxin injections a significant improvement of forearm flexion scores from 2.57 to 2.0 ($p<0.014$), and a reduced lateral deviation of the upper trunk from 3.5degrees to 2.5degrees ($p<0.014$) were observed. Free-walkers tended to walk faster ($p<0.046$, 1-sided), with reduced pre-swing duration of both legs and an increased step length of the non-affected leg. The C7-marker trajectory was shifted towards the midline.
INTERPRETATION: Injections of botulinum toxin into the affected arm of hemiplegic patients improve abnormal trunk lateral flexion. This shift of the center of mass of the upper body towards the midline improves various gait parameters including gait speed.

DOI: 10.1016/j.clinbiomech.2017.01.018
PMID: 28187305 [PubMed - as supplied by publisher]

Long-term therapy with intrathecal baclofen improves quality of life in children with severe spastic cerebral palsy.
Kraus T, Gegenleitner K, Svehlik M, Novak M, Steinwender G, Singer G.
Eur J Paediatr Neurol. 2017 Feb 11. pii: S1090-3798(17)30098-3. doi: 10.1016/j.ejpn.2017.01.016. [Epub ahead of print]

INTRODUCTION: Children with severe spastic cerebral palsy (CP) are highly limited in daily life activities causing a reduced quality of life (QoL). This is partly due to an increased muscle tone causing pain and contractures. Continuous intrathecal infusion of baclofen (ITB) reduces the spasticity of affected patients. The hypothesis of the present study was that ITB leads to a significant improvement of QoL in non-ambulant children with CP.
PATIENTS AND METHODS: 13 patients (10 male, 3 female, mean age 14 years) were included. Mean time between pump implantation and follow-up was 60 months (range, 12-100). QoL was assessed before and after baclofen pump implantation using standardized questionnaires (CP CHILD, KINDL). Spasticity was evaluated using the modified Ashworth Scale (MAS) at the two time points.
RESULTS: QoL evaluated with the CPCHILD questionnaire and the KINDL improved from pre - implantation to follow-up. MAS markedly decreased from 3.8 to 1.7. All interviewed participants indicated that their expectations had been met and that they would choose ITB treatment again.
CONCLUSION: Intrathecal treatment of baclofen is an excellent method for spasticity management in children with severe cerebral palsy. Quality of life sustainably improves, parents' satisfaction is high and the level of spasticity decreases. Therefore, baclofen treatment can be highly recommended in non-ambulant children with CP suffering from spasticity.

DOI: 10.1016/j.ejpn.2017.01.016
PMID: 28237420 [PubMed - as supplied by publisher]

Real-World, Long-Term Quality of Life Following Therapeutic OnabotulinumtoxinA Treatment.
Jog M, Wein T, Bhogal M, Dhani S, Miller R, Ismail F, Beauchamp R, Trentin G
Can J Neurol Sci. 2016 Sep;43(5):687-96. doi: 10.1017/cjn.2016.262. Epub 2016 Jul 19.

BACKGROUND: OnabotulinumtoxinA is an efficacious treatment option for patients with various conditions. Although studies have reported on the efficacy of onabotulinumtoxinA, quality of life (QoL) data are limited. This study evaluated QoL in patients treated with onabotulinumtoxinA across various therapeutic indications.
METHODS: MDs on BOTOX Utility (MOBILITY) was a prospective, multicenter, observational Canadian study in patients initiating (naïve) or receiving ongoing (maintenance) onabotulinumtoxinA treatment. Health utility was the primary outcome measure and was obtained from the Short Form-12 Health Survey using the Short Form-6D at baseline, week 4 posttreatment, and up to five subsequent treatment visits. The safety cohort included patients who received ≥1 onabotulinumtoxinA treatment.

RESULTS: The efficacy cohort included 1062 patients; the majority were Caucasian, female, and on maintenance onabotulinumtoxinA treatment. Adult focal spasticity (n=398), blepharospasm (n=81), cerebral palsy (n=22), cervical dystonia (n=234), hemifacial spasm (n=116), and hyperhidrosis (n=211) patients were included. Baseline health utility was generally higher in maintenance versus naïve patients; however, naïve patients showed the greatest improvements over time. Health utility was generally maintained or trended toward improvement across all cohorts, including maintenance patients who had been treated for up to 22 years before study entry. Eighteen of 1222 patients (2%) in the safety cohort reported 28 treatment-related adverse events; eight were serious in four patients.
CONCLUSION: MOBILITY is the largest prospective study to date to provide QoL data over a variety of therapeutic indications following treatment with onabotulinumtoxinA. Although the QoL burden varies by disease, data suggest that long-term treatment may help improve or maintain QoL over time.
DOI: 10.1017/cjn.2016.262
PMID: 27430524 [PubMed - indexed for MEDLINE]

Safety, Tolerability, and Sensorimotor Effects of Extended-release Dalfampridine in Adults With Cerebral Palsy: A Pilot Study.

Bethoux F Fatemi A, Fowler E, Marciniak C, Mayadev A, Waksman J, Zackowski K, Suarez G, Blight AR, Rabinowicz AL, Carrazana E

Clin Ther. 2017 Feb;39(2):337-346. doi: 10.1016/j.clinthera.2016.12.015. Epub 2017 Jan 25.

PURPOSE: The goal of this study was to evaluate the safety and tolerability of dalfampridine extended release (D-ER) in a pilot study of adults with cerebral palsy (CP) and limited ambulatory ability, and to explore drug effects on sensorimotor function.
METHODS: An initial double-blind, single-dose crossover study was performed in 11 individuals randomized 1:1 to receive D-ER (10 mg) or placebo, followed by a 2-day washout period and the opposite treatment, with evaluation for safety and tolerability. A twice daily dosing, double-blind, placebo-controlled, crossover study was then performed. Participants were randomized in a 1:1 ratio to 1 of 2 sequences: 1 week of D-ER (10 mg BID) or placebo, followed by a 1-week washout and 1 week of the opposite treatment. Key inclusion criteria were age 18 to 70 years, body mass index 18.0 to 30.0 kg/m(2), diagnosis of CP, and ability to perform all study procedures. Key exclusion criteria were severe CP, moderate or severe renal impairment, history of nonfebrile seizures, and prior dalfampridine use. Primary outcomes were safety profile and tolerability. Exploratory functional outcomes comprised changes in upper and lower extremity sensorimotor function (grip and pinch strength tests), manual dexterity (Box and Block Tests), and walking speed (Timed 25-Foot Walk). The most pronounced measured functional deficit in each individual was defined as the exploratory primary functional end point. Full crossover data were analyzed by using a mixed effects model.
FINDINGS: Among the 24 total participants who were randomized to treatment and completed the twice daily dosing phase study, their mean age was 38.6 years (range, 20-62 years), 54% were women, and 83% had spastic CP. Adverse events were consistent with previous D-ER trials, most commonly headache (13% D-ER, 4% placebo), fatigue (13% D-ER, 0% placebo), insomnia (8% D-ER, 4% placebo), diarrhea (4% D-ER, 4% placebo), and nausea (4% D-ER, 4% placebo). The mixed model analysis of full crossover data identified no significant difference between D-ER and placebo in the primary functional analysis (the most pronounced deficit; P = 0.70) or in the secondary analyses (hand strength [P = 0.48], manual dexterity [P = 0.13], or walking speed [P = 0.42]).
IMPLICATIONS: In this preliminary study of adults with CP, a BID dose of 10-mg D-ER was generally safe and well tolerated. The exploratory functional assessments for upper and lower sensorimotor deficits did not establish that the study population was markedly responsive to D-ER relative to placebo. These findings do not provide the proof-of-concept that would support further evaluation of D-ER as a potential intervention to improve function in adults with CP. ClinicalTrials.gov identifier: NCT01468350.

Free Article
DOI: 10.1016/j.clinthera.2016.12.015
PMID: 28131322 [PubMed - in process]

The WE-Study: does botulinum toxin A make walking easier in children with cerebral palsy?: Study protocol for a randomized controlled trial.

Brændvik SM, Roeleveld K, Andersen GL, Raftemo AE, Ramstad K, Majkic-Tajsic J, Lamvik T, Lund B, Follestad T, Vik T

Trials. 2017 Feb 6;18(1):58. doi: 10.1186/s13063-016-1772-8.

BACKGROUND: Intramuscular injections of botulinum toxin A (BoNT-A) have been a cornerstone in the treatment of spasticity for the last 20 years. In Norway, the treatment is now offered to two out of three children with spastic cerebral palsy (CP). However, despite its common use, the evidence for its functional effects is limited and inconclusive. The objective of this study is to determine whether BoNT-A makes walking easier in children with CP. We hypothesize that injections with BoNT-A in the calf muscles will reduce energy cost during walking, improve walking capacity, increase habitual physical activity, reduce pain and improve self-perceived performance and satisfaction.
METHODS/DESIGN: This randomized, double-blinded, placebo-controlled, multicenter trial is conducted in a clinical setting involving three health regions in Norway. Ninety-six children with spastic CP, referred for single-level injections with BoNT-A in the calf muscles, will be invited to participate. Those who are enrolled will be randomized to receive either injections with BoNT-A (Botox®) or 0.9% saline in the calf muscles. Stratification according to age and study center will be made. The allocation ratio will be 1:1. Main inclusion criteria are (1) age 4 - 17.5 years, (2) Gross Motor Function Classification System levels I and II, (3) no BoNT-A injections in the lower limbs during the past 6 months and (4) no orthopedic surgery to the lower limbs during the past 2 years. The outcome measures will be made at baseline and 4, 12 (primary endpoint) and 24 weeks after injections. Primary outcome is change in energy cost during walking. Secondary outcomes are change in walking capacity, change in activity, perceived change in performance and satisfaction in mobility tasks, and pain. The primary analysis will use a linear mixed model to test for difference in change in the outcome measures between the groups. The study is approved by the Regional Ethical Committee and The Norwegian Medicines Agency. Recruitment started in September 2015.
DISCUSSION: The evaluation of effect is comprehensive and includes objective standardized tests and measures on both impairment and activity level. Results are to be expected by spring 2019.
TRIAL REGISTRATION: ClinicalTrials.gov, NCT02546999 . Registered on 9 September 2015.
Free PMC Article
DOI: 10.1186/s13063-016-1772-8
PMCID: PMC5294730
PMID: 28166806 [PubMed - in process]

Chirurgie

Laminoplasty with lateral mass screw fixation for cervical spondylotic myelopathy in patients with athetoid cerebral palsy: A retrospective study.
Zhou H, Liu ZJ, Wang SB, Pan SF, Yan M, Zhang FS, Sun Y.
Medicine (Baltimore). 2016 Sep;95(39):e5033. doi: 10.1097/MD.0000000000005033.

Although several studies report various treatment solutions for cervical spondylotic myelopathy in patients with athetoid cerebral palsy, long-term follow-up studies are very rare. None of the reported treatment solutions represent a gold standard for this disease owing to the small number of cases and lack of long-term follow-up. This study aimed to evaluate the outcomes of laminoplasty with lateral mass screw fixation to treat cervical spondylotic myelopathy in patients with athetoid cerebral palsy from a single center.This retrospective study included 15 patients (9 male patients and 6 female patients) with athetoid cerebral palsy who underwent laminoplasty with lateral mass screw fixation for cervical spondylotic myelopathy at our hospital between March 2006 and June 2010. Demographic variables, radiographic parameters, and pre- and postoperative clinical outcomes determined by the modified Japanese Orthopedic Association (JOA), Neck Disability Index (NDI), and visual analog scale (VAS) scores were assessed.The mean follow-up time was 80.5 months. Developmental cervical spinal canal stenosis ($P = 0.02$) and cervical lordosis ($P = 0.04$) were significantly correlated with lower preoperative modified JOA scores. The mean modified JOA scores increased from 7.97 preoperatively to 12.1 postoperatively ($P < 0.01$). The mean VAS score decreased from 5.30 to 3.13 ($P < 0.01$), and the mean NDI score decreased from 31.73 to 19.93 ($P < 0.01$). There was a significant negative correlation between developmental cervical spinal canal stenosis and recovery rate of the modified JOA score ($P = 0.01$).Developmental cervical spinal canal stenosis is significantly related to neurological function in patients with athetoid cerebral palsy. Laminoplasty with lateral mass screw fixation is an effective treatment for cervical spondylotic myelopathy in patients with athetoid cerebral palsy and developmental cervical spinal canal stenosis.
Free PMC Article

DOI: 10.1097/MD.0000000000005033
PMCID: PMC5265972
PMID: 27684879 [PubMed - indexed for MEDLINE]

Long Term Follow-up of Subcutaneous Achilles Tendon Lengthening in the Treatment of Spastic Equinus Foot in Patients with Cerebral Palsy.

