

Science Infos

Paralysie Cérébrale

N°28 – SEPTEMBRE 2016



Focus

Journée Mondiale de la Paralysie Cérébrale 2016

*Le 5 octobre a eu lieu la Journée Mondiale de la Paralysie Cérébrale.
A cette occasion, la Fondation Paralysie Cérébrale a organisé une conférence avec la
présence de Mme Ségolène Neuville, Secrétaire d'Etat chargée des personnes
handicapées et de la lutte contre l'exclusion*

Les vidéos sont en ligne sur notre chaine Youtube

<https://www.youtube.com/playlist...>

1^{ÈRE} ENQUÊTE NATIONALE SUR LES SOINS REÇUS, BESOINS PERÇUS,
LES PRIORITÉS ET AMÉLIORATIONS ATTENDUES EN RÉÉDUCATION MOTRICE,
RAPPORTÉS PAR LES PERSONNES ATTEINTES DE PARALYSIE CÉRÉBRALE*
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*on utilise aussi les termes de PC et Infirmité Motrice Cérébrale (IMC).

Pour plus d'informations, consulter la brochure
ou le site de la Fondation Motrice.

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la rééducation des Intéressés
Motrices Cérébrales

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Manifestations et congrès

Novembre 2016

Congrès National de la Fédération Française des Associations pour l'Infirmité Motrice Cérébrale

vendredi 18 novembre

Saint Etienne , France

http://www.ffaimc.org/PROGRAMME%20CONGRES%202016%20_%2019092016.pdf

Journées d'études, Polyhandicap 2016

21-22 novembre 2016

Paris, France

<http://www.institutmc.org/index.php/journees-d-etudes-polyhandicap-2016-21-et-22-novembre-2016>

Séminaire Interuniversitaire International sur la Clinique du Handicap,

25-26 novembre

Paris, France

<http://www.siiclha.com/>

Décembre 2016

Pédiadol 23^{ème} journées « La douleur de l'enfant : quelles réponses »

5-7 décembre 2016

Paris, France

<https://www.pediadol.org/23emes-Journees-La-douleur-de-l.html>

Congrès Posture Equilibre Mouvement

Faculté de Médecine de Nancy

8-10 décembre 2016

Nancy, France

http://pem-nancy2016.event.univ-lorraine.fr/pem_accueil.php

Innovation, Robotique et Santé : Assistance à la conduite de fauteuil roulant

Réseau Breizh Paralyse Cérébrale

9 décembre 2016

Rennes, France

<https://sites.google.com/site/innorobosante/>

Journées d'Etude annuelles du CDI

12-13 décembre 2016

Paris , France

<http://www.institutmc.org/index.php/journee-d-etude-annuelles-du-cdi-12-et-13-decembre-2016>

Janvier 2017

27^{ème} congrès de la Société française de Neurologie Pédiatrique

18-20 janvier 2017

Paris, France

<http://www.sfneuroped.fr/nos-missions/congres-sfnp/>

Mai 2017

Science Infos Paralyse Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
cdoumergue@lafondationmotrice.org

29th Annual EACD Meeting,

17-20 mai 2017

Amsterdam, pays bas

<http://www.eacd2017.org/>

Publications Abstracts de Congrès

2016 AAPM&R Annual Assembly Abstracts (American Academy Of Physical Medicine & Rehabilitation)

[*September 2016 Volume 8, Issue 9, Supplement, S151-S332*](#)

Abstracts of the European Academy of Childhood Disability 27th Annual Meeting, 27–30 May 2016, Copenhagen, Denmark

[*DMCN 2016 October Volume 58, Issue Supplement S6 Pages 1–66*](#)

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

Ontologie

Integrating semantic dimension into openEHR archetypes for the management of cerebral palsy electronic medical records.

Ellouze AS, Bouaziz R, Ghorbel H

J Biomed Inform. 2016 Aug 24. pii: S1532-0464(16)30100-9. doi: 10.1016/j.jbi.2016.08.018. [Epub ahead of print]

PURPOSE: Integrating semantic dimension into clinical archetypes is necessary once modeling medical records. First, it enables semantic interoperability and, it offers applying semantic activities on clinical data and provides a higher design quality of Electronic Medical Record (EMR) systems. However, to obtain these advantages, designers need to use archetypes that cover semantic features of clinical concepts involved in their specific applications. In fact, most of archetypes filed within open repositories are expressed in the Archetype Definition Language (ADL) which allows defining only the syntactic structure of clinical concepts weakening semantic activities on the EMR content in the semantic web environment. This paper focuses on the modeling of an EMR prototype for infants affected by Cerebral Palsy (CP), using the dual model approach and integrating semantic web technologies. Such a modeling provides a better delivery of quality of care and ensures semantic interoperability between all involved therapies' information systems.

METHODS: First, data to be documented are identified and collected from the involved therapies. Subsequently, data are analyzed and arranged into archetypes expressed in accordance of ADL. During this step, open archetype repositories are explored, in order to find the suitable archetypes. Then, ADL archetypes are transformed into archetypes expressed in OWL-DL (Ontology Web Language - Description Language). Finally, we construct an ontological source related to these archetypes enabling hence their annotation to facilitate data extraction and providing possibility to exercise semantic activities on such archetypes.

RESULTS: Semantic dimension integration into EMR modeled in accordance to the archetype approach. The feasibility of our solution is shown through the development of a prototype, baptized "CP-SMS", which ensures semantic exploitation of CP EMR. This prototype provides the following features: (i) creation of CP EMR instances and their checking by using a knowledge base which we have constructed by interviews with domain experts, (ii) translation of initially CP ADL archetypes into CP OWL-DL archetypes, (iii) creation of an ontological source which we can use to annotate obtained archetypes and (vi) enrichment and supply of the ontological source and integration of semantic relations by providing hence fueling the ontology with new concepts, ensuring consistency and eliminating ambiguity between concepts.

CONCLUSIONS: The degree of semantic interoperability that could be reached between EMR systems depends strongly on the quality of the used archetypes. Thus, the integration of semantic dimension in archetypes modeling process is crucial. By creating an ontological source and annotating archetypes, we create a supportive platform ensuring semantic interoperability between archetypes-based EMR-systems.

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DOI: 10.1016/j.jbi.2016.08.018

PMID: 27568295 [PubMed - as supplied by publisher]

+Prévalence- Incidence

Estimation of the number of children with cerebral palsy using nationwide health insurance claims data in Japan.

Toyokawa S, Maeda E, Kobayashi Y

Dev Med Child Neurol. 2016 Sep 20. doi: 10.1111/dmcn.13278. [Epub ahead of print]

AIM: Japan lacks a population-based registration system for cerebral palsy (CP), therefore the nationwide prevalence of CP is unknown. Our aim was to estimate the number of children with CP using the National Database of Health Insurance Claims and Specific Health Checkups of Japan, which has been recently developed by the government.

METHOD: Study participants were children and adolescents aged below 20 years, who had been assigned CP diagnosis codes more than once in claims issued between June 2012 and May 2013 from all health insurance schemes in Japan, except for Social Welfare and Elderly Health Insurance.

RESULTS: The number of participants with diagnosed CP was 44 381. The number of males with CP (25 237) was greater than the number of females (19 144). Peak CP prevalence per 1000 population was 2.39 at age 4 years, and this gradually declined with age. The prevalence of CP per 1000 population was 2.27 at age 5 to 9 years. The numbers of inpatients and outpatients with CP were 9126 (20.6%) and 35 255 (79.4%) respectively.

INTERPRETATION: Our estimation of CP prevalence per 1000 population at age 5 to 9 years lay in the higher range of figures from previous studies in Japan, and was close to figures reported by European countries.

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DOI: 10.1111/dmcn.13278

PMID: 27644438 [PubMed - as supplied by publisher]

+Facteurs de risque – Causes

Association between Cerebral Palsy or Death and Umbilical Cord Blood Magnesium Concentration.

Palatnik A, Rouse DJ, Stamilio DM, McPherson JA, Grobman WA

Am J Perinatol. 2015 Nov;32(13):1263-7. doi: 10.1055/s-0035-1554798. Epub 2015 Jun 9.

OBJECTIVE: This study aims to evaluate whether magnesium sulfate (MgSO₄) infusion at the time of delivery or magnesium cord blood concentration is associated with cerebral palsy (CP) or death diagnosed by the age of 2 years.

METHODS: Secondary analysis of data from a randomized trial of MgSO₄ versus placebo for prevention of CP or death among offspring of women with anticipated preterm delivery. This study cohort included singleton, nonanomalous fetuses, whose mothers received MgSO₄ as neuroprophylaxis. The primary outcomes were CP or death diagnosed by the age of 2 years.

RESULTS: A total of 936 neonates (93 with CP or death, 843 controls) were included in the analysis. Infants in the group with CP or death had MgSO₄ infusing at delivery at a similar frequency to that of controls (49 [52.7%] vs. 463 [54.9%], $p = 0.68$). Mean concentrations of cord blood magnesium, available for 596 neonates, also were not different between the two groups (2.7 ± 0.9 vs. 2.6 ± 0.9 mEq/L, $p = 0.66$, respectively). Multivariable analyses did not alter these findings.

CONCLUSION: Among the offspring of women exposed to MgSO₄, in utero, neither MgSO₄ infusion at the time of delivery nor magnesium cord blood concentration is associated with CP or death.

Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.

DOI: 10.1055/s-0035-1554798

PMID: 26058371 [PubMed - indexed for MEDLINE]

Clinical profile of children with cerebral palsy born term compared with late-and post-term: a retrospective cohort study.

Frank R, Garfinkle J, Oskoui M, Shevell MI

BJOG. 2016 Sep 5. doi: 10.1111/1471-0528.14240. [Epub ahead of print]

OBJECTIVE: To determine whether cerebral palsy (CP) risks factors, neurological subtype, severity and co-morbidities differ between early/full-term-born children with CP compared with those born late/post-term.

DESIGN: Retrospective cohort study.

SETTING: Children with CP born between 1998 and 2014, residing in Canada, and registered in the Canadian Cerebral Palsy Registry (CCPR) (n = 1691), a database with information from 15 participating centres across six Canadian provinces.

POPULATION: Children with CP from the CCPR born at 37 weeks of gestation and later (n = 802).

METHODS: The clinical profile of children with CP born at 37-40 weeks of gestation was compared with those born at 41 weeks and later using the Pearson chi-square test (or Fisher's exact test) for univariate analyses of categorical data. A P value <0.05 was considered significant a priori.

MAIN OUTCOME MEASURES: CP neurological subtype, Gross Motor Function Classification System (GMFCS) severity, risk factors and co-morbidities.

RESULTS: Neonatal encephalopathy was found in 23.9% of children with CP born early/full-term and in 33.6% of those born late/post-term (P = 0.026). Neonatal hyperbilirubinaemia was found in 10.2% of children born in the earlier period and in 2.6% of those born in the later period (P = 0.008). Apgar score at 5 minutes, but not 10 minutes, was significantly higher in the early/full-term group (9) compared with its late/post-term counterpart (7; P = 0.046). Rates of CP subtype, severity (GMFCS) and co-morbidities did not differ significantly between the two gestational periods.

CONCLUSIONS: In children with CP, neonatal encephalopathy was significantly less frequent and neonatal hyperbilirubinaemia was significantly more frequent in those born early/full-term compared with their later-born counterparts. However, clinical outcomes of CP were not significantly different between these two gestational epochs.

TWEETABLE ABSTRACT: Children with cerebral palsy born early/full-term have similar outcomes to those born late/post-term.

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PMID: 27592548 [PubMed - as supplied by publisher]

Cohort profile: cerebral palsy in the Norwegian and Danish birth cohorts (MOBD-CP).

Tollånes MC, Strandberg-Larsen K, Forthun I, Petersen TG, Moster D, Andersen AM, Stoltenberg C, Olsen J, Wilcox AJ *BMJ Open*. 2016 Sep 2;6(9):e012777. doi: 10.1136/bmjopen-2016-012777.

PURPOSE: The purpose of MOthers and BABies in Norway and Denmark cerebral palsy (MOBAND-CP) was to study CP aetiology in a prospective design.