Krupiński M, Borowski A, Synder M.

Ortop Traumatol Rehabil. 2015 Mar-Apr;17(2):155-61. doi: 10.5604/15093492.1157092.

BACKGROUND: Spastic equinus foot is among the most common deformities in patients with cerebral palsy. The optimal therapy of this condition is yet to be determined. Despite a considerable volume of literature concerned with the subject of cerebral palsy, there is still a need for studies focusing on long-term follow-up after corrective procedures. The study aimed to evaluate the long-term effects of subcutaneous Achilles tendon lengthening in the treatment of spastic equinus foot.
MATERIAL AND METHODS: A total of 100 patients after Hooke's or White's isolated subcutaneous lengthening of the Achilles tendon were invited to participate in the retrospective assessment. Of the above number, 53 patients reported for an examination (76 feet). The average follow-up time was 10.09 years. To enable a more accurate determination of the risk of recurrence, the patients were divided into two groups according to whether they had been operated before or after reaching the age of 8 years. All patients were able to walk and suffered from the spastic type of cerebral palsy.
RESULTS: The average age of patients at the time of the Achilles tendon lengthening procedure was 7 years. The follow-up time ranged from 3 to 17 years (an average of 10.09 years). The degree of equinus foot contracture before the surgery was from -5 to -60 degrees (an average of -17.53 degrees). Recurrence of the deformity was reported in 43.42% of the patients. Recurrences were more common in those with hemiplegic cerebral palsy.
CONCLUSIONS: 1. Subcutaneous Achilles tendon lengthening is not associated with a risk of serious complications, while providing good long-term therapeutic outcomes as well as very good cosmetic and functional effects. 2. Subcutaneous Achilles tendon lengthening minimises the costs and time of patients' hospitalisation and uses a relatively simple operative technique.
DOI: 10.5604/15093492.1157092
PMID: 26248760 [PubMed - indexed for MEDLINE]

Popliteal block for lower limb surgery in children with cerebral palsy: effect on sevoflurane consumption and postoperative pain (a randomized, double-blinded, controlled trial).

Ozkan D, Gonen E, Akkaya T, Bakir M

J Anesth. 2017 Feb 14. doi: 10.1007/s00540-017-2318-2. [Epub ahead of print]

PURPOSE: The aim of this study was to evaluate the effects of a preoperative popliteal block on sevoflurane consumption, postoperative pain, and analgesic consumption in children with cerebral palsy (CP) following lower limb surgery.
METHODS: Fifty-four patients undergoing lower limb surgery were randomized to receive either a popliteal block + general anaesthesia (group P, n = 27) or general anaesthesia without a popliteal block (group C, n = 27). After anesthesia induction with 50% N2O, O2, and 8% sevoflurane, a popliteal block was given to group P patients with ultrasound guidance as a single dose of 0.3 ml/kg body weight of 0.25% bupivacaine. Group C patients received the same regimen of anesthesia induction but no preoperative popliteal block. Both the conductance fluctuation (SCF) peak numbers per second and the Wong-Baker FACES® Pain Rating Scale (WBFS) values of the patients were recorded upon arrival at the PACU, at 10 and 20 min after arrival at the PACU, and at postoperative hours 1, 4, 8, 12, and 24 when they were in the ward. The total paracetamol consumption of the patients was also recorded.
RESULTS: The end-tidal sevoflurane concentration values were significantly higher in group C patients than in group P patients, except for at 5 min after induction of anaesthesia ($p < 0.001$). The SCF peak numbers per second and WBFS scores were significantly higher in group C patients than in group P patients, except at Tp24h ($p < 0.001$). The total paracetamol consumption was 489.7 ± 122.7 mg in
group P patients and 816.6 ± 166.5 in group C patients ($p < 0.001$).
CONCLUSION: Popliteal block is effective for postoperative analgesia, decreasing the paracetamol consumption and sevoflurane requirement in children with CP undergoing lower limb surgery. Trial registration ClinicalTrial.gov identifier:

NCT02507700.
DOI: 10.1007/s00540-017-2318-2
PMID: 28197774 [PubMed - as supplied by publisher]

Sudden falls as a persistent complication of selective dorsal rhizotomy surgery in children with bilateral spasticity: report of 3 cases.
Grootveld LR, van Schie PE Buizer AI, Jeroen Vermeulen R, van Ouwerkerk WJ, Strijers RL, Becher JJ
J Neurosurg Pediatr. 2016 Aug;18(2):192-5. doi: 10.3171/2016.2.PEDS15527. Epub 2016 Apr 22.

Selective dorsal rhizotomy (SDR) surgery is a well-established treatment for ambulatory children with bilateral spastic paresis and is performed to eliminate spasticity and improve walking. The objective of this case report is to describe sudden falls as a persistent complication of SDR. The authors report on 3 patients with bilateral spastic paresis, aged 12, 6, and 7 years at the time of surgery. The percentage of transected dorsal rootlets was around 40% at the L2-S1 levels. Sudden falls were reported with a frequency of several a day, continuing for years after SDR. The falls were often triggered by performing dual tasks as well as occurring in the transition from sitting to standing, during running, after strenuous exercise, or following a fright. Patients also had residual hyperesthesia and dysesthesia of the foot sole. The authors hypothesize that the sudden falls are caused by a muscle inhibition reflex of the muscles in the legs, as an abnormal reaction to a sensory stimulus that is perceived with increased intensity by a patient with hyperesthesia. A favorable effect of gabapentin medication supports this hypothesis.
DOI: 10.3171/2016.2.PEDS15527
PMID: 27104630 [PubMed - indexed for MEDLINE]

Undercorrection of planovalgus deformity after calcaneal lengthening in patients with cerebral palsy.
Cho BC, Lee IH, Chung CY, Sung KH, Lee KM, Kwon SS, Moon SJ, Kim J, Lim H, Park MS.
J Pediatr Orthop B. 2017 Feb 1. doi: 10.1097/BPB.0000000000000436. [Epub ahead of print]

Calcaneal lengthening (CL) is one of the treatment options for planovalgus deformity in patients with cerebral palsy (CP). However, its indication still needs to be clarified according to the functional status of CP. The aim of this study was to investigate the radiographic outcome after CL in patients with CP and to evaluate the risk factors causing undercorrection of planovalgus deformities. We included consecutive patients with CP who underwent CL for planovalgus deformity, were followed for more than 2 years, and had preoperative and postoperative weight-bearing anteroposterior (AP) and lateral foot radiographs. Six radiographic indices were used to assess the radiographic outcome. The patient age, sex, and Gross Motor Function Classification System (GMFCS) level were evaluated as possible risk factors, and we controlled for the interaction of potentially confounding variables using multivariate analysis. A total of 44 (77 feet) patients were included in this study. The mean age of the patients at the time of surgery was 10.5±4.0 years and the mean follow-up was 5.1±2.2 years. Patients with GMFCS III/IV achieved less correction than those with GMFCS I/II in the AP talus-first metatarsal angle (P=0.001), lateral talocalcaneal angle (P=0.028), and the lateral talus-first metatarsal angle (P<0.001). The rate of undercorrection in the GMFCS III/IV group was 1.6 times higher than that in the GMFCS I/II group in the AP talus-first metatarsal angle (odds ratios: 1.6; 95% confidence interval: 1.2-2.0; P<0.001) and 1.6 times higher in the lateral talus-first metatarsal angle (odds ratios: 1.6; 95% confidence interval: 1.3-1.9; P<0.001). In GMFCS I/II patients with CP, we found CL to be an effective procedure for the correction of planovalgus foot deformities. However, in GMFCS III/IV patients with planovalgus deformities, CL appears to be insufficient on the basis of the high rate of undercorrection in these patients. For patients with GMFCS level III/IV, additional or alternative procedures should be considered to correct the deformity and maintain the correction achieved.LEVEL OF EVIDENCE: Level III, therapeutic study.
DOI: 10.1097/BPB.0000000000000436
PMID: 28151778 [PubMed - as supplied by publisher]

Réadaptation fonctionnelle

A Prospective Case-Control Study of Radial Extracorporeal Shock Wave Therapy for Spastic Plantar Flexor Muscles in Very Young Children With Cerebral Palsy.
Wang T, Du L, Shan L, Dong H, Feng J, Kiessling MC, Angstman NB, Schmitz C,Jia F.
Medicine (Baltimore). 2016 May;95(19):e3649. doi: 10.1097/MD.0000000000003649.

To assess the effects of radial extracorporeal shock wave therapy (rESWT) on plantar flexor muscle spasticity and gross motor function in very young patients with cerebral palsy (CP).The design was case-control study (level of evidence 3).The setting was the Department of Pediatric Neurology and Neurorehabilitation, First Hospital of Jilin University, Changchun, China.Those with a diagnosis of CP and spastic plantar flexor muscles were recruited between April 2014 and April 2015.According to the parents' decision, patients received 1 ESWT session per week for 3 months, with 1500 radial shock waves per ESWT session and leg with positive energy flux density of 0.03 mJ/mm, combined with traditional conservative therapy (rESWT group) or traditional conservative therapy alone (control group).The Modified Ashworth Scale (MAS) (primary outcome measure) and passive range of motion (pROM) measurements were collected at baseline (BL), 1 month (M1), and 3 months (M3) after BL. The Gross Motor Function Measure (GMFM)-88 was collected at BL and M3.Sixty-six patients completed the final review at 3 months and were included in the study. Subjects ranged in age from 12 to 60 months (mean age 27.0 ± 13.6 months; median age 22.0 months; 33.3% female). For the rESWT group (n = 34), mean MAS grades at BL, M1, and M3 were 2.6, 1.9, and 1.5 on the left side and 1.9, 1.7, and 1.2 on the right side. For the control group (n = 32), mean MAS grades at BL, M1, and M3 were 2.5, 2.4, and 2.1 on the left side and 1.8, 1.8, and 1.5 on the right side. The within-subject effects time × side and time × treatment were statistically significant ($P < 0.01$). Similar results were found for the improvement of mean pROM. GMFM-88 improved from BL to M3, but showed no statistically significant difference between the groups. There were no significant complications.This study demonstrates that the combination of rESWT and traditional conservative therapy is more effective than traditional conservative therapy alone in the treatment of spasticity in very young patients with CP.

Free PMC Article

DOI: 10.1097/MD.0000000000003649
PMCID: PMC4902531
PMID: 27175689 [PubMed - indexed for MEDLINE]

Impact of a short walking exercise on gait kinematics in children with cerebral palsy who walk in a crouch gait.

Parent A, Raison M, Pouliot-Laforte A, Marois P, Maltais DB, Ballaz L.

Clin Biomech (Bristol, Avon). 2016 May;34:18-21. doi: 10.1016/j.clinbiomech.2016.03.003. Epub 2016 Mar 14

BACKGROUND: Crouch gait results in an increase of the joint stress due to an excessive knee flexion. Daily walking exercises, even when performed at a self-selected speed, may result in a decrease of the extensor muscle strength which could lead to a more severe crouch gait pattern. The aim of this study was to assess the impact of a short walking exercise on gait kinematics in children with cerebral palsy who walk with a crouch gait.
METHODS: Seven children with cerebral palsy who walk with a crouch gait were asked to walk for 6min at a self-selected speed. The spatio-temporal and kinematic measures, as well as the center of mass position were compared before and after the exercise.
FINDINGS: There was no significant difference between walking speed before and after the walking exercise. Knee flexion and the maximal ankle dorsiflexion increased after the walking exercise. The vertical position of the center of mass decreased. No significant difference was found at the hip.
INTERPRETATION: Children with cerebral palsy who walk with a crouch gait were more crouched after a 6-min walking exercise performed at their self-selected speed. These gait modifications could be due to fatigue of the extensor muscle groups. This study highlighted that a short walking exercise, corresponding to daily mobility, results in gait pattern modifications. Since therapies in children with cerebral palsy aim to improve motor function in everyday life situations, it could be relevant to evaluate gait adaptation after a few minutes of walking exercise.

DOI: 10.1016/j.clinbiomech.2016.03.003
PMID: 27038653 [PubMed - indexed for MEDLINE]

Implicit Learning of a Finger Motor Sequence by Patients with Cerebral Palsy After Neurofeedback.

Alves-Pinto A, Turova V, Blumenstein T, Hantuschke C, Lampe R

Appl Psychophysiol Biofeedback. 2017 Feb 7. doi: 10.1007/s10484-017-9349-1. [Epub ahead of print]

Facilitation of implicit learning of a hand motor sequence after a single session of neurofeedback training of alpha power recorded from the motor cortex has been shown in healthy individuals (Ros et al., Biological Psychology 95:54-58, 2014). This facilitation effect could be potentially applied to improve the outcome of rehabilitation in patients with impaired hand motor function. In the current study a group of ten patients diagnosed with cerebral

palsy trained reduction of alpha power derived from brain activity recorded from right and left motor areas. Training was distributed in three periods of 8 min each. In between, participants performed a serial reaction time task with their non-dominant hand, to a total of five runs. A similar procedure was repeated a week or more later but this time training was based on simulated brain activity. Reaction times pooled across participants decreased on each successive run faster after neurofeedback training than after the simulation training. Also recorded were two 3-min baseline conditions, once with the eyes open, another with the eyes closed, at the beginning and end of the experimental session. No significant changes in alpha power with neurofeedback or with simulation training were obtained and no correlation with the reductions in reaction time could be established.
Contributions for this are discussed.
DOI: 10.1007/s10484-017-9349-1
PMID: 28176012 [PubMed - as supplied by publisher]

Feasibility and effect of home-based therapy programmes for children with cerebral palsy: a protocol for a systematic review.
Beckers LW, Schnackers ML, Janssen-Potten YJ(1,)(2), Kleijnen J, Steenbergen B.
BMJ Open. 2017 Feb 24;7(2):e013687. doi: 10.1136/bmjopen-2016-013687.

INTRODUCTION: Given the promising advantages of upper extremity home-based programmes in children with cerebral palsy (CP), a systematic review of the available literature on this topic is warranted. The purpose of the systematic review described in this protocol is to investigate currently available home-based occupational therapy and physiotherapy programmes regarding both their feasibility and effect.
METHODS AND ANALYSIS: This protocol describes a systematic review, developed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015. Studies will be included in which primary data are collected, participants are children aged <18 years with any type of CP and the intervention of interest is a home-based occupational therapy or physiotherapy intervention. Comparators of interest are: no therapy, care as usual, centre-based occupational therapy or physiotherapy, an alternative home-based programme and a medical intervention. Studies will be included that report either on feasibility (ie, acceptability, demand, implementation, practicality, adaptation, expansion or integration) or on efficacy/effectiveness (ie, child-related upper extremity outcomes within all International Classification of Functioning, Disability and Health levels or parent-related/caregiver-related outcomes on the psychological and social domain). Relevant studies will be identified by searching the databases MEDLINE, EMBASE, CINAHL, PsycINFO, PEDro, OTSeeker and CPCI-S as well as the trial registers ICTRP and CENTRAL, the reference lists of included records and by circulating a bibliography of the included records to authors of included studies. There will be no restrictions on language or year of publication. The search strategy consists of terms related to the population and intervention. Data will be extracted in duplicate using a digital data extraction form.
ETHICS AND DISSEMINATION: The proposed study does not involve collection of primary data. Accordingly, no ethical approval is required. The authors will disseminate the findings of this systematic review through publication in a peer-reviewed journal and conference presentation(s).
TRIAL REGISTRATION NUMBER: CRD42016043743; pre-results.

Free Article
DOI: 10.1136/bmjopen-2016-013687
PMID: 28237960 [PubMed - in process]

Intensive upper- and lower-extremity training for children with bilateral cerebral palsy: a quasi-randomized trial.
Bleyenheuft Y, Ebner-Karestinos D, Surana B, Paradis J, Sidiropoulos A, Renders A, Friel KM, Brandao M, Rameckers E, Gordon AM.
Dev Med Child Neurol. 2017 Jan 30. doi: 10.1111/dmcn.13379. [Epub ahead of print]

AIM: An approach that simultaneously engages both the upper and lower extremities, hand-arm bimanual intensive therapy including lower extremity (HABIT-ILE), has recently demonstrated improvements in upper and lower extremities in children with unilateral cerebral palsy (CP). It is not known whether children with bilateral CP would benefit from this approach. The aim of this study was to examine the efficacy of HABIT-ILE in children with bilateral CP.

METHOD: A quasi-randomized trial design was used, whereby 20 participants (age 6-15y, Gross Motor Function Classification System levels II-IV, Manual Ability Classification System levels I-III) were assigned to a treatment (HABIT-ILE) or a comparison group in the order in which they were enrolled. Children in the HABIT-ILE group were assessed before and after 84 hours of intervention over 13 days, as well as at 3 months' follow-up. Children in the comparison group were assessed at the same time points. Children in both groups were assessed using the Gross Motor Function Measure (GMFM-66) and ABILHAND-Kids (primary measures), and six secondary measures.
RESULTS: A group×test session interaction indicated significant improvements in the HABIT-ILE group as assessed by the GMFM-66, lower-extremity performance (6-Minute Walk Test; Pediatric Balance Scale), functional upper-extremity abilities (ABILHAND-Kids/Pediatric Evaluation of Disability Inventory), and the dexterity of the less affected upper extremity.
CONCLUSION: HABIT-ILE is efficacious for improving both upper- and lower-extremity function in children with bilateral CP.

DOI: 10.1111/dmcn.13379
PMID: 28133725 [PubMed - as supplied by publisher]

Measuring neuroplasticity associated with cerebral palsy rehabilitation: An MRI based power analysis.
Reid LB, Pagnozzi AM, Fiori S, Boyd RN, Dowson N, Rose SE.
Int J Dev Neurosci. 2017 Jan 24;58:17-25. doi: 10.1016/j.ijdevneu.2017.01.010. [Epub ahead of print]

Researchers in the field of child neurology are increasingly looking to supplement clinical trials of motor rehabilitation with neuroimaging in order to better understand the relationship between behavioural training, brain changes, and clinical improvements. Randomised controlled trials are typically accompanied by sample size calculations to detect clinical improvements but, despite the large cost of neuroimaging, not equivalent calculations for concurrently acquired imaging neuroimaging measures of changes in response to intervention. To aid in this regard, a power analysis was conducted for two measures of brain changes that may be indexed in a trial of rehabilitative therapy for cerebral palsy: cortical thickness of the impaired primary sensorimotor cortex, and fractional anisotropy of the impaired, delineated corticospinal tract. Power for measuring fractional anisotropy was assessed for both region-of-interest-seeded and fMRI-seeded diffusion tractography. Taking into account practical limitations, as well as data loss due to behavioural and image-processing issues, estimated required participant numbers were 101, 128 and 59 for cortical thickness, region-of-interest-based tractography, and fMRI-seeded tractography, respectively. These numbers are not adjusted for study attrition. Although these participant numbers may be out of reach of many trials, several options are available to improve statistical power, including careful preparation of participants for scanning using mock simulators, careful consideration of image processing options, and enrolment of as homogeneous a cohort as possible. This work suggests that smaller and moderate sized studies give genuine consideration to harmonising scanning protocols between groups to allow the pooling of data.

DOI: 10.1016/j.ijdevneu.2017.01.010
PMID: 28130065 [PubMed - as supplied by publisher]

Telerehabilitation approach for patients with hand impairment.
Staszuk A, Wiatrak B, Tadeusiewicz R, Karuga-Kuźniewska E, Rybak Z
Acta Bioeng Biomech. 2016;18(4):55-62.

PURPOSE: Telerehabilitation is one of the newest branches of telemedicine which has been developed because patients need regular trainings outside the medical institution but still under specialist supervision. It helps maintain regularity of exercises and reduces costs. The professional and advanced systems for telerehabilitation are presented in papers, however, there is still lack of development of minor systems which provide therapeutic values and are more accessible to people. Therefore we focus on a solution for hand telerehabilitation of poststroke patients, based solely on a personal computer and camera.
METHODS: We focused on the manipulative hand (fingers, metacarpus, wrist) movements trainings for patients with cerebral palsy. The contact between patient and physiotherapist is provided by using web cameras and web service. Additionally, the camera can be used to monitor the effectiveness of performed exercises. Computer vision system keeps track of the patient's hand movement. The digital image processing is used to detect if the patient performs exercises correctly.

RESULTS: We created web service and software application TeleReh that provides therapeutic values for the hand impaired people. The system created was evaluated by three physiotherapists, one doctor and a cerebral palsy patient.
CONCLUSIONS: Our solution applies to all patients who have undergone basic rehabilitation in hospital and need to continue hand rehabilitation at home. The main advantages are: easy adaptation to the individual needs and abilities, monitoring the progress by using automatically generated reports after each training session. It is worth noticing that discussion between IT specialists, rehabilitants and patients was necessary to achieve good results.
PMID: 28133379 [PubMed - indexed for MEDLINE]

Orthèses

Carbon Modular Orthosis (Ca.M.O.): An innovative hybrid modular ankle-foot orthosis to tune the variable rehabilitation needs in hemiplegic cerebral palsy.
Tavernese E, Petrarca M, Rosellini G, Di Stanislao E, Pisano A, Di Rosa G, Castelli E
NeuroRehabilitation. 2017 Feb 10. doi: 10.3233/NRE-161432. [Epub ahead of print]

BACKGROUND: Hemiplegic Celebral Palsy (CP) children commonly use AFO orthoses as walking aids. It is known that AFOs may have a detrimental effect on gait. To enhance mechanical properties of AFOs we developed an innovative, custom-made, carbon, ankle-foot orthosis (Ca.M.O) which offers the opportunity to tune its response to the patient's gait characteristics and/or functional maturity.
OBJECTIVE: To assess the efficacy of Ca.M.O. in improving gait in a group of hemiplegic CP children and to compare its performances with those of commonly prescribed AFO.
METHODS: A clinical and instrumental gait analysis was performed on a group of 15 spastic hemiplegic children (WINTERS-GAGE type I-II) walking barefoot, with commonly prescribed AFOs and with Ca.M.O.Temporal, kinematic and kinetic data were collected with a 8 cameras optoelectronic system and 2 force plates.
RESULTS: Studied variables were comparable walking with Ca.M.O. and with the commonly prescribed AFO and are significantly different ($p < 0.01$) with respect to barefoot condition.
CONCLUSIONS: Both types of orthoses normalize the kinematics of the first and second ankle rocker. The main advantage of Ca.M.O. is its modularity that allows to tune its effect on gait in relationship with the progress or involution of the child's functional development.
DOI: 10.3233/NRE-161432
PMID: 28222565 [PubMed - as supplied by publisher]

Effect of Knee Orthoses on Hamstring Contracture in Children With Cerebral Palsy: Multiple Single-Subject Study.
Laessker-Alkema K, Eek MN.
Pediatr Phys Ther. 2016 fall;28(3):347-53. doi: 10.1097/PEP.0000000000000267.
Comment in Pediatr Phys Ther. 2016 Fall;28(3):354.