PARTICIPANTS: MOBAND-CP is a cohort of more than 210 000 children, created as a collaboration between the world's two largest pregnancy cohorts-the Norwegian Mother and Child Cohort study (MoBa) and the Danish National Birth Cohort. MOBAND-CP includes maternal interview/questionnaire data collected during pregnancy and follow-up, plus linked information from national health registries.

FINDINGS TO DATE: Initial harmonisation of data from the 2 cohorts has created 140 variables for children and their mothers. In the MOBAND-CP cohort, 438 children with CP have been identified through record linkage with validated national registries, providing by far the largest such sample with prospectively collected detailed pregnancy data. Several studies investigating various hypotheses regarding CP aetiology are currently on-going.

FUTURE PLANS: Additional data can be harmonised as necessary to meet requirements of new projects. Biological specimens collected during pregnancy and at delivery are potentially available for assay, as are results from assays conducted on these specimens for other projects. The study size allows consideration of CP subtypes, which is rare in aetiological studies of CP. In addition, MOBAND-CP provides a platform within the context of a merged birth cohort of exceptional size that could, after appropriate permissions have been sought, be used for cohort and case-cohort studies of other relatively rare health conditions of infants and children.

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PMCID: PMC5020679

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High Presence of Extracellular Hemoglobin in the Periventricular White Matter Following Preterm Intraventricular Hemorrhage.

Ley D, Romantsik O, Vallius S, Sveinsdóttir K, Sveinsdóttir S, Agyemang AA, Baumgarten M, Mörgelin M, Lutay N, Bruschetti M, Holmqvist B, Gram M

Front Physiol. 2016 Aug 3;7:330. doi: 10.3389/fphys.2016.00330. eCollection 2016.

Severe cerebral intraventricular hemorrhage (IVH) in preterm infants continues to be a major clinical problem, occurring in about 15-20% of very preterm infants. In contrast to other brain lesions the incidence of IVH has not been reduced over the last decade, but actually slightly increased. Currently over 50% of surviving infants develop post-hemorrhagic ventricular dilatation and about 35% develop severe neurological impairment, mainly cerebral palsy and intellectual disability. To date there is no therapy available to prevent infants from developing either hydrocephalus or serious neurological disability. It is known that blood rapidly accumulates within the ventricles following IVH and this leads to disruption of normal anatomy and increased local pressure. However, the molecular mechanisms causing brain injury following IVH are incompletely understood. We propose that extracellular hemoglobin is central in the pathophysiology of periventricular white matter damage following IVH. Using a preterm rabbit pup model of IVH the distribution of extracellular hemoglobin was characterized at 72 h following hemorrhage. Evaluation of histology, histochemistry, hemoglobin immunolabeling and scanning electron microscopy revealed presence of extensive amounts of extracellular hemoglobin, i.e., not retained within erythrocytes, in the periventricular white matter, widely distributed throughout the brain. Furthermore, double immunolabeling together with the migration and differentiation markers polysialic acid neural cell adhesion molecule (PSA-NCAM) demonstrates that a significant proportion of the extracellular hemoglobin is distributed in areas of the periventricular white matter with high extracellular plasticity. In conclusion, these findings support that extracellular hemoglobin may contribute to the pathophysiological processes that cause irreversible damage to the immature brain following IVH.

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PMCID: PMC4971438

PMID: 27536248 [PubMed]

Immediate versus deferred delivery of the preterm baby with suspected fetal compromise for improving outcomes.

Stock SJ, Bricker L, Norman JE, West HM.

Cochrane Database Syst Rev. 2016 Jul 12;7:CD008968. doi: 10.1002/14651858.CD008968.pub3.

Update of Cochrane Database Syst Rev. 2012;(7):CD008968.

BACKGROUND: Immediate delivery of the preterm fetus with suspected compromise may decrease the risk of damage due to intrauterine hypoxia. However, it may also increase the risks of prematurity.

OBJECTIVES: To assess the effects of immediate versus deferred delivery of preterm babies with suspected fetal compromise on neonatal, maternal and long-term outcomes.

SEARCH METHODS: We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (30 April 2016) and reference lists of retrieved studies.

SELECTION CRITERIA: Randomised trials comparing a policy of immediate delivery with deferred delivery or expectant management in preterm fetuses with suspected in utero compromise. Quasi-randomised trials and trials employing a cluster-randomised design were eligible for inclusion but none were identified.

DATA COLLECTION AND ANALYSIS: Two review authors independently assessed trials for inclusion and risk of bias, extracted data and checked them for accuracy.

MAIN RESULTS: We included one trial of 548 women (588 babies) in the review. Women with pregnancies between 24 and 36 weeks' gestation took part. The study took place in 13 European countries, between 1993 and 2001. The difference in the median randomisation to delivery interval between immediate delivery and deferred delivery was four days (median: 0.9 (inter-quartile range (IQR) 0.4 to 1.3) days for immediate delivery, median: 4.9 (IQR 2.0 to 10.8) days in the delay group). There was no clear difference in the primary outcomes of extended perinatal mortality (risk ratio (RR) 1.17, 95% confidence interval (CI) 0.67 to 2.04, one trial, 587 babies, moderate-quality evidence) or the composite outcome of death or disability at or after two years of age (RR 1.22, 95% CI 0.85 to 1.75, one trial, 573 babies, moderate-quality evidence) with immediate delivery compared to deferred delivery. The results for these outcomes are consistent with both appreciable benefit and harm. More babies in the immediate delivery group were ventilated for more than 24 hours (RR 1.54, 95% CI 1.20 to 1.97, one trial, 576 babies). There were no differences between the immediate delivery and deferred delivery groups in any other infant mortality outcome (stillbirth, neonatal mortality, postneonatal mortality > 28 days to discharge), individual neonatal morbidity or markers of neonatal morbidity (cord pH less than 7.00, Apgar less than seven at five minutes, convulsions, interventricular haemorrhage or germinal matrix haemorrhage, necrotising enterocolitis and periventricular leucomalacia or ventriculomegaly). Some important outcomes were not reported, in particular infant admission to neonatal intensive care or special care facility, and respiratory distress syndrome. We were not able to calculate composite rates of serious neonatal morbidity, even though individual morbidities were reported, due to the risk of double counting infants with more than one morbidity. More children in the immediate delivery group had cerebral palsy at or after two years of age (RR 5.88, 95% CI 1.33 to 26.02, one trial, 507 children). There were, however, no differences in neurodevelopment impairment at or after two years (RR 1.72, 95% CI 0.86 to 3.41, one trial, 507 children), death at or after two years of age (RR 1.04, 95% CI 0.66 to 1.63, one trial, 573 children), or death or disability in childhood (six to 13 years of age) (RR 0.82, 95% CI 0.48 to 1.40, one trial, 302 children). More women in the immediate delivery group had caesarean delivery than in the deferred delivery group (RR 1.15, 95% CI 1.07 to 1.24, one trial, 547 women, high-quality evidence). Data were not available on any other maternal outcomes. There were several methodological weaknesses in the included study, and the level of evidence for the primary outcomes was graded high for caesarean section and moderate for extended perinatal mortality and death or disability at or after two years. The evidence was downgraded because the CIs for these outcomes were wide, and were consistent with both appreciable benefit and harm. Bias may have been introduced by several factors: blinding was not possible due to the nature of the intervention, data for childhood follow-up were incomplete due to attrition, and no adjustment was made in the analysis for the non-independence of babies from multiple pregnancies (39 out of 548 pregnancies). This study only included cases of suspected fetal compromise where there was uncertainty whether immediate delivery was indicated, thus results must be interpreted with caution.

AUTHORS' CONCLUSIONS: Currently there is insufficient evidence on the benefits and harms of immediate delivery compared with deferred delivery in cases of suspected fetal compromise at preterm gestations to make firm recommendations. There is a lack of trials addressing this question, and limitations of the one included trial means that caution must be used in interpreting and generalising the findings. More research is needed to guide clinical practice. Although the included trial is relatively large, it has insufficient power to detect differences in neonatal mortality. It did not report any maternal outcomes other than mode of delivery, or evaluate maternal satisfaction or economic outcomes. The applicability of the findings is limited by several factors: Women with a wide range of obstetric complications and gestational ages were included, and subgroup analysis is currently limited. Advances in Doppler assessment techniques may diagnose severe compromise more accurately and help make decisions about the timing of delivery. The potential benefits of deferring delivery for longer or shorter periods cannot be presumed. Where there is uncertainty whether or not to deliver a preterm fetus with suspected fetal compromise, there seems to be no benefit to immediate delivery. Deferring delivery until test results worsen or increasing gestation favours delivery may improve the outcomes for mother and baby. There is a need for high-quality randomised controlled trials comparing immediate and deferred delivery where there is suspected fetal compromise at preterm gestations to guide clinical practice. Future trials should report all important outcomes, and should be adequately powered to detect differences in maternal and neonatal morbidity and mortality.

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Impact of fetal growth restriction on neurodevelopmental outcome at 2 years for extremely preterm infants: a single institution study.

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El Ayoubi M, Patkai J, Bordarier C, Desfrere L, Moriette G, Jarreau PH, Zeitlin J
Dev Med Child Neurol. 2016 Aug 13. doi: 10.1111/dmcn.13218. [Epub ahead of print]

AIM: We evaluated the impact of fetal growth restriction on neurodevelopmental outcomes at 2 years corrected age for infants born before 27 weeks gestational age.

METHOD: Data on infants born before 27 weeks gestational age between 1999 and 2008 (n=463), admitted to a tertiary neonatal unit in Paris, were used to compare neurological outcomes at 2 years for infants with birthweight lower than the 10th centile and birthweight of at least the 10th centile, using intrauterine reference curves. Outcomes were cerebral palsy (CP) and the Brunet-Lézine assessment of cognitive development, which provides age-corrected overall and domain-specific (global and fine motor skills, language and social interaction) developmental quotients. Models were adjusted for perinatal and social factors.

RESULTS: Seventy-two percent of infants were discharged alive. Eighty-three percent (n=268) were evaluated at 2 years. Six percent had CP. Fetal growth restriction was not associated with the risk of CP. After adjustment, children with a birthweight lower than the 10th centile had a global developmental quotient 4.7 points lower than those with birthweight of at least the 10th centile ($p<0.001$); differences were greatest for fine motor and social skills (-4.7, $p=0.053$ and -7.3, $p<0.001$ respectively).

INTERPRETATION: In extremely preterm children, fetal growth restriction was associated with poorer neurodevelopmental outcomes at 2 years, but not with CP.

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Maternal Prepregnancy BMI and Risk of Cerebral Palsy in Offspring.

Forthun I, Wilcox AJ, Strandberg-Larsen K, Moster D, Nohr EA, Lie RT, Surén P, Tollånes MC
Pediatrics. 2016 Sep 8. [Epub ahead of print]

OBJECTIVES: To investigate the association between maternal pre-pregnancy BMI and risk of cerebral palsy (CP) in offspring.

METHODS: The study population consisted of 188 788 children in the Mothers and Babies in Norway and Denmark CP study, using data from 2 population-based, prospective birth cohorts: the Norwegian Mother and Child Cohort Study and the Danish National Birth Cohort. Prepregnancy BMI was classified as underweight (BMI <18.5), lower normal weight (BMI 18.5-22.9), upper normal weight (BMI 23.0-24.9), overweight (BMI 25.0-29.9), and obese (BMI ≥ 30). CP diagnoses were obtained from the national CP registries. Associations between maternal prepregnancy BMI and CP in offspring were investigated by using log-binomial regression models.

RESULTS: The 2 cohorts had 390 eligible cases of CP (2.1 per 1000 live-born children). Compared with mothers in the lower normal weight group, mothers in the upper normal group had a 40% excess risk of having a child with CP relative risk [RR], 1.35; 95% confidence interval [CI], 1.03-1.78). Excess risk was 60% (RR, 1.56; 95% CI, 1.21-2.01) for overweight mothers and 60% (RR, 1.55; 95% CI 1.11-2.18) for obese mothers. The risk of CP increased ~4% for each unit increase in BMI (RR, 1.04; 95% CI, 1.02-1.06). Estimates changed little with adjustment for mother's occupational status, age, and smoking habits.

CONCLUSIONS: Higher prepregnancy maternal BMI was associated with increased risk of CP in offspring.

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PMID: 27609826 [PubMed - as supplied by publisher]

Motor vehicle crashes during pregnancy and cerebral palsy during infancy: a longitudinal cohort analysis.