PURPOSE: To examine the effect of knee orthoses on extensibility of the hamstrings in children with spastic cerebral palsy (CP).
METHODS: The short-term effects of knee orthoses on passive range of motion (ROM), spasticity, and gross motor function of the hamstrings. Ten children with spastic CP, aged 5 to 14 years, at Gross Motor Function Classification System levels I to V, were followed. The orthoses were worn for a minimum of 30 minutes day, 5 days per week, during the intervention period of 8 weeks.
RESULTS: Visual analysis using the Two Standard Deviation Band Method supported improvements in passive ROM for all 20 hamstring muscles and in 12 of 14 knee extension measurements. Analyses with the Wilcoxon signed rank test confirm the individual results and support a significant increase in hamstring muscles ($P = .005$) and knee extension (right: $P = .028$; left: $P = .018$) compared with baseline.
CONCLUSIONS: In children with spastic CP, 8 weeks of treatment with knee orthoses can improve extensibility of the hamstrings.
DOI: 10.1097/PEP.0000000000000267
PMID: 27027243 [PubMed - indexed for MEDLINE]

Effect of Segmental Trunk Support on Posture and Reaching in Children With Cerebral Palsy.
Santamaria V, Rachwani J, Saavedra S, Woollacott M.

Pediatr Phys Ther. 2016 fall;28(3):285-93. doi: 10.1097/PEP.0000000000000273.Comment in Pediatr Phys Ther. 2016 Fall;28(3):293.

PURPOSE: To test the effects of segmental trunk support on seated postural and reaching control in children with cerebral palsy.
METHODS: Seventeen children (age range 2-15 y, Gross Motor Function Classification System levels III-V) were classified with the Segmental Assessment of Trunk Control into mild (complete trunk control/lower lumbar deficits), moderate (thoracic/upper lumbar deficits), and severe (cervical/upper thoracic deficits). Postural and arm kinematics were measured while reaching with trunk support at axillae, mid-ribs, or pelvis.
RESULTS: Children in the mild group did not display changes in posture or reaching across conditions. The moderately involved group showed decrements in postural and reaching performance with pelvic compared with higher supports (P < .01). Children in the severe group were unable to maintain posture with pelvic support and showed postural deficiencies with mid-ribs compared with axillae support (P < .01).
CONCLUSIONS: Children with cerebral palsy and trunk dysfunction demonstrate improved motor performance when the external assistance matches their intrinsic level of trunk control.
PMCID: PMC4922488 [Available on 2017-10-01]
PMID: 27341576 [PubMed - indexed for MEDLINE]

Robots – Exosquelette

.

Custom sizing of lower limb exoskeleton actuators using gait dynamic modelling of children with cerebral palsy.
Samadi B, Achiche S, Parent A, Ballaz L, Chouinard U, Raison M.
Comput Methods Biomech Biomed Engin. 2016 Nov;19(14):1519-24. doi: 10.1080/10255842.2016.1159678. Epub2016 Mar 15

The use of exoskeletons as an aid for people with musculoskeletal disorder is the subject to an increasing interest in the research community. These devices are expected to meet the specific needs of users, such as children with cerebral palsy (CP) who are considered a significant population in pediatric rehabilitation. Although these exoskeletons should be designed to ease the movement of people with physical shortcoming, their design is generally based on data obtained from healthy adults, which leads to oversized components that are inadequate to the targeted users. Consequently, the objective of this study is to custom-size the lower limb exoskeleton actuators based on dynamic modeling of the human body for children with CP on the basis of hip, knee, and ankle joint kinematics and dynamics of human body during gait. For this purpose, a multibody modeling of the human body of 3 typically developed children (TD) and 3 children with CP is used. The results show significant differences in gait patterns especially in knee and ankle with respectively 0.39 and -0.33 (Nm/kg) maximum torque differences between TD children and children with CP. This study provides the recommendations to support the design of actuators to normalize the movement of children with CP.
DOI: 10.1080/10255842.2016.1159678
PMID: 26980164 [PubMed - indexed for MEDLINE]

Quantitative Evaluation of Performance during Robot-assisted Treatment.
Peri E, Biffi E, Maghini C, Servodio Iammarrone F, Gagliardi C, Germiniasi C, Pedrocchi A, Turconi AC, Reni G.
Methods Inf Med. 2016;55(1):84-8. doi: 10.3414/ME14-01-0126. Epub 2015 Dec 7.

INTRODUCTION: This article is part of the Focus Theme of Methods of Information in Medicine on "Methodologies, Models and Algorithms for Patients Rehabilitation".
OBJECTIVES: The great potential of robots in extracting quantitative and meaningful data is not always exploited in clinical practice. The aim of the present work is to describe a simple parameter to assess the performance of subjects during upper limb robotic training exploiting data automatically recorded by the robot, with no additional effort for patients and clinicians.
METHODS: Fourteen children affected by cerebral palsy (CP) performed a training with Armeo®Spring. Each session was evaluated with P, a simple parameter that depends on the overall performance recorded, and median and interquartile values were computed to perform a group analysis.

RESULTS: Median (interquartile) values of P significantly increased from 0.27 (0.21) at T0 to 0.55 (0.27) at T1 . This improvement was functionally validated by a significant increase of the Melbourne Assessment of Unilateral Upper Limb Function.
CONCLUSIONS: The parameter described here was able to show variations in performance over time and enabled a quantitative evaluation of motion abilities in a way that is reliable with respect to a well-known clinical scale.
DOI: 10.3414/ME14-01-0126
PMID: 26640835 [PubMed - indexed for MEDLINE]

Robotic-assisted gait training improves walking abilities in diplegic children with cerebral palsy.
Wallard L, Dietrich G, Kerlirzin Y, Bredin J.
Eur J Paediatr Neurol. 2017 Feb 2. pii: S1090-3798(17)30072-7. doi: 10.1016/j.ejpn.2017.01.012. [Epub ahead of print]

The robotic-assisted gait training therapy (RAGT), based on intensity and repetition of movement, presents beneficial effects on recovery and improvement of postural and locomotor functions of the patient. This study sought to highlight the effect of this RAGT on the dynamic equilibrium control during walking in children with Cerebral Palsy (CP) by analyzing the different postural strategies of the fullbody (upper/lower body) before and after this RAGT in order to generate forward motion while maintaining balance. Data were collected by a motion analysis system (Vicon(®) - Oxford Metrics). Thirty children with bilateral spastic CP were evaluated using a full-body marker set which allows assessing both the lower and upper limb kinematics. The children were divided into two groups in such a way as to obtain a randomized controlled population: i) a group of fourteen children (Treated Group) underwent 20 sessions of RAGT using the driven gait orthosis Lokomat(®)Pediatric (Hocoma) compared to ii) a group of sixteen children without sessions of Lokomat(®)Pediatric (Control Group) receiving only daily physiotherapy. Significant improvements are observed between the TG pre- and post-test values of i) the kinematic data of the full-body in the sagittal and frontal planes and ii) the Gross Motor Function Measure test (D and E). This study shows the usefulness of this RAGT mainly in the balance control in gait. Indeed, the Treated Group use new dynamic strategies of gait that are especially characterized by a more appropriate control of the upper body associated with an improvement of the lower limbs kinematics.

DOI: 10.1016/j.ejpn.2017.01.012
PMID: 28188024 [PubMed - as supplied by publisher]

Stimulation cérébrale - Stimulation neurosensorielle

A comprehensive database of published tDCS clinical trials (2005-2016).
Lefaucheur JP
Neurophysiol Clin. 2016 Dec;46(6):319-398. doi: 10.1016/j.neucli.2016.10.002. Epub 2016 Nov 17.

Transcranial direct current stimulation (tDCS) is a technique of noninvasive cortical stimulation allowing significant modification of brain functions. Clinical application of this technique was reported for the first time in March 2005. This paper presents a detailed list of the 340 articles (excluding single case reports) which have assessed the clinical effect of tDCS in patients, at least when delivered to cortical targets. The reviewed conditions were: pain syndromes, Parkinson's disease, dystonia, cerebral palsy, post-stroke limb motor impairment, post-stroke neglect, post-stroke dysphagia, post-stroke aphasia, primary progressive aphasia, multiple sclerosis, epilepsy, consciousness disorders, Alzheimer's disease and other types of dementia, tinnitus, depression, auditory hallucinations and negative symptoms of schizophrenia, addiction and craving, autism, and attention disorders. The following data were collected: (i) clinical condition; (ii) study design; (iii) sample size; (iv) anode and cathode locations; (v) stimulation intensity and electrode area; (vi) number and duration of sessions; (vii) clinical outcome measures and results. This article does not include any meta-analysis and aims simply at providing a comprehensive overview of the raw data reported in this field to date, as an aid to researchers.

DOI: 10.1016/j.neucli.2016.10.002
PMID: 27865707 [PubMed - indexed for MEDLINE]

Transcranial Magnetic and Direct Current Stimulation in Children.

Hameed MQ, Dhamne SC, Gersner R, Kaye HL, Oberman LM, Pascual-Leone A, Rotenberg A
Curr Neurol Neurosci Rep. 2017 Feb;17(2):11. doi: 10.1007/s11910-017-0719-0.

Promising results in adult neurologic and psychiatric disorders are driving active research into transcranial brain stimulation techniques, particularly transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS), in childhood and adolescent syndromes. TMS has realistic utility as an experimental tool tested in a range of pediatric neuropathologies such as perinatal stroke, depression, Tourette syndrome, and autism spectrum disorder (ASD). tDCS has also been tested as a treatment for a number of pediatric neurologic conditions, including ASD, attention-deficit/hyperactivity disorder, epilepsy, and cerebral palsy. Here, we complement recent reviews with an update of published TMS and tDCS results in children, and discuss developmental neuroscience considerations that should inform pediatric
transcranial stimulation.
DOI: 10.1007/s11910-017-0719-0
PMID: 28229395 [PubMed - in process]

Réalité virtuelle - Jeux video

Active Videogaming for Individuals with Severe Movement Disorders: Results from a Community Study.
Chung PJ, Vanderbilt DL, Schrager SM, Nguyen E, Fowler E
Games Health J. 2015 Jun;4(3):190-4. doi: 10.1089/g4h.2014.0091. Epub 2015 Jan 23.

OBJECTIVE: Active videogaming (AVG) has potential to provide positive health outcomes for individuals with cerebral palsy (CP), but their use for individuals with severe motor impairments is limited. Our objective was to evaluate the accessibility and enjoyment of videogames using the Kinect™ (Microsoft, Redmond, WA) with the Flexible Action and Articulated Skeleton Toolkit (FAAST) system (University of Southern California Institute for Creative Technologies, Los Angeles, CA) for individuals with severely limiting CP.
MATERIALS AND METHODS: A videogaming system was installed in a community center serving adults with CP, and a staff member was instructed in its use. Participants completed a baseline survey assessing demographics, mobility, and prior videogame experience; they then used the FAAST system with Kinect and completed a 5-point Likert survey to assess their experience. Descriptive statistics assessed overall enjoyment of the system, and Mann-Whitney U tests were conducted to determine whether responses differed by demographic factors, mobility, or prior videogame experience.
RESULTS: Twenty-two subjects were recruited. The enjoyment scale demonstrated high internal consistency (Cronbach's alpha=0.88). The mean total enjoyment score was 4.24 out of 5. Median scores did not significantly differ by ethnicity, gender, CP severity, or previous videogame exposure.
CONCLUSIONS: The FAAST with Kinect is a low-cost system that engages individuals with severe movement disorders across a wide range of physical ability and videogame experience. Further research should be conducted on in-home use, therapeutic applications, and potential benefits for socialization.
DOI: 10.1089/g4h.2014.0091
PMID: 26182063 [PubMed - indexed for MEDLINE

Augmented effects of EMG biofeedback interfaced with virtual reality on neuromuscular control and movement coordination during reaching in children with cerebral palsy.
Yoo JW, Lee DR, Cha YJ, You SH.
NeuroRehabilitation. 2017 Jan 30. doi: 10.3233/NRE-161402. [Epub ahead of print]