Redelmeier DA, Naqib F, Thiruchelvam D, R Barrett JF
BMJ Open. 2016 Sep 20;6(9):e011972. doi: 10.1136/bmjopen-2016-011972.

OBJECTIVES: To assess the incidence of cerebral palsy among children born to mothers who had their pregnancy complicated by a motor vehicle crash.

DESIGN: Retrospective longitudinal cohort analysis of children born from 1 April 2002 to 31 March 2012 in Ontario, Canada.

PARTICIPANTS: Cases defined as pregnancies complicated by a motor vehicle crash and controls as remaining pregnancies with no crash.

MAIN OUTCOME: Subsequent diagnosis of cerebral palsy by age 3 years.

RESULTS: A total of 1 325 660 newborns were analysed, of whom 7933 were involved in a motor vehicle crash during pregnancy. A total of 2328 were subsequently diagnosed with cerebral palsy, equal to an absolute risk of 1.8 per 1000 newborns. For the entire cohort, motor vehicle crashes correlated with a 29% increased risk of subsequent cerebral palsy that was not statistically significant (95% CI -16 to +110, $p=0.274$). The increased risk was only significant for those with preterm birth who showed an 89% increased risk of subsequent cerebral palsy associated with a motor vehicle crash (95% CI +7 to +266, $p=0.037$). No significant increase was apparent for those with a term delivery (95% CI -62 to +79, $p=0.510$). A propensity score-matched analysis of preterm births ($n=4384$) yielded a 138% increased relative risk of cerebral palsy associated with a motor vehicle crash (95% CI +27 to +349, $p=0.007$), equal to an absolute increase of about 10.9 additional cases per 1000 newborns (18.2 vs 7.3, $p=0.010$).

CONCLUSIONS: Motor vehicle crashes during pregnancy may be associated with an increased risk of cerebral palsy among the subgroup of cases with preterm birth. The increase highlights a specific role for traffic safety advice in prenatal care.

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No association of labor epidural analgesia with cerebral palsy in children.

Zhang L, Graham JH, Feng W, Lewis MW, Zhang X, Kirchner HL

J Anesth. 2016 Sep 2. [Epub ahead of print]

BACKGROUND: Some pregnant women avoid labor epidural analgesia because of their concerns about risk of cerebral palsy in children. Although it is believed that labor epidural does not contribute to cerebral palsy, to our knowledge no study has been published to specifically address this concern. We carried out a retrospective case-control study to investigate whether labor epidural analgesia is associated with cerebral palsy in children.

METHODS: This study used data that were collected and entered into the Geisinger electronic health records between January 2004 and January 2013. During this period, 20,929 children were born at Geisinger hospitals. Among them, 50 children were diagnosed with cerebral palsy, and 20 of those were born vaginally. Each of these 20 cerebral palsy children was matched with up to 5 non-cerebral palsy children born at the same hospitals in the same timeframe using propensity scoring methods. Analgesia was classified as epidural (including epidural or combined spinal and epidural) or non-epidural. Conditional logistic regression was used to compare the percentages of deliveries with each analgesia type between the cerebral palsy and non-cerebral palsy groups.

RESULTS: In the non-cerebral palsy group, the percentage of patients receiving labor epidural analgesia was 72 %, and in the cerebral palsy group the percentage was 45 %. There was no significant difference between non-cerebral palsy and cerebral palsy groups (odds ratio, 0.57; 95 % confidence interval, 0.14-2.24; $p = 0.42$).

CONCLUSION: We found no association between the use of labor epidural analgesia and the occurrence of cerebral palsy in children.

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PMID: 27590523 [PubMed - as supplied by publisher]

Pathophysiology of Birth Asphyxia.

Rainaldi MA, Perlman JM

Clin Perinatol. 2016 Sep;43(3):409-22. doi: 10.1016/j.clp.2016.04.002. Epub 2016 Jun 17.

The pathophysiology of asphyxia generally results from interruption of placental blood flow with resultant fetal hypoxia, hypercarbia, and acidosis. Circulatory and noncirculatory adaptive mechanisms exist that allow the fetus to cope with asphyxia and preserve vital organ function. With severe and/or prolonged insults, these compensatory mechanisms fail, resulting in hypoxic ischemic injury, leading to cell death via necrosis and apoptosis. Permanent

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brain injury is the most severe long-term consequence of perinatal asphyxia. The severity and location of injury is influenced by the mechanisms of injury, including degree and duration, as well as the developmental maturity of the brain.

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Perinatal Asphyxia from the Obstetric Standpoint: Diagnosis and Interventions.

Herrera CA, Silver RM

Clin Perinatol. 2016 Sep;43(3):423-38. doi: 10.1016/j.clp.2016.04.003. Epub 2016 Jun 17.

Perinatal asphyxia is a general term referring to neonatal encephalopathy related to events during birth. Asphyxia refers to a deprivation of oxygen for a duration sufficient to cause neurologic injury. Most cases of perinatal asphyxia are not necessarily caused by intrapartum events but rather associated with underlying chronic maternal or fetal conditions. Of intrapartum causes, obstetric emergencies are the most common and are not always preventable. Screening high-risk pregnancies with ultrasound, Doppler velocimetry, and antenatal testing can aid in identifying fetuses at risk. Interventions such as intrauterine resuscitation or operative delivery may decrease the risk of severe hypoxia from intrauterine insults and improve long-term neurologic outcomes.

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Psychiatric diagnoses, emotional-behavioral symptoms and functional outcomes in adolescents born preterm with very low birth weights.

Yang P, Chen YH, Yen CF, Chen HL.

Child Psychiatry Hum Dev. 2015 Jun;46(3):358-66. doi: 10.1007/s10578-014-0475-1.

Children born preterm with very low birth weight (VLBW; birth weight $\leq 1,500$ g) run risks of neurodevelopmental disorders. Studies of adolescent outcome are relatively few. In this follow-up survey, we examined the emotional-behavioral symptoms, psychiatric diagnoses and functional status in a geographically-based birth cohort of VLBW adolescents (average 13.4 years) as registered in a level III center of a recently developed Asian country. Psychiatric interviews were conducted. Parents were asked to fill out the Child Behavioral Checklist and the Current Status Survey. Results revealed that neonatal survival rate was 75.7% (112/148). In the follow-up, 26.2% of the adolescents required individualized educational plan; 52.5% were with at least one neuropsychiatric diagnosis (e.g. cerebral palsy 24.6%, intellectual disabilities 21.3%, attention deficit/hyperactivity disorder 19.7%), and 32.8% of the participants were disabled. Logistic regression found that neonatal sepsis and grade III/IV intraventricular hemorrhage were most predictive of a disabled status in adolescence.

DOI: 10.1007/s10578-014-0475-1

PMID: 24879118 [PubMed - indexed for MEDLINE]

Recommendations for clinical practice after neonatal arterial ischemic stroke: Clinical monitoring and early rehabilitation intervention.

Vuillerot C, Dinomais M, Marret S, Chabrier S, Debillon T

Ann Phys Rehabil Med. 2016 Sep;59S:e1. doi: 10.1016/j.rehab.2016.07.006.

OPINION/FEEDBACK: Neonatal arterial ischemic stroke (NAIS) affects one child in 6-17 100,000-birth term neonates, most of these children will keep long-term motor and cognitive impairment. In 2014, initiated by the French Center for Pediatric Stroke in association with the French Society of Neonatology, a steering committee was created to propose clinical guidelines after NAIS. From all the relevant questions, the importance is given to long-term outcomes after a NAIS with a need for a better description of motor and cognitive outcomes after a NAIS in order to propose a more consensual monitoring for these children to improve their management. Guidelines were proposed based on an extensive literature review and experts experience. About 30% of children after a NAIS will develop a unilateral cerebral palsy requiring a management by a team with expertise in physical medicine and rehabilitation. To quantify impairments, activity limitations and participation restrictions resulting from this NAIS, evaluations, with

reliable tools must be carried out systematically, early and repeated annually through adolescence. A multidisciplinary team with a longitudinal follow-up, in all the different developmental dimensions, must conduct these evaluations in term of motor skills, cognitive impairment, behavior, autonomy, quality of life, and participation. Consequences on family functioning need to be evaluate in order to help children and family coping with this event. A number of data on brain plasticity and effect of early interventions in association with preliminary results in children with cerebral palsy are very much in favor of early treatment. It remains now important to determine the intensity and what types of early intervention. The importance is given in all cases to a comprehensive care of the child and his/her family with the goal to prevent limitations in terms of activity and participation.

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Génétique

The importance of de novo mutations for pediatric neurological disease--It is not all in utero or birth trauma.

Erickson R

Mutat Res Rev Mutat Res. 2016 Jan-Mar;767:42-58. doi: 10.1016/j.mrrev.2015.12.002. Epub 2016 Jan 4.

The advent of next generation sequencing (NGS, which consists of massively parallel sequencing to perform TGS (total genome sequencing) or WES (whole exome sequencing)) has abundantly discovered many causative mutations in patients with pediatric neurological disease. A surprisingly high number of these are de novo mutations which have not been inherited from either parent. For epilepsy, autism spectrum disorders, and neuromotor disorders, including cerebral palsy, initial estimates put the frequency of causative de novo mutations at about 15% and about 10% of these are somatic. There are some shared mutated genes between these three classes of disease. Studies of copy number variation by comparative genomic hybridization (CGH) preceded the NGS approaches but they also detect de novo variation which is especially important for ASDs. There are interesting differences between the mutated genes detected by CGS and NGS. In summary, de novo mutations cause a very significant proportion of pediatric neurological disease.

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PMID: 27036065 [PubMed - indexed for MEDLINE]

Lésions - Prévention des lésions

Données fondamentales

IGF-1 in retinopathy of prematurity, a CNS neurovascular disease.

Liegl R, Löfqvist C, Hellström A, Smith LE

Early Hum Dev. 2016 Sep 17. pii: S0378-3782(16)30404-2. doi: 10.1016/j.earlhumdev.2016.09.008. [Epub ahead of print]

The retina is part of the central nervous system and both the retina as well as the brain can suffer from severe damage after very preterm birth. Retinopathy of prematurity is one of the major causes of blindness in these children and brain neuronal impairments including cognitive defects, cerebral palsy and intraventricular hemorrhage (IVH) are also complications of very preterm birth. Insulin-like growth factor 1 (IGF-1) acts to promote proliferation, maturation, growth and survival of neural cells. Low levels of circulating IGF-1 are associated with ROP and defects in the IGF-1 gene are associated with CNS disorders including learning deficits and brain growth restriction. Treatment of preterm infants with recombinant IGF-1 may potentially prevent ROP and CNS disorders. This review compares the role of IGF-1 in ROP and CNS disorders. A recent phase 2 study showed a positive effect of IGF-1 on the severity of IVH but no effect on ROP. A phase 3 trial is planned.

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Inhibition of Signal Transducer and Activator of Transcription 3 (STAT3) reduces neonatal hypoxic-ischaemic brain damage.

Hristova M, Rocha-Ferreira E, Fontana X, Thei L, Buckle R, Christou M, Hompoonsup S, Gostelow N, Raivich G, Peebles D

J Neurochem. 2016 Mar;136(5):981-94. doi: 10.1111/jnc.13490. Epub 2016 Jan 11.

Hypoxic-ischaemic encephalopathy is a leading cause of child death, with high mortality and morbidity, including cerebral palsy, epilepsy and cognitive disabilities. Hypoxia-ischaemia (HI) strongly up-regulates Signal Transducer and Activator of Transcription 3 (STAT3) in the immature brain. Our aim was to establish whether STAT3 up-regulation is associated with neonatal HI-brain damage and evaluate the phosphorylated STAT3-contribution from different cell types in eliciting damage. We subjected postnatal day seven mice to unilateral carotid artery ligation followed by 60 min hypoxia. Neuronal STAT3-deletion reduced cell death, tissue loss, microglial and astroglial activation in all brain regions. Astroglia-specific STAT3-deletion also reduced cell death, tissue loss and microglial activation, although not as strongly as the deletion in neurons. Systemic pre-insult STAT3-blockade at tyrosine 705 (Y705) with JAK2-inhibitor WP1066 reduced microglial and astroglial activation to a more moderate degree, but in a pattern similar to the one produced by the cell-specific deletions. Our results suggest that STAT3 is a crucial factor in neonatal HI-brain damage and its removal in neurons or astrocytes, and, to some extent, inhibition of its phosphorylation via JAK2-blockade reduces inflammation and tissue loss. Overall, the protective effects of STAT3 inactivation make it a possible target for a therapeutic strategy in neonatal HI. Current data show that neuronal and astroglial STAT3 molecules are involved in the pathways underlying cell death, tissue loss and gliosis following neonatal hypoxia-ischaemia, but differ with respect to the target of their effect. Y705-phosphorylation contributes to hypoxic-ischaemic histopathology. Protective effects of STAT3 inactivation make it a possible target for a therapeutic strategy in neonatal hypoxia-ischaemia.