BACKGROUND: The purpose of the present study was to compare therapeutic effects of an electromyography (EMG) biofeedback augmented by virtual reality (VR) and EMG biofeedback alone on the triceps and biceps (T:B) muscle activity imbalance and elbow joint movement coordination during a reaching motor taskOBJECTIVE: To compare therapeutic effects of an electromyography (EMG) biofeedback augmented by virtual reality (VR) and EMG biofeedback alone on the triceps and biceps muscle activity imbalance and elbow joint movement coordination during a reaching motor task in normal children and children with spastic cerebral palsy (CP).
METHODS: 18 children with spastic CP (2 females; mean±standard deviation = 9.5 ± 1.96 years) and 8 normal children (3 females; mean ± standard deviation = 9.75 ± 2.55 years) were recruited from a local community center. All children with CP first underwent one intensive session of EMG feedback (30 minutes), followed by one session of

the EMG-VR feedback (30 minutes) after a 1-week washout period. Clinical tests included elbow extension range of motion (ROM), biceps muscle strength, and box and block test. EMG triceps and biceps (T:B) muscle activity imbalance and reaching movement acceleration coordination were concurrently determined by EMG and 3-axis accelerometer measurements respectively. Independent t-test and one-way repeated analysis of variance (ANOVA) were performed at $p < 0.05$.
RESULTS: The one-way repeated ANOVA was revealed to be significantly effective in elbow extension ROM ($p = 0.01$), biceps muscle strength ($p = 0.01$), and box and block test ($p = 0.03$). The one-way repeated ANOVA also revealed to be significantly effective in the peak triceps muscle activity ($p = 0.01$). However, one-way repeated ANOVA produced no statistical significance in the composite 3-dimensional movement acceleration coordination data ($p = 0.12$).
CONCLUSIONS: The present study is a first clinical trial that demonstrated the superior benefits of the EMG biofeedback when augmented by virtual reality exercise games in children with spastic CP. The augmented EMG and VR feedback produced better neuromuscular balance control in the elbow joint than the EMG biofeedback alone.
DOI: 10.3233/NRE-161402
PMID: 28222541 [PubMed - as supplied by publisher]

Digital Posturography Games Correlate with Gross Motor Function in Children with Cerebral Palsy.
Bingham PM, Calhoun B.
Games Health J. 2015 Apr;4(2):145-8. doi: 10.1089/g4h.2014.0096. Epub 2015 Feb 27.

OBJECTIVE: This pilot study aimed to assess whether performance on posturography games correlates with the Gross Motor Function Measure (GMFM) in children with cerebral palsy.
MATERIALS AND METHODS: Simple games using static posturography technology allowed subjects to control screen events via postural sway. Game performance was compared with GMFMs using correlation analysis in a convenience sample of nine girls and six boys with cerebral palsy. Likert scales were used to obtain subjective responses to the balance games.
RESULTS: GMFM scores correlated with game performance, especially measures emphasizing rhythmic sway. Twelve of the 15 subjects enjoyed the game and asserted an interest in playing again.
CONCLUSIONS: Digital posturography games engage children with cerebral palsy in balance tasks, provide visual feedback in a balance control task, and have the potential to increase autonomy in balance control training among pediatric patients with cerebral palsy. This approach can support the relationship between child and therapist. The potential for interactive posturography to complement the assessment and treatment of balance in cerebral palsy bears continuing study.
Free PMC Article
DOI: 10.1089/g4h.2014.0096
PMCID: PMC4601550
PMID: 26181808 [PubMed - indexed for MEDLINE]

Is There Evidence That Active Videogames Increase Energy Expenditure and Exercise Intensity for People Poststroke and with Cerebral Palsy?
Deutsch JE, Guarrera-Bowlby P, Myslinski MJ, Kafri M.
Games Health J. 2015 Feb;4(1):31-7. doi: 10.1089/g4h.2014.0082. Epub 2014 Dec 3.

This article asked and answered the question of whether there was evidence to support the use of videogames for promotion of wellness and fitness for people poststroke and those with cerebral palsy (CP). A literature search of PubMed, CINAHL, and PEDro using a population, intervention, and outcome (PIO) approach and the key words "stroke (or CP) AND video games (and synonyms) AND energy expenditure (EE) (and synonyms)" was conducted. It yielded two relevant references for people poststroke and five references for people with CP. The literature extraction and synthesis by the categories of the PIO indicated that most studies used only the population of interest, except two that compared the EE with that of healthy controls. The main finding is that both people poststroke (moderate severity) and people with CP (mild severity) can achieve moderate EE playing Wii(™) (Nintendo, Kyoto, Japan), PlayStation(®) (Sony, Tokyo, Japan), and Kinect(™) (Microsoft, Redmond, WA) games. Adults with CP of mild severity played the videogames at vigorous levels, whereas those with severe CP played them at low levels. There appears to be an interaction between development and severity that influences the exercise intensity measured by EE. The findings suggests that videogames are a gateway for wellness promotion.

DOI: 10.1089/g4h.2014.0082
PMID: 26181678 [PubMed - indexed for MEDLINE]

Novel Virtual Environment for Alternative Treatment of Children with CerebralPalsy.
de Oliveira JM, Fernandes RC, Pinto CS, Pinheiro PR, Ribeiro S, deAlbuquerque VH.
Comput Intell Neurosci. 2016;2016:8984379. doi: 10.1155/2016/8984379. Epub 2016Jun 14.

Cerebral palsy is a severe condition usually caused by decreased brain oxygenation during pregnancy, at birth or soon after birth. Conventional treatments for cerebral palsy are often tiresome and expensive, leading patients to quit treatment. In this paper, we describe a virtual environment for patients to engage in a playful therapeutic game for neuropsychomotor rehabilitation, based on the experience of the occupational therapy program of the Nucleus for Integrated Medical Assistance (NAMI) at the University of Fortaleza, Brazil. Integration between patient and virtual environment occurs through the hand motion sensor "Leap Motion," plus the electroencephalographic sensor "MindWave," responsible for measuring attention levels during task execution. To evaluate the virtual environment, eight clinical experts on cerebral palsy were subjected to a questionnaire regarding the potential of the experimental virtual environment to promote cognitive and motor rehabilitation, as well as the potential of the treatment to enhance risks and/or negatively influence the patient's development. Based on the very positive appraisal of the experts, we propose that the experimental virtual environment is a promising alternative tool for the rehabilitation of children with cerebral palsy.
Free PMC Article
DOI: 10.1155/2016/8984379
PMCID: PMC4923569
PMID: 27403154 [PubMed - indexed for MEDLINE]

Thérapies cellulaires

Comparative analysis of curative effect of bone marrow mesenchymal stem cell and bone marrow mononuclear cell transplantation for spastic cerebral palsy.
Liu X, Fu X, Dai G, Wang X, Zhang Z, Cheng H, Zheng P, An Y
J Transl Med. 2017 Feb 24;15(1):48. doi: 10.1186/s12967-017-1149-0.

BACKGROUND: Bone marrow mesenchymal stem cells (BMMSCs) and bone marrow mononuclear cells (BMMNCs) are both used to treat spastic cerebral palsy. However, the differences in therapeutic effect remain unknown.
METHODS: A total of 105 patients with spastic cerebral palsy were enrolled and randomly assigned to three groups: the BMMSC group, the BMMNC group and the control group. Patients in both transplantation groups received four intrathecal cell injections. Patients in the control group received Bobath therapy. The gross motor function measure (GMFM) and the fine motor function measure (FMFM) were used to evaluate the therapeutic efficacy before transplantation and 3, 6, and 12 months after transplantation.
RESULTS: Three months after cell transplantation, scores in the A dimension of GMFM and the A and C dimensions of FMFM scores in the BMMSC group are all higher than those of the BMMNC and the control groups ($P < 0.05$). Six months after cell transplantation, scores in the A, B dimensions of GMFM and the A, B, C, D, and E dimensions of FMFM scores in the BMMSC group are higher than those of the BMMNC and the control groups ($P < 0.05$). Twelve months after cell transplantation, scores in the A, B, and C dimensions of GMFM and the A, B, C, D, and E dimensions of FMFM scores in the BMMSC group are all higher than those of the BMMNC and the control groups ($P < 0.05$). No obvious adverse effects were investigated during follow-up.
CONCLUSIONS: BMMSC transplantation for the treatment of cerebral palsy is safe and feasible, and can improve gross motor and fine motor function significantly. In addition, compared with BMMNC, the motor function of children improved significantly in terms of gross motor and fine motor functions.
Free PMC Article
DOI: 10.1186/s12967-017-1149-0
PMCID: PMC5324263
PMID: 28235424 [PubMed - in process]

Autres

Effects of assisted aquatic movement and horseback riding therapies on emotion and brain activation in patients with cerebral palsy.

Ryu K, Ali A, Kwon M, Lee C, Kim Y, Lee G, Kim J.

J Phys Ther Sci. 2016 Dec;28(12):3283-3287. doi: 10.1589/jpts.28.3283. Epub 2016 Dec 27.

[Purpose] The purpose of this study was to determine the effects of assisted aquatic movement and horseback riding therapies on emotion and brain activation in patients with cerebral palsy.
[Subjects and Methods] Thirty-two right-handed patients with cerebral palsy (18 male, 14 female) whose ages ranged from 8 to 48 years participated in this experiment. Their cerebral palsy levels ranged from 1 to 3. The participants were assigned to one of three groups according to the experimental conditions: an assisted aquatic movement therapy group, a horseback riding therapy group, or a control group. Electroencephalograms, the Feeling Scale and the Felt Arousal Scale were examined as dependent variables.
[Results] Analysis of self-reported data demonstrated a significant positive improvement in the emotions of participants in the assisted aquatic movement therapy group in comparison with the control group. With regard to the electroencephalogram analysis, the results of this study showed increased alpha power in the assisted aquatic movement therapy group compared with the horseback riding and control groups.
[Conclusion] The results of this study suggest that professionals can consider assisted aquatic movement therapy as an effective therapeutic intervention for the improvement of mental health and brain activation.

Free PMC Article

DOI: 10.1589/jpts.28.3283
PMCID: PMC5276744
PMID: 28174435 [PubMed - in process]

Experience of using hippotherapy in complex effects on muscle spirals in children with spastic forms of cerebral palsy.

Strashko EY, Kapustianska AA, Bobyreva LE.

Wiad Lek. 2016;69(3 pt 2):527-529.

Matters of physical and medical rehabilitation of children with organic lesions of the nervous system, in particular, with cerebral palsy, are actual in countries around the world. Hippotherapy is neurophysiologically oriented therapy using horses. Determine whether a combination of hippotherapy as a method of rehabilitation in the aftermath of outpatient comprehensive impact on MS on a stationary phase; Study of the effect of hippotherapy as securing and preparation method for learning new postures and movements in children with spastic cerebral palsy forms; The study of the possible optimization of psychophysical state, activation motivations of patients; Determination of the optimal timing of hippotherapy sessions, the number of procedures, the study of possible fatigue factor children. HT classes were conducted at the Ippotsentra "Wind of Change" in the period 2010-2013 the main group of children surveyed (36 people) with spastic forms of cerebral palsy. HT procedure took place twice a day - morning and evening - 30 minutes during 10-12 days. Thus, the proposed integration of the HT program of complex effects on muscle spirals children with spastic cerebral palsy forms is physiologically and anthropologically based on 4-5 day training children adequately transferred the full amount of lessons learned new postures and movements, HT does not cause complications in the somatic and psycho-emotional state of the children, HT enables sensorimotor and psychomotor effects, save and normalize muscle tone for a longer period (up to three months), compared with traditional methods of physiotherapy. HT can serve as a method of learning a new "postures and movements", the preparation of the locomotor apparatus to learn walking.

PMID: 27717938 [PubMed - indexed for MEDLINE]

Influence of Hippotherapy on Body Balance in the Sitting Position Among Children with Cerebral Palsy.

Matusiak-Wieczorek E, Małachowska-Sobieska M, Synder M.