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Motor Experience Reprograms Development of a Genetically-Altered Bilateral Corticospinal Motor Circuit.

Serradj N, Martin JH

PLoS One. 2016 Sep 27;11(9):e0163775. doi: 10.1371/journal.pone.0163775.

Evidence suggests that motor experience plays a role in shaping development of the corticospinal system and voluntary motor control, which is a key motor function of the system. Here we used a mouse model with conditional forebrain deletion of the gene for EphA4 (Emx1-Cre:EphA4tm2Kldr), which regulates development of the laterality of corticospinal tract (CST). We combined study of Emx1-Cre:EphA4tm2Kldr with unilateral forelimb constraint during development to expand our understanding of experience-dependent CST development from both basic and translational perspectives. This mouse develops dense ipsilateral CST projections, a bilateral motor cortex motor representation, and bilateral motor phenotypes. Together these phenotypes can be used as readouts of corticospinal system organization and function and the changes brought about by experience. The Emx1-Cre:EphA4tm2Kldr mouse shares features with the common developmental disorder cerebral palsy: bilateral voluntary motor impairments and bilateral CST miswiring. Emx1-Cre:EphA4tm2Kldr mice with typical motor experiences during development display the bilateral phenotype of "mirror" reaching, because of a strongly bilateral motor cortex motor representation and a bilateral CST. By contrast, Emx1-Cre:EphA4tm2Kldr mice that experienced unilateral forelimb constraint from P1 to P30 and tested at maturity had a more contralateral motor cortex motor representation in each hemisphere; more lateralized CST projections; and substantially more lateralized/independent reaching movements. Changes in CST organization and function in this model can be

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explained by reduced synaptic competition of the CST from the side without developmental forelimb motor experiences. Using this model we show that unilateral constraint largely abrogated the effects of the genetic mutation on CST projections and thus demonstrates how robust and persistent experience-dependent development can be for the establishment of corticospinal system connections and voluntary control. Further, our findings inform the mechanisms of and strategies for developing behavioral therapies to treat bilateral movement impairments and CST miswiring in cerebral palsy.

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mTOR pathway inhibition prevents neuroinflammation and neuronal death in a mouse model of cerebral palsy.

Srivastava IN, Shperdheja J, Baybis M, Ferguson T, Crino PB

Neurobiol Dis. 2016 Jan;**85**:144-54. doi: 10.1016/j.nbd.2015.10.001. Epub 2015 Oct 13. PubMed PMID: 26459113.

BACKGROUND AND PURPOSE: Mammalian target of rapamycin (mTOR) pathway signaling governs cellular responses to hypoxia and inflammation including induction of autophagy and cell survival. Cerebral palsy (CP) is a neurodevelopmental disorder linked to hypoxic and inflammatory brain injury however, a role for mTOR modulation in CP has not been investigated. We hypothesized that mTOR pathway inhibition would diminish inflammation and prevent neuronal death in a mouse model of CP.

METHODS: Mouse pups (P6) were subjected to hypoxia-ischemia and lipopolysaccharide-induced inflammation (HIL), a model of CP causing neuronal injury within the hippocampus, periventricular white matter, and neocortex. mTOR pathway inhibition was achieved with rapamycin (an mTOR inhibitor; 5mg/kg) or PF-4708671 (an inhibitor of the downstream p70S6kinase, S6K, 75 mg/kg) immediately following HIL, and then for 3 subsequent days. Phospho-activation of the mTOR effectors p70S6kinase and ribosomal S6 protein and expression of hypoxia inducible factor 1 (HIF-1 α) were assayed. Neuronal cell death was defined with Fluoro-Jade C (FJC) and autophagy was measured using Beclin-1 and LC3II expression. Iba-1 labeled, activated microglia were quantified.

RESULTS: Neuronal death, enhanced HIF-1 α expression, and numerous Iba-1 labeled, activated microglia were evident at 24 and 48 h following HIL. Basal mTOR signaling, as evidenced by phosphorylated-S6 and -S6K levels, was unchanged by HIL. Rapamycin or PF-4,708,671 treatment significantly reduced mTOR signaling, neuronal death, HIF-1 α expression, and microglial activation, coincident with enhanced expression of Beclin-1 and LC3II, markers of autophagy induction.

CONCLUSIONS: mTOR pathway inhibition prevented neuronal death and diminished neuroinflammation in this model of CP. Persistent mTOR signaling following HIL suggests a failure of autophagy induction, which may contribute to neuronal death in CP. These results suggest that mTOR signaling may be a novel therapeutic target to reduce neuronal cell death in CP.

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PMID: 26459113 [PubMed - indexed for MEDLINE]

Pathogenesis of cerebral palsy through the prism of immune regulation of nervous tissue homeostasis: literature review.

Lisovska N, Daribayev Z, Lisovskyy Y, Kussainova K, Austin L, Bulekbayeva S

Childs Nerv Syst. 2016 Sep 14. [Epub ahead of print]

BACKGROUND: The cerebral palsy is highly actual issue of pediatrics, causing significant neurological disability. Though the great progress in the neuroscience has been recently achieved, the pathogenesis of cerebral palsy is still poorly understood.

METHODS: In this work, we reviewed available experimental and clinical data concerning the role of immune cells in pathogenesis of cerebral palsy. Maintaining of homeostasis in nervous tissue and its transformation in case of periventricular leukomalacia were analyzed.

RESULTS: The reviewed data demonstrate involvement of immune regulatory cells in the formation of nervous tissue imbalance and chronicity of inborn brain damage. The supported opinion, that periventricular leukomalacia is not a static phenomenon, but developing process, encourages our optimism about the possibility of its correction.

CONCLUSIONS: The further studies of changes of the nervous and immune systems in cerebral palsy are needed to create fundamentally new directions of the specific therapy and individual schemes of rehabilitation.

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Données cliniques

Differential Morbidity in Preterm Small versus Appropriate for Gestational Age: Perhaps Unverifiable.

Marrs CC, Mendez-Figueroa H, Hammad IA, Chauhan SP

Am J Perinatol. 2015 Nov;32(13):1251-6. doi: 10.1055/s-0035-1552939. Epub 2015 May 29.

OBJECTIVE: The objective of this study was to determine the morbidity of preterm small for gestational age (SGA) infants compared with appropriate for GA (AGA).

STUDY DESIGN: This is a secondary analysis of the randomized trial evaluating magnesium sulfate for the prevention of cerebral palsy (CP). We compared outcomes of preterm (< 37 weeks) nonanomalous infants who were SGA (birth weight < 10% for GA) versus AGA (birth weight 10-89% for GA). We compared (1) the parent trial primary outcome, a composite of stillbirth, infant death by 1 year of age, or moderate to severe CP at 2 years of age and (2) composite neonatal morbidity (CNM).

RESULTS: Of the 1,948 infants who met inclusion criteria, 95% were AGA and 5% were SGA. The primary outcome was similar (10 and 15%, $p = 0.08$), as was the CNM (24 and 25%, $p = 0.89$). Sample size calculations indicate that detection of a one-third higher rate of CNM among SGA compared with AGA infants requires more than 93,900 preterm births; for a one-third difference in moderate to severe CP, more than 1.4 million infants.

CONCLUSION: Owing to the prohibitive sample size required, ascertaining a difference in sequela between preterm SGA and AGA infants is possibly unverifiable.

Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.

DOI: 10.1055/s-0035-1552939

PMID: 26023905 [PubMed - indexed for MEDLINE]

Localization of Basal Ganglia and Thalamic Damage in Dyskinetic Cerebral Palsy.

Aravamuthan BR, Waugh JL

Pediatr Neurol. 2016 Jan;54:11-21. doi: 10.1016/j.pediatrneurol.2015.10.005. Epub 2015 Oct 20.

BACKGROUND: Dyskinetic cerebral palsy affects 15%-20% of patients with cerebral palsy. Basal ganglia injury is associated with dyskinetic cerebral palsy, but the patterns of injury within the basal ganglia predisposing to dyskinetic cerebral palsy are unknown, making treatment difficult. For example, deep brain stimulation of the globus pallidus interna improves dystonia in only 40% of patients with dyskinetic cerebral palsy. Basal ganglia injury heterogeneity may explain this variability.

METHODS: To investigate this, we conducted a qualitative systematic review of basal ganglia and thalamic damage in dyskinetic cerebral palsy. Reviews and articles primarily addressing genetic or toxic causes of cerebral palsy were excluded yielding 22 studies (304 subjects).

RESULTS: Thirteen studies specified the involved basal ganglia nuclei (subthalamic nucleus, caudate, putamen, globus pallidus, or lentiform nuclei, comprised by the putamen and globus pallidus). Studies investigating the lentiform nuclei (without distinguishing between the putamen and globus pallidus) showed that all subjects (19 of 19) had lentiform nuclei damage. Studies simultaneously but independently investigating the putamen and globus pallidus also showed that all subjects (35 of 35) had lentiform nuclei damage (i.e., putamen or globus pallidus damage); this was followed in frequency by damage to the putamen alone (70 of 101, 69%), the subthalamic nucleus (17 of 25, 68%), the thalamus (88 of 142, 62%), the globus pallidus (7/35, 20%), and the caudate (6 of 47, 13%). Globus pallidus damage was almost always coincident with putaminal damage.

CONCLUSIONS: Noting consistent involvement of the lentiform nuclei in dyskinetic cerebral palsy, these results could suggest two groups of patients with dyskinetic cerebral palsy: those with putamen-predominant damage and

those with parolenticular damage involving both the putamen and the globus pallidus. Differentiating between these groups could help predict response to therapies such as deep brain stimulation.

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PMID: 26706479 [PubMed - indexed for MEDLINE]

Magnesium sulphate for fetal neuroprotection: benefits and challenges of a systematic knowledge translation project in Canada.

Teela KC, De Silva DA, Chapman K, Synnes AR, Sawchuck D, Basso M, Liston RM, von Dadelszen P, Magee LA; MAG-CP Collaborative Group.

BMC Pregnancy Childbirth. 2015 Dec 22;15:347. doi: 10.1186/s12884-015-0785-8.

BACKGROUND: Administration of magnesium sulphate (MgSO₄) to women with imminent preterm birth at <34 weeks is an evidence-based antenatal neuroprotective strategy to prevent cerebral palsy. Although a Society of Obstetricians and Gynaecologists of Canada (SOGC) national guideline with practice recommendations based on relevant clinical evidence exists, ongoing controversies about aspects of this treatment remain. Given this, we anticipated managed knowledge translation (KT) would be needed to facilitate uptake of the guidelines into practice. As part of the Canadian Institutes of Health Research (CIHR)-funded MAG-CP (MAGnesium sulphate to prevent Cerebral Palsy) project, we aimed to compare three KT methods designed to impact both individual health care providers and the organizational systems in which they work.

METHODS: The KT methods undertaken were an interactive online e-learning module available to all SOGC members, and at MAG-CP participating sites, on-site educational rounds and focus group discussions, and circulation of an anonymous 'Barriers and Facilitators' survey for the systematic identification of facilitators and barriers for uptake of practice change. We compared these strategies according to: (i) breadth of respondents reached; (ii) rates and richness of identified barriers, facilitators, and knowledge needed; and (iii) cost.

RESULTS: No individual KT method was superior to the others by all criteria, and in combination, they provided richer information than any individual method. The e-learning module reached the most diverse audience of health care providers, the site visits provided opportunity for iterative dialogue, and the survey was the least expensive. Although the site visits provided the most detailed information around individual and organizational barriers, the 'Barriers and Facilitators' survey provided more detail regarding social-level barriers. The facilitators identified varied by KT method. The type of knowledge needed was further defined by the e-learning module and surveys.

CONCLUSIONS: Our findings suggest that a multifaceted approach to KT is optimal for translating national obstetric guidelines into clinical practice. As audit and feedback are essential parts of the process by which evidence to practice gaps are closed, MAG-CP is continuing the iterative KT process described in this paper concurrent with tracking of MgSO₄ use for fetal neuroprotection and maternal and child outcomes until September 2015; results are anticipated in 2016.

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PMCID: PMC4688933

PMID: 26694323 [PubMed - indexed for MEDLINE]

Neonatal Encephalopathy: Update on Therapeutic Hypothermia and Other Novel Therapeutics.

McAdams RM, Juul SE

Clin Perinatol. 2016 Sep;43(3):485-500. doi: 10.1016/j.clp.2016.04.007. Epub 2016 Jun 22.

Neonatal encephalopathy (NE) is a major cause of neonatal mortality and morbidity. Therapeutic hypothermia (TH) is standard treatment for newborns at 36 weeks of gestation or greater with intrapartum hypoxia-related NE. Term and late preterm infants with moderate to severe encephalopathy show improved survival and neurodevelopmental outcomes at 18 months of age after TH. TH can increase survival without increasing major disability, rates of an IQ less than 70, or cerebral palsy. Neonates with severe NE remain at risk of death or severe neurodevelopmental impairment. This review discusses the evidence supporting TH for term or near term neonates with NE.

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PMID: 27524449 [PubMed - in process]

Science Infos Paralysie Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
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Perinatal neuroprotection update.

Jelin AC, Salmeen K, Gano D, Burd I, Thiet MP

F1000Res. 2016 Aug 9;5. pii: F1000 Faculty Rev-1939. doi: 10.12688/f1000research.8546.1. eCollection 2016.

Antepartum, intrapartum, and neonatal events can result in a spectrum of long-term neurological sequelae, including cerebral palsy, cognitive delay, schizophrenia, and autism spectrum disorders [1]. Advances in obstetrical and neonatal care have led to survival at earlier gestational ages and consequently increasing numbers of periviable infants who are at significant risk for long-term neurological deficits. Therefore, efforts to decrease and prevent cerebral insults attempt not only to decrease preterm delivery but also to improve neurological outcomes in infants delivered preterm. We recently published a comprehensive review addressing the impacts of magnesium sulfate, therapeutic hypothermia, delayed cord clamping, infections, and prevention of preterm delivery on the modification of neurological risk [2]. In this review, we will briefly provide updates to the aforementioned topics as well as an expansion on avoidance of toxin and infections, specifically the Zika virus.

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DOI: 10.12688/f1000research.8546.1

PMCID: PMC4979645

PMID: 27606053 [PubMed]

Surface-Based fMRI-Driven Diffusion Tractography in the Presence of Significant Brain Pathology: A Study Linking Structure and Function in Cerebral Palsy.

Reid LB, Cunnington R, Boyd RN, Rose SE

PLoS One. 2016 Aug 3;11(8):e0159540. doi: 10.1371/journal.pone.0159540. eCollection 2016.

Diffusion MRI (dMRI) tractography analyses are difficult to perform in the presence of brain pathology. Automated methods that rely on cortical parcellation for structural connectivity studies often fail, while manually defining regions is extremely time consuming and can introduce human error. Both methods also make assumptions about structure-function relationships that may not hold after cortical reorganisation. Seeding tractography with functional-MRI (fMRI) activation is an emerging method that reduces these confounds, but inherent smoothing of fMRI signal may result in the inclusion of irrelevant pathways. This paper describes a novel fMRI-seeded dMRI-analysis pipeline based on surface-meshes that reduces these issues and utilises machine-learning to generate task specific white matter pathways, minimising the requirement for manually-drawn ROIs. We directly compared this new strategy to a standard voxelwise fMRI-dMRI approach, by investigating correlations between clinical scores and dMRI metrics of thalamocortical and corticomotor tracts in 31 children with unilateral cerebral palsy. The surface-based approach successfully processed more participants (87%) than the voxel-based approach (65%), and provided significantly more-coherent tractography. Significant correlations between Dmri metrics and five clinical scores of function were found for the more superior regions of these tracts. These significant correlations were stronger and more frequently found with the surface-based method (15/20 investigated were significant; $R^2 = 0.43-0.73$) than the voxelwise analysis (2 sig. correlations; 0.38 & 0.49). More restricted fMRI signal, better-constrained tractography, and the novel track-classification method all appeared to contribute toward these differences.

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DOI: 10.1371/journal.pone.0159540

PMID: 27487011 [PubMed - in process]

The need for improved brain lesion segmentation techniques for children with cerebral palsy: A review.

Pagnozzi AM, Gal Y, Boyd RN, Fiori S, Fripp J, Rose S, Dowson N

Int J Dev Neurosci. 2015 Dec;47(Pt B):229-46. doi: 10.1016/j.ijdevneu.2015.08.004. Epub 2015 Sep 21.

Cerebral palsy (CP) describes a group of permanent disorders of posture and movement caused by disturbances in the developing brain. Accurate diagnosis and prognosis, in terms of motor type and severity, is difficult to obtain due to the heterogeneous appearance of brain injury and large anatomical distortions commonly observed in children with CP. There is a need to optimise treatment strategies for individual patients in order to lead to lifelong improvements in function and capabilities. Magnetic resonance imaging (MRI) is critical to non-invasively visualizing brain lesions, and is currently used to assist the diagnosis and qualitative classification in CP patients. Although such

qualitative approaches under-utilise available data, the quantification of MRIs is not automated and therefore not widely performed in clinical assessment. Automated brain lesion segmentation techniques are necessary to provide valid and reproducible quantifications of injury. Such techniques have been used to study other neurological disorders, however the technical challenges unique to CP mean that existing algorithms require modification to be sufficiently reliable, and therefore have not been widely applied to MRIs of children with CP. In this paper, we present a review of a subset of available brain injury segmentation approaches that could be applied to CP, including the detection of cortical malformations, white and grey matter lesions and ventricular enlargement. Following a discussion of strengths and weaknesses, we suggest areas of future research in applying segmentation techniques to the MRI of children with CP. Specifically, we identify atlas-based priors to be ineffective in regions of substantial malformations, instead propose relying on adaptive, spatially consistent algorithms, with fast initialisation mechanisms to provide additional robustness to injury. We also identify several cortical shape parameters that could be used to identify cortical injury, and shape modelling approaches to identify anatomical injury. The benefits of automatic segmentation in CP is important as it has the potential to elucidate the underlying relationship between image derived features and patient outcome, enabling better tailoring of therapy to individual patients.

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PMID: 26394278 [PubMed - indexed for MEDLINE]

The Role of the Neurointensive Care Nursery for Neonatal Encephalopathy.

Glass HC, Rowitch DH

Clin Perinatol. 2016 Sep;43(3):547-57. doi: 10.1016/j.clp.2016.04.011.

Neonatal encephalopathy due to intrapartum events is estimated at 1 to 2 per 1000 live births in high-income countries. Outcomes have improved over the past decade due to implementation of therapeutic hypothermia, the only clinically available neuroprotective strategy for hypoxic-ischemic encephalopathy. Neonatal encephalopathy is the most common condition treated within a neonatal neurocritical care unit. Neonates with encephalopathy benefit from a neurocritical care approach due to prevention of secondary brain injury through attention to basic physiology, earlier recognition and treatment of neurologic complications, consistent management using guidelines and protocols, and use of optimized teams at dedicated referral centers.

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PMID: 27524453 [PubMed - in process]

Using a novel laminar flow unit provided effective total body hypothermia for neonatal hypoxic encephalopathy.

Perez JM, Golombek SG, Alpan G, Sola A

Acta Paediatr. 2015 Nov;104(11):e483-8. doi: 10.1111/apa.13109. Epub 2015 Aug 17.

AIM: This was a clinical observational trial on a laminar flow device that provides total body hypothermia for infants with hypoxic ischaemic encephalopathy (HIE).

METHODS: We enrolled infants born at up to 35 weeks of gestation, who presented with HIE within six hours of birth. Total body cooling was achieved using the neonatal laminar flow unit for 72 hours, with continuous rectal temperature servo control, isolation and humidification. Outcome measures were cerebral palsy, a Bayley II Mental Development Index score <70, hearing loss or blindness. We compared findings with previously published studies.

RESULTS: We included 26 newborn infants (69% male) with a birthweight of 3.341 ± 1658 g and gestational age of 38.2 ± 3.2 weeks. The majority (62.6%) had a Sarnat HIE score of three and 38.4% had a score of two. Total body cooling (33-34°C) was achieved in 70 minutes and maintained with servo control, showing very little variability until rewarming. At 18-24 months of age, two of the 18 survivors were diagnosed with cerebral palsy and one was diagnosed with impaired hearing.

CONCLUSION: The laminar flow unit proved effective in maintaining moderate total body hypothermia under well-controlled conditions, and our results were very similar to other studies.

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PMID: 26148138 [PubMed - indexed for MEDLINE]

Détection – Diagnostic

+Données cliniques

De Novo Cerebral Palsy Diagnosis in 9-Year-Old Soccer Player Presenting With Knee Pain.

Ouellet J, Jevremovic T.

Clin J Sport Med. 2016 Jan;26(1):e1-2. doi: 10.1097/JSM.000000000000189.

A 9-year-old boy presented to our outpatient specialized sport and exercise medicine clinic complaining of a subacute onset of unilateral knee pain, after an increased level of soccer training. His knee examination was unremarkable. However, he demonstrated significant tenderness on palpation of his ipsilateral hip flexor and adductor tendons. Abnormalities in muscle tone and difficulty in relaxing and resisting the examiner properly were noted and lead to a complete neurological examination. It demonstrated multiple abnormalities such as increased tone and deep tendon reflexes, greater in lower than upper extremities, and abnormal patterning. A mild form of spastic diplegia was suspected and the patient was referred to a pediatric neurologist who confirmed our initial diagnosis. This case draws attention to the importance of maintaining a high level of suspicion for milder forms of diseases that can go unnoticed for years.

DOI: 10.1097/JSM.000000000000189

PMID: 25831409 [PubMed - indexed for MEDLINE]

Maturation of Sensori-Motor Functional Responses in the Preterm Brain.

Allievi AG, Arichi T, Tusor N, Kimpton J, Arulkumaran S, Counsell SJ, Edwards AD, Burdet E

Cereb Cortex. 2016 Jan;26(1):402-13. doi: 10.1093/cercor/bhv203. Epub 2015 Oct 21.

Preterm birth engenders an increased risk of conditions like cerebral palsy and therefore this time may be crucial for the brain's developing sensori-motor system. However, little is known about how cortical sensori-motor function matures at this time, whether development is influenced by experience, and about its role in spontaneous motor behavior. We aimed to systematically characterize spatial and temporal maturation of sensori-motor functional brain activity across this period using functional MRI and a custom-made robotic stimulation device. We studied 57 infants aged from 30 + 2 to 43 + 2 weeks postmenstrual age. Following both induced and spontaneous right wrist movements, we saw consistent positive blood oxygen level-dependent functional responses in the contralateral (left) primary somatosensory and motor cortices. In addition, we saw a maturational trend toward faster, higher amplitude, and more spatially dispersed functional responses; and increasing integration of the ipsilateral hemisphere and sensori-motor associative areas. We also found that interhemispheric functional connectivity was significantly related to ex-utero exposure, suggesting the influence of experience-dependent mechanisms. At term equivalent age, we saw a decrease in both response amplitude and interhemispheric functional connectivity, and an increase in spatial specificity, culminating in the establishment of a sensori-motor functional response similar to that seen in adults.

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PMCID: PMC4677983

PMID: 26491066 [PubMed - indexed for MEDLINE]

Motor trajectories from birth to 5 years of children born at less than 30 weeks' gestation: early predictors and functional implications. Protocol for a prospective cohort study.