Ortop Traumatol Rehabil. 2016 Mar 23;18(2):165-175. doi:10.5604/15093492.1205024.

BACKGROUND: Cerebrally palsied children demonstrated limited independence while performing various activities of daily living, which is due to disorders of postural control. The best solution to improve postural control is the use of therapies that simultaneously focus on the sense of balance and motor skills. Such possibilities for patients with cerebral palsy are offered, for example, by hippotherapy.

OBJECTIVE: To assess the influence of hippotherapy on body balance in the sitting position among children with cerebral palsy.
MATERIAL AND METHODS: The study enrolled thirty-nine children aged 6-12 years with GMFCS level 1 or 2 spastic diplegia or spastic hemiplegia. The participants were divided into an intervention group (n=19) and a control group (n=20). Children from the intervention group attended 30 minutes of hippotherapy once weekly for 12 consecutive weeks. The Sitting Assessment Scale (SAS) was used to assess the patients' posture and balance.
RESULTS: Some children improved their posture and balance during the study. Generally, control of trunk and head position and function of arms were getting better, while footwork was the weakest.
CONCLUSION: Hippotherapy has positive effects on the position and function of individual parts of the body, thus making it possible for cerebrally palsied children to improve posture and the ability to maintain balance in the sitting position.
DOI: 10.5604/15093492.1205024
PMID: 28155825 [PubMed - in process]

Autres Troubles / Troubles concomitants

Troubles musculosquelettiques, des tissus conjonctifs et osseux

Bone age in unilateral spastic cerebral palsy: is there a correlation with hand function and limb length?
Lee JS, Choi IJ, Shin MJ, Yoon JA, Ko SH, Shin YB.
J Pediatr Endocrinol Metab. 2017 Feb 23. pii: /j/jpem.ahead-of-print/jpem-2016-0349/jpem-2016-0349.xml. doi: 10.1515/jpem-2016-0349. [Epub ahead of print]

BACKGROUND: The purpose of this study was to analyze the bone age and the upper extremity segmental lengths between the affected and the unaffected side and to reveal the correlation between the difference of bone age and the upper limb length discrepancy in the unilateral spastic cerebral palsy (CP). We also evaluated the relationship between difference of bone age and hand function.
METHODS: Seventy-eight patients participated in this study. The bone ages of hand-wrists of the patients were determined by the Greulich and Pyle atlas. Upper extremity segmental lengths were measured by radiograph. The side-to side length discrepancy was calculated as a percentage. Hand function was classified according to the Manual Ability Classification System (MACS).
RESULTS: There was significant difference in the bone age between the affected and unaffected side ($p<0.001$). Segmental lengths of the upper extremities showed significant differences between the affected and unaffected side ($p<0.001$). The hand function of 56 patients was evaluated by MACS and the MACS level showed correlation with difference of side-to-side bone age ($r=0.29$, $p=0.03$) and all segmental upper limb length discrepancies ($p<0.05$). The hand function in the bone-age-delayed group was significantly better than the hand function in the bone-age-symmetrical group ($p<0.01$).
CONCLUSIONS: The bone age of the affected side compared to the unaffected side is delayed and the hand function of the affected side is correlated with the difference of side-to-side bone age and the upper limb length discrepancy. Hand function might be helpful for predicting potential limb shortness and delayed bone age.
DOI: 10.1515/jpem-2016-0349
PMID: 28231063 [PubMed - as supplied by publisher]

Bone mineral density and insulin-like growth factor-1 in children with spastic cerebral palsy.
Nazif H, Shatla R, Elsayed R, Tawfik E, Osman N, Korra S, Ibrahim A
Childs Nerv Syst. 2017 Feb 24. doi: 10.1007/s00381-017-3346-9. [Epub ahead of print]

BACKGROUND: Children with cerebral palsy (CP) have significant decrease linear growth rate and low bone mineral density (BMD).
AIMS: This study is to evaluate BMD in children with CP and its relation to the levels of insulin-like growth factor-1 (IGF-1).
SUBJECTS AND METHODS: This cross-sectional study was carried out on 58 children suffering from spastic CP with the age range 4-12 years compared to 19 controls. All assessed by dual energy x-ray

absorptiometry (DXA) to measure BMD, serum level of IGF-1, and serum vitamin D. The patients were classified according to their GMFCS.
RESULTS: Fractures were reported in seven (12.1%) of cases. Our study demonstrated that, IGF-1 level and BMD decrease in correlation with the severity of CP. IGF-1correlates positively with serum vitamin D, BMI, and BMD. CP children with severe GMFCS level or who use anticonvulsive drugs are at a high risk for low BMD and low levels of IGF-1.
CONCLUSION: Both BMD and IGF-1 were significantly in low children with spastic CP; IGF-1 negatively correlates with the severity of osteopenia in children with spastic. Children with CP who are not independently ambulant or with severe GMFCS level or who use anticonvulsive drugs are at a high risk for developing low BMD.
DOI: 10.1007/s00381-017-3346-9
PMID: 28236062 [PubMed - as supplied by publisher]

Motor impairment and skeletal mineralization in children with cerebral palsy.
Akhter N, Khan AA, Ayyub A
J Pak Med Assoc. 2017 Feb;67(2):200-203.

OBJECTIVE: To evaluate the bone mineral density and the effect of motor impairment on bone mineral density in children with cerebral palsy.
METHODS: The cross-sectional study was conducted at the Armed Forces Institute of Rehabilitation Medicine, Rawalpindi, Pakistan, from January 2013 to January 2015. Children diagnosed with cerebral palsy were sampled by non-probability purposive sampling from the Cerebral Palsy clinic. On the basis of Gross Motor Function Classification level of motor impairment, the children were divided into mild Cerebral Palsy (level 1 & 2) and moderate to severe Cerebral Palsy (level 3-5) groups. Bone mineral density z-score was measured at lumbar spine with Dual Energy X-Ray Absorptiometry at L1-L4 lumbar vertebra. Data was analysed using SPSS 20.
RESULTS: Of the total 108 children selected, 18(16.6%) had to be excluded due to poor nutrition status or deranged serum chemistry, while in 4(3.7%) children Dual Energy X-ray Absorptiometry scan was not done on technical grounds. Of the remaining 86(79.6%) children, 39(45.3%) were males and 47(54.7%) were females. The overall mean age was 6.08±2.89 years and mean bone mineral density z-score was -2.16±0.62. Statistically significant difference was found in bone mineral density z-scores of moderate to severe compared to mild Cerebral Palsy group ($p<0.05$). Significant difference in bone mineral density z-scores was also found among different levels of Gross Motor Function Classification system of motor impairment ($p<0.05$).
CONCLUSIONS: Cerebral Palsy children had low bone mineral density z-score, especially those who were non-ambulatory.
Free Article
PMID: 28138171 [PubMed - in process]

Nutrition – Troubles nutritionnels

Effect of impaired ambulation and anti-epileptic drug intake on vitamin D status of children with cerebral palsy.
Seth A, Aneja S, Singh R, Majumdar R, Sharma N, Gopinath M
Paediatr Int Child Health. 2017 Feb 1:1-6. doi: 10.1080/20469047.2016.1266116. [Epub ahead of print]

BACKGROUND: Children with cerebral palsy (CP) are vulnerable to developing vitamin D deficiency. There is little information on the prevalence and severity of vitamin D deficiency in these patients.
OBJECTIVE: To study vitamin D status in children with CP with special reference to their intake of anti-epileptic drugs (AED) and ambulatory status.
METHODS: The relative effects of AED use and ambulatory status on the vitamin D status of 120 children with CP aged 2-10 years were examined in this observational study. The patients were classified into four groups (30 in each) on the basis of AED use and ambulatory status: ambulatory (CPA), ambulatory receiving AED (CPAD), non-ambulatory (CPNA) and non-ambulatory receiving AED (CPNAD). A control group of 30 age-matched healthy children was also included. Parameters assessed included dietary calcium intake, sun exposure, serum total and ionised

calcium (tCa, iCa), inorganic phosphate (iP), alkaline phosphatase (ALP), parathormone (PTH), 25 hydroxy vitamin D [25(OH)D] levels and a wrist radiograph to detect rickets. Vitamin D status was defined on the basis of serum 25(OH)D levels as normal (>50 nmol/L), mild deficiency (25-50 nmol/L), moderate deficiency (12.5-25 nmol/L), severe deficiency (<12.5 nmol/L).
RESULTS: Median (IQR) serum 25 (OH)D levels in patients with CP were 35.6 (26.75-64) nmol/L compared with 60 (37-69.25) nmol/L in controls ($p = 0.04$). Sixty per cent of children with CP and 36.7% of controls were vitamin D-deficient [25(OH)D < 50 nmol/L]. Children with CP had a significantly lower dietary calcium intake and sun exposure than controls ($p < 0.0001$ each). Serum tCa and iCa levels were significantly lower ($p = 0.01$ and $p < 0.001$, respectively) and PTH and ALP levels significantly higher ($p = 0.04$ and $p = 0.001$, respectively) in children with CP than in controls. Patients in the CPNAD group were the worst affected, 83.3% of them being vitamin D-deficient with median (IQR) 25(OH)D levels of 33.5 (12.5-45.25) nmol/L. Also, 53.3% of them had raised ALP and 17.2% raised PTH levels.
CONCLUSION: Children with CP are highly vulnerable to vitamin D deficiency. In these patients, AED use and lack of sun exposure contribute towards poor vitamin D status, the effect being more pronounced when they co-exist.
DOI: 10.1080/20469047.2016.1266116
PMID: 28145154 [PubMed - as supplied by publisher]

Perinatal undernutrition associated to experimental model of cerebral palsy increases adverse effects on chewing in young rats.
Lacerda DC, Ferraz-Pereira KN, Visco DB, Pontes PB, Chaves WF,Guzman-Quevedo O, Manhães-de-Castro R, Toscano AE.
Physiol Behav. 2017 Jan 30;173:69-78. doi: 10.1016/j.physbeh.2017.01.043. [Epubahead of print]

The aim of the present study was to investigate the effect of perinatal undernutrition on the sensorimotor pattern of chewing in rats submitted to cerebral palsy experimental model. A total of 60 male Wistar rats were randomly distributed into four groups: Nourished/Control (NC, n=15), Nourished/Cerebral Palsy (NCP, n=15); Undernourished/Control (UC, n=15) and Undernourished/Cerebral Palsy (UCP, n=15). Animals of cerebral palsy (CP) group were subjected to an experimental model based on the combination of perinatal anoxia associated with sensorimotor restriction of the hindlimb. In the rats were evaluated body weight gain, intake of breast milk, feed post-weaning consumption, parameters of the chewing, intra-oral sensitivity and muscle properties (muscle weight and distribution of types of fibers) of the masseter and digastric. Animals from undernourished CP group showed greater reduction in most data evaluated including body weight ($P<0.05$), food intake post-weaning ($P<0.05$), frequency of chewing cycles ($P<0.05$), duration of the reactions of "taste" ($P<0.05$), muscle weight and decrease of the proportion of type IIB fibers in the masseter muscle ($P<0.05$). These results demonstrated in rats submitted a cerebral palsy that perinatal undernutrition intensifies the damage in morphological and functional parameters of chewing.

DOI: 10.1016/j.physbeh.2017.01.043
PMID: 28153456 [PubMed - as supplied by publisher]

Sphère bucco-dentaire – Troubles de la déglutition

Orofacial functions in experimental models of cerebral palsy: A systematic review.
Lacerda DC, Ferraz-Pereira KN, Terácio A, de Santana BJ, QuevedoOG, Manhães-de-Castro R, Toscano AE.
J Oral Rehabil. 2017 Feb 4. doi: 10.1111/joor.12489. [Epub ahead of print]

BACKGROUND: Children who suffer from cerebral palsy (CP) often present comorbidities in the form of orofacial dysfunctions. Studies in animals have contributed to elaborate potential therapies aimed at minimizing the chronic disability of the syndrome.
OBJECTIVE: To systematically review the scientific literature regarding the possible effects that experimental models of CP can have on orofacial functions.
METHODS: Two independent authors conducted a systematic review in the electronic databases Medline, Scopus, CINAHL, Web of Science and Lilacs, using Mesh and Decs terms in animal models. The motor and sensory parameters of sucking, chewing and swallowing were considered as primary outcomes; reactivity odor, controlled salivation, postural control, head mobility during feeding, and the animal's ability to acquire food were secondary outcomes.

RESULTS: Ten studies were included in the present review. Most studies used rabbits as experimental models of CP, which was induced by either hypoxia-ischemia, inflammation or intraventricular hemorrhage. Orofacial functions were altered in all experimental models of CP. However, we found more modifications in hypoxia-ischemia models overall. On the other hand, the model of inflammation was more effective to reproduce higher damage for coordinating sucking and swallowing.
CONCLUSION: All of the CP experimental models that were assessed modified the oral functions in different animal species. However, further studies should be conducted in order to clarify the mechanisms underlying orofacial damage in order to optimize treatment strategies for children who suffer from CP. This article is protected by copyright. All rights reserved.

DOI: 10.1111/joor.12489
PMID: 28160523 [PubMed - as supplied by publisher]

Troubles visuels

Ocular findings in patients with spastic type cerebral palsy.
Park MJ, Yoo YJ, Chung CY, Hwang JM.
BMC Ophthalmol. 2016 Nov 8;16(1):195.

BACKGROUND: Refractive errors, strabismus, nystagmus, amblyopia, and cortical visual impairment are observed in 50 to 90 % of patients with cerebral palsy. Ocular abnormalities are known to differ according to cerebral palsy type, and spastic type has been reported to be more likely to be associated with ocular defects than the athetoid and ataxic types.
METHODS: A retrospective review of medical records was performed on 105 consecutive children with spastic type of cerebral palsy who underwent ophthalmologic examination between July 2003 and March 2006. The complete ophthalmological examination included measurement of visual acuity, ocular motility, stereoacuity, binocular vision, cycloplegic refraction along with the evaluation of the anterior segment and the posterior segment.
RESULTS: The most common ocular abnormality was strabismus (70.5 %) followed by refractive errors (53.3 %). Exodeviation was more commonly found than esodeviation (46 vs 27 patients), and hyperopia was much more prevalent than myopia. A considerable number of patients with strabismus had abnormal ocular motility wherein 16 patients showed inferior oblique overaction and ten superior oblique overaction. Whereas inferior oblique overaction was accompanied similarly in exotropia and esotropia, superior oblique overaction was accompanied more by exotropia.
CONCLUSIONS: Children with spastic type cerebral palsy have a high prevalence of strabismus and refractive errors. Exotropia and hyperopia are the most common ocular abnormalities. All children with spastic type of cerebral palsy may require a detailed ophthalmologic evaluation.
Free PMC Article
DOI: 10.1186/s12886-016-0367-1
PMCID: PMC5100247
PMID: 27821110 [PubMed - indexed for MEDLINE]

Epilepsie

Seizures in Children With Cerebral Palsy and White Matter Injury.
Cooper MS, Mackay MT, Fahey M, Reddihough D, Reid SM, Williams K, Harvey AS.
Pediatrics. 2017 Mar;139(3). pii: e20162975. doi: 10.1542/peds.2016-2975. Epub 2017 Feb 16.

OBJECTIVE: The goal of this study was to describe the prevalence, syndromes, and evolution of seizure disorders in children with cerebral palsy (CP) due to white matter injury (WMI).
METHODS: For this population-based cohort study, brain MRI scans and medical records were reviewed in children in the Victorian Cerebral Palsy Register born between 1999 and 2006 recorded as having WMI. Children were excluded if they had features of an undiagnosed syndrome, associated cortical malformation or injury,or no medical contact in the preceding year. Included were 166 children with CP and isolated WMI due to presumed vascular insufficiency or hemorrhage; 87 were born preterm. Seizure and CP details were obtained from medical records and interviews, and EEG recordings were reviewed.

RESULTS: Forty-one children (25%) had seizures beyond the neonatal period. Four children had West syndrome, which resolved with treatment. Thirteen children had febrile seizures that they outgrew. Thirty children had focal epilepsy with seizure manifestations and EEG discharges typical of early-onset childhood occipital epilepsy or childhood epilepsy with centrotemporal spikes; 23 have outgrown these seizures. Two children had idiopathic generalized epilepsy; it was ongoing in 1 child. Fourteen children had evolution from 1 epileptic syndrome to another. At last follow-up (median age, 12.7 years; minimum age, 9.7 years), 80% had not had a seizure for >2 years.
CONCLUSIONS: The electroclinical features of seizure disorders associated with CP and WMI are those of the age-limited, epileptic syndromes of childhood, with favorable outcome in the majority. The findings have important implications for counseling and drug treatment.

DOI: 10.1542/peds.2016-2975
PMID: 28209769 [PubMed - in process]

Troubles du sommeil

Hyperbaric oxygen therapy is safe and effective for the treatment of sleep disorders in children with cerebral palsy.

Long Y, Tan J, Nie Y, Lu Y, Mei X, Tu C.

Neurol Res. 2017 Mar;39(3):239-247. doi: 10.1080/01616412.2016.1275454. Epub 2017 Jan 12.

OBJECTIVE: To observe the effects of hyperbaric oxygen (HBO2) therapy on the treatment of sleep disorders and its safety in children with cerebral palsy (CP).
METHODS: A total of 71 recruited children were divided into two groups based on age: group 1, aged between 2 and 4 years; and group 2, aged between 4 and 6 years. The effects of HBO2 therapy on sleep quality were observed.
RESULTS: The total sleep items (TSIs) were significantly different in the two groups between pre-HBO2, post 10 HBO2 sessions, and post 20 HBO2 sessions ($p < 0.01$). A total of 15/38 (39.5%) participants in group 1 and 8/21 (38.0%) in group 2 presented difficulty in falling asleep; 17/38 (44.7%) in group 1 and 4/21 (19.0%) in group 2 had a short duration of sleep during the night; and 20/38 (52.6%) in group 1 and 11/21 (52.4%) in group 2 woke up easily in the night. No significant difference in the average TSIs in 59 participants was found after 10 HBO2 sessions. Eight participants had insomnia after the first 5 sessions, and three in group 2 had nocturnal hyperkinesia after 15 sessions. A seizure during decompression was observed in 2/59 participants (2/419 sessions).
DISCUSSION: These results indicate that HBO2 therapy is beneficial to improve sleep and is safe for children with CP; however, further studies are necessary to explore the mechanisms of HBO2 on sleep.
DOI: 10.1080/01616412.2016.1275454
PMID: 28079475 [PubMed - indexed for MEDLINE]

Sleep disordered breathing in children with cerebral palsy.

Koyuncu E, Türkkani MH, Sarikaya FG, Özgirgin N.

Sleep Med. 2017 Feb;30:146-150. doi: 10.1016/j.sleep.2016.01.020. Epub 2016 Jun 6.

OBJECTIVES: The purpose of this study was to investigate the frequency of Sleep Disordered Breathing (SDB) in children with Cerebral Palsy (CP), and determine whether a relationship between SDB and age, gender, weight status, type of CP, motor function level, and spasticity can be established.
METHODS: The study included 94 children with CP and 94 healthy children with normal development, between the ages two and 18. SDB was assessed using the Sleep-Related Breathing Disorder (SRBD) scale of the Pediatric Sleep Questionnaire (PSQ).
RESULTS: No statistically significant difference was found with respect to age and gender between the study and the control groups. It was found that 9.6% of the patients with CP had snoring, 12.8% had sleepiness, 37.2% had attention deficiency-hyperactivity, and 18.1% had SRBD. SRBD was statistically significantly higher in patients with CP compared with the control group. No significant relationship was detected between SRBD and age, gender, weight status, type of CP, motor function level, spasticity, and epilepsy.
CONCLUSIONS: Our result confirm that SDB is more common in children with CP than typically developing children. Thus, SDB problems should be identified in routine clinical practice in patients with CP, by using the SRBD scale of the PSQ.

DOI: 10.1016/j.sleep.2016.01.020
PMID: 28215238 [PubMed - in process]

Qualité de vie et rapport au monde

Qualité de vie – Retentissement dans la vie quotidienne

Theory of mind, emotional and social functioning, and motor severity in children and adolescents with dystonic cerebral palsy.

Adegboye D(1), Sterr A(2), Lin JP(3), Owen TJ(4).

Eur J Paediatr Neurol. 2017 Jan 31. pii: S1090-3798(17)30073-9. doi: 10.1016/j.ejpn.2017.01.013. [Epub ahead of print]

AIMS: This cross-sectional study aimed to investigate whether children and adolescents with dystonic cerebral palsy (CP) present with emotional and social difficulties along side motor limitations.
PARTICIPANTS/MEASURES: Twenty-two verbal and nonverbal children and adolescents with dystonic CP were compared with a normative sample of twenty children and adolescents on measures of theory of mind (ToM), emotion regulation (ER), and social difficulties (SD).
RESULTS: Higher social and emotional difficulties were found in the dystonic CP group compared to the control group. Nonverbal participants with dystonic CP were found to present with greater social impairment and lower ToM ability than their verbal counterparts. Emotional regulation and hyperactivity and attentional difficulties (HAD) significantly predicted ToM ability and social difficulties. Lower Gross Motor Function Classification System (GMFCS) level and IQ also contributed to differences in ToM ability.
INTERPRETATION: Findings support the need for greater attention to the emotional health and social development of children/adolescents with dystonic CP, along with assessments of motor difficulties in the planning and implementation of interventions and individual care plans. Further research is needed to explore links between motor disorder and mental state understanding in this clinical group.

DOI: 10.1016/j.ejpn.2017.01.013
PMID: 28237421 [PubMed - as supplied by publisher]

Activité physique

A qualitative evaluation of an aerobic exercise program for young people with cerebral palsy in specialist schools.

Cleary SL, Taylor NF, Dodd KJ, Shields N

Dev Neurorehabil. 2017 Feb 2:1-8. doi: 10.1080/17518423.2016.1277798. [Epub ahead of print]

PURPOSE: To explore the perceived effects of an aerobic exercise program delivered in specialist schools for young people with cerebral palsy with high support needs.
METHODS: In-depth interviews were completed with 8 students with cerebral palsy, 10 parents, 8 teachers and 7 physiotherapists. Interviews were audio-recorded, transcribed verbatim and independently coded by two researchers. Data were analyzed using thematic analysis.
RESULTS: Two themes emerged: one about program impact and the second about influential design features. Exercise was perceived as important, and participants indicated that the program had resulted in positive physical (e.g., improved ease of mobility, fitness and stamina) and psychosocial (e.g., happiness, social experience, challenge) impacts. The school setting, program staff and student attitudes were key features of the program.
CONCLUSIONS: These data converge with those from a randomized controlled trial and attribute physical and psychosocial benefits to a specialist school-based exercise program for young people with cerebral palsy.
DOI: 10.1080/17518423.2016.1277798
PMID: 28152322 [PubMed - as supplied by publisher]

Effect of Playground Environments on the Physical Activity of Children With Ambulatory Cerebral Palsy.

Pratt B, Hartshorne NS, Mullens P, Schilling ML, Fuller S, Pisani E.

Pediatr Phys Ther. 2016 winter;28(4):475-82. doi: 10.1097/PEP.0000000000000318. Comment in Pediatr Phys Ther. 2016 Winter;28(4):482.