Spittle AJ, McGinley JL, Thompson D, Clark R, FitzGerald TL, Mentiplay BF, Lee KJ, Olsen JE, Burnett A, Treyvaud K, Josev E, Alexander B, Kelly CE, Doyle LW, Anderson PJ, Cheong JL

J Physiother. 2016 Aug 5. pii: S1836-9553(16)30038-8. doi: 10.1016/j.jphys.2016.07.002. [Epub ahead of print]

INTRODUCTION: Motor impairments are one of the most frequently reported adverse neurodevelopmental consequences in children born < 30 weeks' gestation. Up to 15% of children born at < 30 weeks have cerebral palsy

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and an additional 50% have mild to severe motor impairment at school age. The first 5 years of life are critical for the development of fundamental motor skills. These skills form the basis for more complex skills that are required to competently and confidently participate in schooling, sporting and recreational activities. In children born at < 30 weeks' gestation, the trajectory of motor development from birth to 5 years is not fully understood. The neural alterations that underpin motor impairments in these children are also unclear. It is essential to determine if early clinical evaluations and neuroimaging biomarkers can predict later motor impairment and associated functional problems at 5 years of age. This will help to identify children who will benefit the most from early intervention and improve functional outcomes at school age.

RESEARCH AIMS: The primary aim of this study is to compare the prevalence of motor impairment from birth to 5 years of age between children born at < 30 weeks and term-born controls, and to determine whether persistent abnormal motor assessments in the newborn period in those born at < 30 weeks predict abnormal motor functioning at 5 years of age. Secondary aims for children born at < 30 weeks and term-born children are: 1) to determine whether novel early magnetic resonance imaging-based structural or functional biomarkers that can predict motor impairments at 5 years are detectable in the neonatal period; 2) to investigate the association between motor impairments and concurrent deficits in body structure and function at 5 years of age; and 3) to explore how motor impairments at 5 years (including abnormalities of gait, postural control and strength) are associated with concurrent functional outcomes, including physical activity, cognitive ability, learning ability, and behavioural and emotional problems.

DESIGN: Prospective longitudinal cohort study.

PARTICIPANTS AND SETTING: 150 preterm children (born at < 30 weeks' gestation) and 151 term-born children (born at > 36 completed weeks' gestation and weighing > 2499g) admitted to the Royal Women's Hospital, Melbourne, were recruited at birth and will be invited to participate in a 5-year follow-up study.

PROCEDURE: This study will examine previously collected data (from birth to 2 years) that comprise detailed motor assessments, and structural and functional brain MRI images. At 5 years, preterm and term, children will be examined using comprehensive motor assessments, including: the Movement Assessment Battery for Children (2nd edition) and measures of gait function through spatiotemporal (assessed with the GAITRite® Walkway) and dynamic postural control (assessed with Microsoft Kinect) variables; and hand grip strength (assessed with a dynamometer); and measures of physical activity (assessed using accelerometry), cognitive development (assessed with Wechsler Preschool and Primary Scale of Intelligence), and emotional and behavioural status (assessed with the Strengths and Difficulties Questionnaire and the Developmental and Wellbeing Assessment). At the 5-year assessment, parents/caregivers will be asked to complete questionnaires on demographics, physical activity, activities of daily living, behaviour, additional therapy (eg, physiotherapy and occupational therapy), and motor function (assessed with Pediatric Evaluation of Disability Inventory, Pediatric Quality of Life Questionnaire, the Little Developmental Coordination Questionnaire and an activity diary).

ANALYSIS: For the primary aim, the prevalence of motor impairment from birth to 5 years will be compared between children born at < 30 weeks and at term, using the proportion of children classified as abnormal at each of the time points (term age, 1, 2 and 5 years). Persistent motor impairments during the neonatal period will be assessed as a predictor of severity of motor impairment at 5 years of age in children born < 30 weeks using linear regression. Models will be fitted using generalised estimating equations to allow for the clustering of multiple births. Analysis will be repeated with adjustment for predictors of motor outcome, including additional therapy, sex, brain injury and chronic lung disease.

DISCUSSION/SIGNIFICANCE: Understanding the developmental precursors of motor impairment in children born before 30 weeks is essential for limiting disruption to skill development, and potential secondary impacts on physical activity, participation, academic achievement, self-esteem and associated outcomes (such as obesity, poor physical fitness and social isolation). An improved understanding of motor skill development will enable targeting of interventions and streamlining of services to children at highest risk of motor impairments.

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[Neonatal eucapnic pH at birth: Application in a cohort of 5392 neonates].[Article in French]

Racinet C, Peresse JF, Richalet G, Corne C, Ouellet P

Science Infos Paralysie Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
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To apply a newly concept of neonatal eucapnic pH at birth [pH euc (n)] and compare its contribution towards conventional criteria of severe metabolic acidosis.

METHODS: Analysis of a cohort of 5392 neonates from 2010 to 2014 in a level 1 maternity. clinical data (birth weight, gestational age, mode of delivery, APGAR score) were collected from archived files. Biological data were collected from umbilical cord blood, consisting of pH, PCO₂, Base deficit, lactate. Eucapnic pH and eucapnic base deficit were calculated from pH and PCO₂ with the Henderson-Hasselbalch equation applied in the Charles-Racinet diagram and/or with an Excel spreadsheet.

RESULTS: Data set the prevalence of neonatal acidemia < 7.00 to 0.62 %. The current cohort shows 32 cases of severe neonatal metabolic acidosis according to ACOG-AAP (2014) criteria and 26/29 cases according to McLennan (2015) criteria, of which 80 % were born by cesarean section or instrumental delivery. In 55 % of cases, calculated eucapnic pH at birth did not confirm the severity of metabolic acidosis based on a threshold set at 7.11. Five cases were transferred in neonatology only on clinical considerations of poor neonatal adaptation but not on biological consideration (pH euc < 7.11 was equally distributed between transferred and non-transferred neonates, P=0.76; the same distribution was observed with the pH, P=0.20) and followed normal outcome.

DISCUSSION AND CONCLUSION: The pH determination provides information only on the degree of acidemia and not on respiratory and/or metabolic components. Moreover, hypercapnia always present at birth is not included in the instructions to determine a metabolic acidosis (The American College of Obstetricians and Gynecologists, 2014; MacLennan et al., 2015). The new concept of neonatal eucapnic pH at birth accounts for only the metabolic component. We feel it should fine tune indications for cerebral hypothermia and thus improve its effectiveness. From a medicolegal perspective, for cases of cerebral palsy, it often allows to refute metabolic acidosis in perpartum events, often wrongfully being linked to generate cerebral injuries.

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Plasma Tumor Necrosis Factor-alpha (TNF- α) Levels Correlate with Disease Severity in Spastic Diplegia, Triplegia, and Quadriplegia in Children with Cerebral Palsy.

Wu J, Li X

Med Sci Monit. 2015 Dec 11;21:3868-74.

BACKGROUND Inflammatory responses in utero and in neonates have been involved in the development of white matter lesions. This study aimed to investigate the role of tumor necrosis factor-alpha (TNF- α) in spastic cerebral palsy.

MATERIAL AND METHODS Plasma TNF- α was measured by ELISA in 54 children with spastic cerebral palsy and 28 aged-matched controls. Both groups were split into age subgroups (1-3 vs. 4-12). Gross motor function and activities of daily living were assessed on enrollment and after 6 months of rehabilitation.

RESULTS TNF- α was higher in patients with cerebral palsy than in controls in young (P<0.001) and older subjects (P<0.001). TNF- α levels were comparable in both control subgroups (P=0.819). Younger patients with cerebral palsy had significantly higher TNF- α levels compared with older ones (P<0.001). Pre-rehabilitation TNF- α levels correlated with improvements in activities of daily living after rehabilitation (P<0.001).

CONCLUSIONS Children with cerebral palsy showed higher plasma levels of TNF- α than controls. In addition, pre-treatment TNF- α levels were correlated with the improvements after rehabilitation therapy.

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PMCID: PMC4678922

PMID: 26656070 [PubMed - indexed for MEDLINE]

Somatic stimulation causes frontoparietal cortical changes in neonates: a functional near-infrared spectroscopy study.

Kashou NH, Dar IA, Hasenstab KA, Nahhas RW, Jadcherla SR

Neurophotonics. 2017 Jan;4(1):011004. doi: 10.1117/1.NPh.4.1.011004. Epub 2016 Aug 17.

Palmar and plantar grasp are the foremost primitive neonatal reflexes and functions. Persistence of these reflexes in infancy is a sign of evolving cerebral palsy. Our aims were to establish measurement feasibility in a clinical setting and to characterize changes in oxyhemoglobin (HbO) and deoxyhemoglobin (HbD) concentration in the bilateral frontoparietal cortex in unsedated neonates at the crib-side using functional near-infrared spectroscopy (fNIRS). We hypothesized that bilateral concentration changes will occur upon somatic central and peripheral somatic stimulation. Thirteen preterm neonates (five males) underwent time 1, and six (two males) returned for time 2 (mean [Formula: see text] and 47.0 weeks, respectively). Signals from a total of 162 somatic stimuli responses were measured. Response amplitude, duration, and latency were log-transformed and compared between palmar, plantar, and oromotor stimuli using linear mixed models, adjusted for cap, electroencephalogram abnormality, time (1 versus 2), and Sarnat score, if necessary. The oromotor stimulus resulted in a 50% greater response than the palmar or plantar stimuli for HbO left and right hemisphere duration ([Formula: see text]). There were no other statistically significant differences between stimuli for any other outcome ([Formula: see text]). Utilizing fNIRS in conjunction with occupational and physical therapy maneuvers is efficacious to study modifiable and restorative neurophysiological mechanisms.

DOI: 10.1117/1.NPh.4.1.011004

PMCID: PMC4981749 [Available on 2017-08-17]

PMID: 27570791 [PubMed]

Volumetric Magnetic Resonance Imaging Study of Brain and Cerebellum in Children with Cerebral Palsy.

Kułał P, Maciorkowska , Gościł 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.

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DOI: 10.1155/2016/5961928

PMCID: PMC4989055

PMID: 27579318 [PubMed - in process]

Motricité - Mobilité – Posture

A Nonlinear Model for Mouse Pointing Task Movement Time Analysis Based on Both System and Human Effects.

Almanji A, Payne AR, Amor R, Davies TC.

IEEE Trans Neural Syst Rehabil Eng. 2015 Nov;23(6):1003-11. doi: 10.1109/TNSRE.2014.2377692. Epub 2014 Dec 18.

This paper provides a detailed model for analyzing movement time performance during rapid goal-directed point-and-click motions with a computer mouse. Twelve typically developed individuals and eleven youths with cerebral palsy conducted point and click computer tasks from which the model was developed. The proposed model is nonlinear and based on both system (target width and movement amplitude) and human effects (erroneous clicks, number of submovements, number of slip-offs, curvature index, and average speed). To ensure successful targeting by youths with cerebral palsy, the index of difficulty was limited to a range of 1.58 - 3.0 bits. For consistency, the same range was used with both groups. The most significant contributing human effect to movement time was

found to be the curvature index for both typically developed individuals and individuals with cerebral palsy. This model will assist in algorithm development to improve cursor speed and accuracy for youths with cerebral palsy.

DOI: 10.1109/TNSRE.2014.2377692

PMID: 25532208 [PubMed - indexed for MEDLINE]

Bimanual Capacity of Children With Cerebral Palsy: Intra- and Interrater Reliability of a Revised Edition of the Bimanual Fine Motor Function Classification.

Elvrum AG, Beckung E, Sæther R, Lydersen S, Vik T, Himmelmann K

Phys Occup Ther Pediatr. 2016 Aug 26:1-12. [Epub ahead of print]

AIMS: To develop a revised edition of the Bimanual Fine Motor Function (BFMF 2), as a classification of fine motor capacity in children with cerebral palsy (CP), and establish intra- and interrater reliability of this edition.

METHODS: The content of the original BFMF was discussed by an expert panel, resulting in a revised edition comprising the original description of the classification levels, but in addition including figures with specific explanatory text. Four professionals classified fine motor function of 79 children (3-17 years; 45 boys) who represented all subtypes of CP and Manual Ability Classification levels (I-V). Intra- and inter-rater reliability was assessed using overall intra-class correlation coefficient (ICC), and Cohen's quadratic weighted kappa.

RESULTS: The overall ICC was 0.86. Cohen's weighted kappa indicated high intra-rater (κ_w : >0.90) and inter-rater (κ_w : >0.85) reliability.

CONCLUSIONS: The revised BFMF 2 had high intra- and interrater reliability. The classification levels could be determined from short video recordings (<5 minutes), using the figures and precise descriptions of the fine motor function levels included in the BFMF 2. Thus, the BFMF 2 may be a feasible and useful classification of fine motor capacity both in research and in clinical practice.

DOI: 10.1080/01942638.2016.1185507

PMID: 27563732 [PubMed - as supplied by publisher]

Construct validity and responsiveness of Movakic: An instrument for the evaluation of motor abilities in children with severe multiple disabilities.

Mensch SM, Echte MA, Evenhuis HM, Rameckers EA

Res Dev Disabil. 2016 Sep 11;59:194-201. doi: 10.1016/j.ridd.2016.08.012. [Epub ahead of print]

Movakic is a newly developed instrument for measurement of motor abilities in children with severe multiple disabilities, with a satisfactory feasibility and content validity and good inter-observer and test-retest reliability. The objective of this study was to investigate its construct validity and responsiveness to change. Sixty children with severe multiple disabilities (mean age 7.7 years, range 2-16) were measured using Movakic six times during 18 months. Construct validity was assessed by correlating Movakic scores with expert judgment. In order to assess responsiveness, scores during 3-months intervals were compared (mean score-changes and intraclass correlations) during which some children experienced meaningful events influencing motor abilities and during which others experienced no such event. Forty-five percent of children had a lower cognitive development level than 6-month, 52% had Gross Motor Function Classification System level V and 37% had level IV. For 27 children all measurements were completed, six children dropped out. Construct validity was good ($r=0.50-0.71$). Responsiveness was demonstrated by significantly larger score changes after events than when such events did not occur. Movakic is a valid instrument for measuring motor abilities in children with severe multiple disabilities. Results suggest responsiveness to change in motor abilities after meaningful events.

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DOI: 10.1016/j.ridd.2016.08.012

PMID: 27627682 [PubMed - as supplied by publisher]

Correlation between the gross motor performance measurement and pediatric balance scale with respect to movement disorder in children with cerebral palsy.

Kwon HY, Ahn SY

J Phys Ther Sci. 2016 Aug;28(8):2279-83. doi: 10.1589/jpts.28.2279. Epub 2016 Aug 31.

Purpose] To determine whether the Gross Motor Performance Measurement is useful in predicting the future score of the Pediatric Balance Scale, this study examined the correlation between the 2 measurement tools with respect to movement disorder in children with cerebral palsy.

[Subjects and Methods] A total of 38 study subjects with cerebral palsy were divided into 3 groups (spastic, dyskinetic, and ataxic) by means of systematic proportional stratified sampling in accordance with the characteristics of their movement disorders.

[Results] The spastic Pediatric Balance Scale had an intermediate level of positive correlation with dissociated movement ($r=0.411$), alignment ($r=0.518$), and weight shift ($r=0.461$). The dyskinetic Pediatric Balance Scale had a strong positive correlation with dissociated movement ($r=0.905$), coordination ($r=0.882$), alignment ($r=0.930$), and stability ($r=0.924$). The ataxic Pediatric Balance Scale had an intermediate level of positive correlation with the overall Gross Motor Performance Measurement ($r=0.636$), and a strong positive correlation with dissociated movement ($r=0.866$), coordination ($r=0.871$) and stability ($r=0.984$).

[Conclusion] Gross Motor Performance Measurement is important in evaluating the quality of movement, and can be considered an excellent supplementary tool in predicting functional balance.

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DOI: 10.1589/jpts.28.2279

PMCID: PMC5011578

PMID: 27630414 [PubMed]

Distinction between pathological and functional co-activation during active upper limb movements in hemiparetic children.

Sarcher A, Raison M, Leboeuf F, Perrouin-Verbe B, Brochard S, Gross R

Ann Phys Rehabil Med. 2016 Sep;59S:e121. doi: 10.1016/j.rehab.2016.07.273.

OBJECTIVE: Children with spastic unilateral cerebral palsy (SUCP) have an involved upper limb (IUL) restricted in active range of motion and in velocity when performing elbow extension, due to a combination of muscle impairments. One of them is excessive muscle co-activation (CA). CA usually has a functional role, particularly in joint stabilization. The aim of this study is to identify when pathological CA occurs during active elbow extension of the IUL to highlight its impact on movement restriction and to discriminate impaired muscles.

MATERIAL/PATIENTS AND METHODS: Thirteen typically developing (TD) children and 13 children with SUCP performed active elbow extension/flexions at 3 externally paced frequencies. Elbow angle and velocity were computed using a subject-specific model tracking the position of 29 upper limb markers. With these data, the extension movement was decomposed into the Extension Acceleration Phase (EAP) (velocity increase) and the Extension Deceleration Phase (EDP) (velocity decrease). The percentage of CA for the brachioradialis (BR)/triceps and biceps/triceps couples for each phase was extracted from the surface electromyographic signals. Statistical analysis was conducted using linear mixed effects models.

RESULTS: During the EAP, excessive and positive frequency-dependent CA was found in the SUCP group, whereas CA in the TD group was low and invariant. These results point to pathological CA in the SUCP group, probably linked to restricted velocity. During the EDP, only excessive BR/triceps CA was found in the SUCP group. CA was positive frequency-dependent in both groups. These results point to mostly functional CA, for joint stabilization at the end of the movement. However, BR seems to stand out in its possible involvement in extension active range of motion restriction.

DISCUSSION-CONCLUSION: This study provides insight into pathological CA in children with SUCP. Perspectives include individual clinical interpretation of the results, to assist in each child's therapeutic decision.

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Energy expenditure during standing in children with cerebral palsy: A brief report1.

Saxena S, Kumaran S, Rao BK

J Pediatr Rehabil Med. 2016 Sep 2;9(3):241-5. doi: 10.3233/PRM-160386.

PURPOSE: The aim of the study was to estimate the energy expenditure (EE) during a quiet standing task in children with bilateral spastic CP (BSCP) in comparison with typically developing (TD) children, using gas analyzer.

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METHODS: The study was an observational cross-sectional study of children with BSCP (Gross Motor Function Classification System [GMFCS] levels II and III; n = 30; 10 males, 20 females; mean weight 27.46 kgs; mean age 10 years) and TD children (n = 30; 16 males, 14 females; mean weight 25.35 kgs; mean age 9 years, 9 months). The energy expenditure during quiet standing task was measured by using Cosmed K4b2 gas analyzer and expressed in terms of peak oxygen consumption (VO₂ max, ml/kg body weight/min).

RESULTS: Children with BSCP expended 1.4 times higher energy during standing than TD children (p < 0.0001).

CONCLUSION: We identified that standing puts an additional energy demand in ambulant children with BSCP. Findings suggest that both dependant and independent ambulating children with BSCP might need to exert more effort to maintain a static standing position. Therefore, clinicians must evaluate standing position for balance control and energy expenditure to evaluate the efficiency of physical therapy and rehabilitation.

DOI: 10.3233/PRM-160386

PMID: 27612085 [PubMed - in process]

Everyday movement and use of the arms: Relationship in children with hemiparesis differs from adults.

Sokal B, Uswatte G, Vogtle L, Byrom E, Barman J

J Pediatr Rehabil Med. 2015;8(3):197-206. doi: 10.3233/PRM-150334.

PURPOSE: In adults with hemiparesis amount of movement of the more-affected arm is related to its amount of use in daily life. In children, little is known about everyday arm use. This report examines the relationships between everyday movement of the more-affected arm and its (a) everyday use and (b) motor capacity in children with hemiparesis.

METHODS: Participants were 28 children with a wide range of upper-extremity hemiparesis subsequent to cerebral palsy due to pre- or peri-natal stroke. Everyday movement of the more-affected arm was assessed by putting accelerometers on the children's forearms for three days. Everyday use of that arm and its motor capacity were assessed with the Pediatric Motor Activity Log-Revised and Pediatric Arm Function Test, respectively.

RESULTS: Intensity of everyday movement of the more-affected arm was correlated with its motor capacity (rs ≥ 0.52, ps ≤ 0.003). However, everyday movement of that arm was not correlated with its everyday use (rs ≤ 0.30, ps ≥ 0.126).

CONCLUSIONS: In children with upper-extremity hemiparesis who meet the study intake criteria amount of movement of the more-affected arm in daily life is not related to its amount to use, suggesting that children differ from adults in this respect.

DOI: 10.3233/PRM-150334

PMID: 26410062 [PubMed - indexed for MEDLINE]

Gait analysis: clinical facts.

Baker R, Esquenazi A, Benedetti MG, Desloovere K.

Eur J Phys Rehabil Med. 2016 Aug;52(4):560-74.

Gait analysis is a well-established tool for the quantitative assessment of gait disturbances providing functional diagnosis, assessment for treatment planning, and monitoring of disease progress. There is a large volume of literature on the research use of gait analysis, but evidence on its clinical routine use supports a favorable cost-benefit ratio in a limited number of conditions. Initially gait analysis was introduced to clinical practice to improve the management of children with cerebral palsy. However, there is good evidence to extend its use to patients with various upper motor neuron diseases, and to lower limb amputation. Thereby, the methodology for properly conducting and interpreting the exam is of paramount relevance. Appropriateness of gait analysis prescription and reliability of data obtained are required in the clinical environment. This paper provides an overview on guidelines for managing a clinical gait analysis service and on the principal clinical domains of its application: cerebral palsy, stroke, traumatic brain injury and lower limb amputation.

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PMID: 27618499 [PubMed - in process]

Gross Motor Function Measure Evolution Ratio: Use as a control for natural progression in cerebral palsy.

Marois P, Marois M, Pouliot-Laforte A, Vanasse M, Lambert J, Ballaz L.

Ann Phys Rehabil Med. 2016 Sep;59S:e5. doi: 10.1016/j.rehab.2016.07.013.

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OBJECTIVE: To develop a new way to interpret Gross Motor Function Measure (GMFM-66) score improvement in studies conducted without control groups in children with cerebral palsy (CP).

MATERIAL AND METHODS: The curves, which describe the pattern of motor development according to the children's Gross Motor Function Classification System level, were used as historical control to define the GMFM-66 expected natural evolution in children with CP. These curves have been modeled and generalized to fit the curve to particular children characteristics.

RESULTS: Assuming that the GMFM-66 score evolution followed the shape of the Rosenbaum curves, by taking into account the age and GMFM-66 score of children, the expected natural evolution of the GMFM-66 score was predicted for any group of children with CP who were <8 years old. Because the expected natural evolution could be predicted for a specific group of children with CP, the efficacy of a treatment could be determined by comparing the GMFM-66 score evolution measured before and after treatment with the expected natural evolution for the same period. A new index, the Gross Motor Function Measure Evolution Ratio, was defined as follows: Gross Motor Function Measure Evolution Ratio = measured GMFM-66 score change / expected natural evolution.

DISCUSSION/CONCLUSION: For practical or ethical reasons, it is almost impossible to use control groups in studies evaluating effectiveness of many therapeutic modalities. The Gross Motor Function Measure Evolution Ratio gives the opportunity to take into account the expected natural evolution of the gross motor function of children with CP, which is essential to accurately interpret the therapy effect on the GMFM-66.

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Instruments for the evaluation of motor abilities for children with severe multiple disabilities: A systematic review of the literature.

Mensch SM, Rameckers EA, Ehteld MA, Evenhuis HM

Res Dev Disabil. 2015 Dec;47:185-98. doi: 10.1016/j.ridd.2015.09.002. Epub 2015 Oct 4.

Based on a systematic review, psychometric characteristics of currently available instruments on motor abilities of children with disabilities were evaluated, with the aim to identify candidates for use in children with severe multiple (intellectual and motor) disabilities. In addition, motor abilities are essential for independent functioning, but are severely compromised in these children. The methodological quality of all studies was evaluated with the Consensus Based Standards for the Selection of Health Status Measurement Instruments (COSMIN) Checklist; overall levels of evidence per instrument were based on the Cochrane Back Review Group strategy. As a result, 18 studies with a total of eight instruments, developed for children with cerebral palsy (CLA, GMFM-88 and LE85), spinal muscular atrophy (MHFMS), neuromuscular diseases (MFM), disabilities 0-6 years (VAB, WeeFIM), and one developed specifically for children with severe multiple disabilities (TDMMT) were found. Strong levels of evidence were found for construct validity of LE85 and MFM and for responsiveness of WeeFIM, but reliability studies of these instruments had a limited methodological quality. Up to now studies of the TDMMT resulted in limited and unknown evidence for structural validity due to the poor methodological quality of reliability studies. In a next step, the clinical suitability of the instruments for children with severe multiple disabilities will be evaluate.