PURPOSE: To compare the effect of 2 different playground environments on the physical activity of children with ambulatory cerebral palsy during their playground play.
METHODS: Five 7- to 8-year-old children with cerebral palsy (Gross Motor Functional Classification System [GMFCS] level II) participated. Using an alternating treatment, single-subject design, stride patterns were obtained using an activity monitor on an Americans with Disabilities Act (ADA)-compliant and noncompliant playground. Visual and statistical analysis of the stride data was used to analyze the effect of the playground environments.
RESULTS: Four of the 5 participants increased the number of strides on an ADA-compliant playground.
CONCLUSION: Children with cerebral palsy (GMFCS II) may benefit from an ADA-compliant playground to increase their physical activity.
DOI: 10.1097/PEP.0000000000000318
PMID: 27661247 [PubMed - indexed for MEDLINE]

Low Energy Availability, Menstrual Dysfunction, and Low Bone Mineral Density in Individuals with a Disability: Implications for the Para Athlete Population.
Blauwet CA, Brook EM, Tenforde AS, Broad E, Hu CH, Abdu-Glass E, Matzkin EG
Sports Med. 2017 Feb 17. doi: 10.1007/s40279-017-0696-0. [Epub ahead of print]

Low energy availability, functional hypothalamic amenorrhea, and low bone mineral density are three interrelated conditions described in athletic women. Although described as the female athlete triad (Triad), males experience similar health concerns. The literature suggests that individuals with a disability may experience altered physiology related to these three conditions when compared with the able-bodied population. The goal of this review is to describe the unique implications of low energy availability, low bone mineral density, and, in females, menstrual dysfunction in individuals with a disability and their potential impact on the para athlete population. A literature review was performed linking search terms related to the three conditions with six disability categories that are most represented in para sport. Few articles were found that directly pertained to athletes, therefore, the review additionally characterizes literature found in a non-athlete population. Review of the available literature in athletes suggests that both male and female athletes with spinal cord injury demonstrate risk factors for low energy availability. Bone mineral density may also show improvements for wheelchair athletes or athletes with hemiplegic cerebral palsy when compared with a disabled non-athlete population. However, the prevalence of the three conditions and implications on the health of para athletes is largely unknown and represents a key gap in the sports medicine literature. As participation in para sport continues to increase, further research is needed to understand the impact of these three interrelated health concerns for athletes with a disability, accompanied by educational initiatives targeting athletes, coaches, and health professionals.
DOI: 10.1007/s40279-017-0696-0
PMID: 28213754 [PubMed - as supplied by publisher]

Parents' experiences of participation in physical activities for children with cerebral palsy - protecting and pushing towards independence.
Lauruschkus K, Nordmark E, Hallström I.
Disabil Rehabil. 2017 Apr;39(8):771-778. doi: 10.3109/09638288.2016.1161841. Epub 2016 Mar 26.

PURPOSE: To explore how parents of children with cerebral palsy (CP) experience their child's participation in physical activities and to identify facilitators and barriers for being physically active and reducing sedentary behaviour.
METHODS: Twenty-five parents of sixteen children, aged 8-11 years old with CP, with varying gross motor, cognitive and communicative functions and with different cultural backgrounds, participated in focus group or individual interviews. Content analysis was used for analysis.
RESULTS: Five subcategories addressing children's participation in physical activity were found: "Belonging and taking space in the family", "Important persons facilitating and hindering", "Friends important but hard to get", "Good for the body but challenging" and "Availability and opting out possibilities". The subcategories built the main

category "Protecting and pushing towards independence", expressing the challenges parents experienced when their child wanted to be physically active.
CONCLUSIONS: Parents desire competent persons to be available for support in participation in physical activities. They want support in finding friends for their child to be physically active with. Family culture and attitudes affect their child's motivation for being physically active and should be taken into account when designing interventions for increased participation in physical activities and for reduced sedentary behaviour in children with disabilities. Implications for Rehabilitation Friends and competent adults facilitate participation in physical activities and reduce sedentary behaviour. Information on accessible and tailored physical activities is an important facilitator for participation in physical activities. Service planning and design of interventions may be facilitated by taking the individual family culture into account.
DOI: 10.3109/09638288.2016.1161841
PMID: 28187693 [PubMed - in process]

Physiotherapeutic interventions and physical activity for children in Northern Sweden with cerebral palsy: a register study from equity and gender perspectives.
Degerstedt F, Wiklund M, Enberg B
Glob Health Action. 2016 Jan - Dec;10(sup2):1272236. doi: 10.1080/16549716.2017.1272236.

BACKGROUND: Young people with disabilities, especially physical disabilities, report worse health than others. This may be because of the disability, lower levels of physical activity, and discrimination. For children with cerebral palsy, access to physiotherapy and physical activity is a crucial prerequisite for good health and function. To date, there is limited knowledge regarding potential gender bias and inequity in habilitation services.
OBJECTIVES: To map how physiotherapeutic interventions (PTI), physical leisure activity, and physical education are allocated for children with cerebral palsy regarding sex, age, level of gross motor function, and county council affiliation. This was done from a gender and equity perspective.
METHODS: A register study using data from the Cerebral Palsy follow-Up Program (CPUP). Data included 313 children ≤18 years with cerebral palsy from the five northern counties in Sweden during 2013. Motor impairment of the children was classified according to the expanded and revised Gross Motor Function Classification System (GMFCS).
RESULTS: In three county councils, boys received more physiotherapy interventions and received them more frequently than girls did. Differences between county councils were seen for frequency and reasons for physiotherapy interventions ($p < 0.001$). The physiotherapist was involved more often with children who had lower motor function and with children who had low physical leisure activity. Children with lower motor function level participated in physical leisure activity less often than children with less motor impairment ($p < 0.001$). Boys participated more frequently in physical education than did girls ($p = 0.028$).
CONCLUSION: Gender and county council affiliation affect the distribution of physiotherapy interventions for children with cerebral palsy, and there are associations between gender and physical activity. Thus, the intervention is not always determined by the needs of the child or the degree of impairment. A gender-bias is indicated. Further studies are needed to ensure fair interventions.
DOI: 10.1080/16549716.2017.1272236
PMID: 28219314 [PubMed - in process]

Training effects of wheelchair dance on aerobic fitness in bedridden individuals with severe athetospastic cerebral palsy rated to GMFCS level V.
Terada K , Satonaka A, Terada Y, Suzuki N
Eur J Phys Rehabil Med. 2017 Feb 8. doi: 10.23736/S1973-9087.17.04486-0. [Epub ahead of print]

BACKGROUND: There were few studies about training effects of wheelchair dance on aerobic fitness in the bedridden individuals with severe cerebral palsy for whom the traditional maximal or submaximal exercise tests were not applicable. As the oxygen pulse (O2P), the oxygen uptake divided by the heart rate, is regarded to be a relative measure of stroke volume and the O2P correlates to peak oxygen uptake, we would be able to assess the training effects of wheelchair dance on aerobic fitness in those individuals measuring O2P.
AIM: To study training effects of wheelchair dance on aerobic fitness in bedridden individuals with severe athetospastic cerebral palsy.
DESIGN: Pre-post study design.

SETTING: A laboratory and a community care center.
POPULATION: Bedridden individuals with athetospastic cerebral palsy rated to Gross Motor Function Classification System (GMFCS) level V (N. = 6).
METHODS: The O2P was compared between during the rest, the waltz, and the jive at the baseline, the 3rd, the 6th, and the 12th month of the intervention of wheelchair dance 6 to 15 minutes at a time, 2 days a week or more.
RESULTS: Paired student t test showed that O2P during the waltz and the jive was significantly increased compared with that during the rest at the 6th and the 12th month, and O2P during the jive was also significantly increased compared with that during the rest at the 3rd, the 6th, and the 12th month of the intervention period.
CONCLUSION AND CLINICAL REHABILITATION IMPACT: This is the first study that shows wheelchair dance may possibly increase aerobic fitness in bedridden individuals with severe athetospastic cerebral palsty rated GMFCS level V. Future studies with a larger sample will be warranted to prove the claim.
Free Article
DOI: 10.23736/S1973-9087.17.04486-0
PMID: 28178772 [PubMed - as supplied by publisher]

Prise en charge et Accompagnant/Accompagnement

Study of Parental Perceptions on Health & Social Needs of Children with Neuro-Developmental Disability and It's Impact on the Family.
Ansari NJ, Dhongade RK, Lad PS, Borade A, Yg S, Yadav V, Mehetre A, Kulkarni R
J Clin Diagn Res. 2016 Dec;10(12):SC16-SC20. doi: 10.7860/JCDR/2016/22538.9039. Epub 2016 Dec 1.

INTRODUCTION: The term Neuro Developmental Disorder (NDD) is used for conditions caused by a dysfunction in any part of the brain or nervous system, resulting in physical and/or psychological symptoms as a child develops. Family of children with NDD face many problems. It is very important to find them and create awareness so that gaps in essential services and supports can be decreased.
AIM: To explore parental perceptions on health & social needs of children with NDD, to understand the impact of disability on the families having children with disability, and to find out the parental perceptions on availability of services for children with NDD and its utilization by families.
MATERIALS AND METHODS: The parents of 30 children with NDD were interviewed using a questionnaire and data elicited in these interviews were analysed. The questionnaire had preliminary information about parents and child with NDDs, socio-demographic profile of the family and the parental perceptions on health and social needs of their child having NDDs.
RESULTS: There were total 30 patients 17 were males and 13 were females. Most of the patients suffered from Cerebral Palsy (13 cases) and were diagnosed by General Practitioner (22 cases) while Developmental Neurologist/paediatrician had diagnosed remaining cases of NDD (8 cases). Most common disability for which parents were worried was inability to walk (17 cases). Common difficulties countered in daily care by parents were feeding and bathing (10 cases). Only 2 children were given assistance with tuition & psychologist (cases of ADHD). Most of the parents knew about special schools but didn't know which place such facilities were available and none of the children were attending special schools. Twenty two parents said they have no plans for the future studies but wish that at least child learns to read & write. With help of spiritual power (doing prayers and pooja) 25 parents got courage to face the difficulties and discrimination. Two parents required antidepressants. Six Mothers had to quit their jobs so as to concentrate and give more time to their children. Experience with services provided was satisfactory in 17 cases, while 13 parents reported problem of arranging money, adjusting time for long travelling and regular follow-up.
CONCLUSION: The findings can be utilized in developing supportive activities for families with disabled children. It addresses the need for new prospective of stigma reduction in our society. The study has found that the care givers of child with NDDs suffer from significant physical and mental stress, and their health should be taken into consideration. The study has found need of "care givers' support group". The professionals can help parents in establishing positive thinking towards care giving. There is need of provision of comprehensive and latest rehabilitation/ support resources & information.
Free PMC Article
DOI: 10.7860/JCDR/2016/22538.9039
PMCID: PMC5296539
PMID: 28208966 [PubMed - in process]

Domotique - Technologie

A preliminary study of the measurement of overload applied to the foot support of a wheelchair and a seated postural support device.

Shirogane S, Handa T, Kozai Y, Maeda Y.

J Phys Ther Sci. 2017 Jan;29(1):8-11. doi: 10.1589/jpts.29.8. Epub 2017 Jan 30.

[Purpose] The mechanical strength of wheelchair and seating products is specified by standards to ensure user safety. However, some individual users are affected by severe spasticity resulting from cerebral palsy that occasionally breaks such devices. Until recently, reports of quantitative measurement of these mechanical overloads have been scarce, and the exact loads applied have been unknown. This study aimed to conduct a sampling survey prior to conducting a future full-scale study. [Subjects and Methods] Using two force plates, we measured the load on the foot support applied by three participants with cerebral palsy. The applied load was measured at a 100 Hz sampling rate, and maximum load and vertical/horizontal component forces were analyzed. [Results] The maximum load applied by participants was approximately 1.34 times their body weight. The vertical force applied on the foot support accounted for 70-80% of the total load. The horizontal force also reached about 35% at its maximum. [Conclusion] Because the horizontal load also reached 1/3 of the total load, it will be advantageous to use a three-axis force plate to measure forces in a future study with more participants.

Free PMC Article

DOI: 10.1589/jpts.29.8
PMCID: PMC5300794
PMID: 28210028 [PubMed - in process]

LA FONDATION MOTRICE . LA FONDATION PARALYSIE CEREBRALE
67 rue Vergniaud 75013 Paris
Tel.: + 33 1 45 54 063 03
secretariat@lafondationmotrice.org
http://www.fondationparalysiecerebrale.org/