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PMID: 26436614 [PubMed - indexed for MEDLINE]

Perspectives on postural control dysfunction to inform future research: A Delphi study for children with cerebral palsy.

Dewar R, Claus AP, Tucker K, Johnston LM.

Arch Phys Med Rehabil. 2016 Aug 25. pii: S0003-9993(16)30897-8. doi: 10.1016/j.apmr.2016.07.021. [Epub ahead of print]

OBJECTIVE: To identify if consensus can be achieved in how clinicians and researchers define, describe, assess and treat postural control dysfunction in children with cerebral palsy (CP).

DESIGN: Delphi study with 3 iterative rounds.

SETTING: Electronic survey PARTICIPANTS: 43 researchers and/or clinicians from 7 countries with a mean(SD) of 20(11) years experience working with children with cerebral palsy (CP) participated. Participants included authors of published works on postural control in CP (identified from a recent systematic review), members of the Australasian CP and Developmental Medicine Academy and two major Australian rehabilitation providers.

INTERVENTION: Not applicable.

MAIN OUTCOME MEASURES: The Delphi study consisted of 3 iterative rounds of surveys. In Round-I, respondents answered open-ended questions regarding their views on: i) definition items for postural control, ii) theoretical frameworks, iii) methods for assessment, and iv) interventions for postural control dysfunction in children with CP. Round II and III were made up of items generated by participants in Round-I and combined with items identified from the literature. Participants indicated their level of agreement for each item on a 7-point Likert scale. Threshold for consensus was $\geq 85\%$ agreement.

RESULTS: Of 306 items generated, 174 items reached consensus by Round-III. Most postural control Definition items (90%) achieved consensus. Two theoretical Frameworks reached consensus (14%). Less than half (42%) of Assessment items reached consensus. More individual assessment items (89%) reached consensus than multi-item tools (4%). Just over half (61%) of the items generated for interventions reached consensus.

CONCLUSION: Consensus was achieved for a postural control definition. However, substantial research is needed to establish a comprehensive, postural control specific framework and suite of assessments. These would provide a foundation to improve intervention selection and dosage.

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Predictive Factors for Inpatient Falls among Children with Cerebral Palsy.

Alemdaroğlu E(1), Özbudak SD(2), Mandiroğlu S(1), Biçer SA(1), Özgirgin N(1), Uçan H(1).

J Pediatr Nurs. 2016 Sep 12. pii: S0882-5963(16)30251-2. doi: 10.1016/j.pedn.2016.08.005. [Epub ahead of print]

Inpatient falls are of significant concern. The aim of this prospective study was to determine the predictors of inpatient falls among children with cerebral palsy in a rehabilitation hospital.

DESIGN AND METHODS: A total of 93 patients with cerebral palsy were assessed based on history, physical findings, the Selective Motor Control Test, the Gross Motor Functional Classification System, the Berg Balance Scale and the Manual Ability Classification System. Previous history of falls/frequent falls, and any falls which occurred during hospitalization, were recorded.

RESULTS: Of all 93 patients, 25 (27%) fell and 68 (73%) did not fall. The mean age of the fallers (6.3 ± 2.0 years) was lower than that of the non-fallers (8.1 ± 3.9 years). Behavioral problems according to the mother's statement (OR 26.454), not being able to maintain a long sitting position (OR 10.807), ability to balance on knees without support (OR 9.810), a history of frequent falls (OR 4.893) and a negative Thomas test (OR 4.192 fold) were found to increase the risk of inpatient falls.

CONCLUSIONS: In these children with cerebral palsy, behavioral problems according to the mother's statement, a history of frequent falls, not being able to maintain a long sitting position, a negative Thomas test, and able to balance on knees without support were associated with the risk of inpatient falls. Children with cerebral palsy may experience inpatient falls. Further studies are required in order to develop prevention programs.

PRACTICE IMPLICATIONS: For patients diagnosed with cerebral palsy, these results may help identify possible inpatient fallers on hospital admission.

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PMID: 27633845 [PubMed - as supplied by publisher]

Psychometric evaluation of spinal assessment methods to screen for scoliosis in children and adolescents with cerebral palsy.

Persson-Bunke M, Czuba T, Hägglund G, Rodby-Bousquet E

BMC Musculoskelet Disord. 2015 Nov 14;16:351. doi: 10.1186/s12891-015-0801-1.

BACKGROUND: In cerebral palsy (CP) there is an increased risk of scoliosis. It is important to identify a progressive scoliosis early-on because the results of surgery depend on the magnitude of the curve. The Swedish follow-up
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program for cerebral palsy (CPUP) includes clinical examinations of the spine. The reliability and validity of the assessment method have not been studied. In this study we evaluate the interrater reliability of the clinical spinal examination used in CPUP and scoliometer measurement in children with CP and we evaluate their validity compared to radiographic examination.

METHODS: Twenty-eight children (6-16 years) with CP in Gross Motor Function Classification System levels II-V were included. Clinical spinal examinations and scoliometer measurements in sitting position were performed by three independent examiners. The results were compared to the Cobb angle as determined by radiographic measurement. Interrater reliability was calculated using weighted kappa. Concurrent validity was analyzed using the Cobb angle as gold standard. Sensitivity, specificity, area under receiver operating characteristic curves (AUC) and likelihood ratios (LR) were calculated. Cut-off values for scoliosis were set to $\geq 20^\circ$ Cobb angle and $\geq 7^\circ$ scoliometer angle.

RESULTS: There was an excellent interrater reliability for both clinical examination (weighted kappa = 0.96) and scoliometer measurement (weighted kappa = 0.86). The clinical examination showed a sensitivity of 75 % (95 % CI: 19.4-99.4 %), specificity of 95.8 % (95 % CI: 78.9-99.9 %) and an AUC of 0.85 (95 % CI: 0.61-1.00). The positive LR was 18 and the negative LR was 0.3. The scoliometer measurement showed a sensitivity of 50 % (95 % CI: 6.8-93.2 %), specificity of 91.7 % (95 % CI: 73.0-99.0 %) and AUC of 0.71 (95 % CI: 0.42-0.99). The positive LR was 6 and the negative LR was 0.5.

CONCLUSION: The psychometric evaluation of the clinical examination showed an excellent interrater reliability and a high concurrent validity compared to the Cobb angle. The findings should be interpreted cautiously until research with larger samples may further quantify the psychometric properties. Clinical spinal examinations seem appropriate as a screening tool to identify scoliosis in children with CP.

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DOI: 10.1186/s12891-015-0801-1

PMCID: PMC4650493

Relationship between hand function assessment and upper limb kinematic analysis in children with hemiplegic cerebral palsy.

Gaillard F, Rauscent H, Crétual A, Le Cornec C, Cordillet S, Bonan I

Ann Phys Rehabil Med. 2016 Sep;59S:e6-e7. doi: 10.1016/j.rehab.2016.07.017.

OBJECTIVE/INTRODUCTION: Children with hemiplegic cerebral palsy (HCP) have upper limb limited motion and decreased hand function in daily activities. The aim of this study was to evaluate the relationship between the severity of the kinematic motion abnormalities and bimanual performance of the impaired upper limb.

PATIENTS AND METHODS: Twenty-three children with HCP (mean age 11.9 ± 2.7 years) were evaluated using the Assisting Hand Assessment (AHA) [1] to score functional activity performance. We used a standardized 3D-analysis protocol to evaluate upper limb movements, containing two reach tasks, three gross motor tasks, and two reach-to-grasp tasks. Summary kinematic indexes were calculated according to Jaspers' method [2] to evaluate the severity of upper limb movement abnormalities in children with HCP, compared to a database of 28 typically developing children (mean age 11.8 ± 2.2 years).

RESULTS: The results show high correlation between the Global-Arm Profile score (APS), a kinematic index, which summarizes the overall severity of upper limb movement pathology for all tasks, and the AHA score ($r = -0.75$). The APS were highly correlated with the AHA during reach-to-grasp tasks ($r = -0.75$) and two of the three gross motor tasks ($r = -0.74$). Concerning the Global-Arm Variable score, which represents the deviation for a single joint angle, significant correlations were found for wrist flexion ($r = -0.85$), elbow flexion ($r = -0.61$) and pronation ($r = -0.47$).

DISCUSSION/CONCLUSION: The severity of movement abnormality in children with HCP is strongly correlated with the level of functional activity performance. This correlation is best demonstrated in reach-to-grasp or gross motor tasks. The influence of wrist and elbow movement abnormality confirms the importance of taking into account these distal limitations in therapeutics.

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DOI: 10.1016/j.rehab.2016.07.017

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

Science Infos Paralysie Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
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Carey H, Martin K, Combs-Miller S, Heathcock JC.
Pediatr Phys Ther. 2016 Winter;28(4):401-8. doi: 10.1097/PEP.0000000000000301.

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 - in process]

Reliability and validity of the Four Square Step Test in children with cerebral palsy and Down syndrome.

Bandong AN, Madriaga GO, Gorgon EJ

Res Dev Disabil. 2015 Dec;47:39-47. doi: 10.1016/j.ridd.2015.08.012. Epub 2015 Aug 27.

Little is known about the measurement properties of clinical tests of stepping in different directions for children with cerebral palsy (CP) and Down syndrome (DS). The ability to step in various directions is an important balance skill for daily life. Standardized testing of this skill can yield important information for therapy planning. This observational methodological study was aimed at defining the relative and absolute reliability, minimal detectable difference, and concurrent validity with the Timed Up-&Go (TUG) of the Four Square Step Test (FSST) for children with CP and DS. Thirty children, 16 with CP and 14 with DS, underwent repeat testing 2 weeks apart on the FSST by 3 raters. TUG was administered on the second test occasion. Intraclass correlation coefficients (ICC [1,1] and [3,1]) with 95% confidence intervals, standard error of measurement (SEM), minimal detectable difference (MDD) and the Spearman rank correlation coefficient were computed. The FSST demonstrated excellent interrater reliability (ICC=.79; 95% CI: .66, .89) and high positive correlation with the TUG ($r=.74$). Test-retest reliability estimates varied from moderate to excellent among the 3 raters (.54, .78 and .89 for raters 1, 2 and 3, respectively). SEM and MDD were calculated at 1.91s and 5.29s, respectively. Scores on the FSST of children with CP and DS between 5 and 12 years of age are reliable and valid.

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The Effects of Acute Intense Physical Exercise on Postural Stability in Children With Cerebral Palsy.

Leineweber MJ, Wyss D, Dufour SK, Gane C, Zabjek K, Bouyer LJ, Maltais DB, Voisin JI, Andrysek J.

Adapt Phys Activ Q. 2016 Jul;33(3):271-82. doi: 10.1123/APAQ.2015-0115.

This study evaluated the effects of intense physical exercise on postural stability of children with cerebral palsy (CP). Center of pressure (CoP) was measured in 9 typically developing (TD) children and 8 with CP before and after a maximal aerobic shuttle-run test (SRT) using a single force plate. Anteroposterior and mediolateral sway velocities, sway area, and sway regularity were calculated from the CoP data and compared between pre- and postexercise levels and between groups. Children with CP demonstrated significantly higher pre-SRT CoP velocities than TD children in the sagittal (18.6 ± 7.6 vs. 6.75 ± 1.78 m/s) and frontal planes (15.4 ± 5.3 vs. 8.04 ± 1.51 m/s). Post-SRT, CoP velocities significantly increased for children with CP in the sagittal plane (27.0 ± 1.2 m/s), with near-significant increases in the frontal plane (25.0 ± 1.5 m/s). Similarly, children with CP evidenced larger sway areas than the TD

children both pre- and postexercise. The diminished postural stability in children with CP after short but intense physical exercise may have important implications including increased risk of falls and injury.

DOI: 10.1123/APAQ.2015-0115

PMID: 27623610 [PubMed - in process]

Three-dimensional analysis of the upper limb movement asymmetry during a bimanual grasp task in children with hemiplegic cerebral palsy.

Gaillard F, Rauscent H, Crétual A, Le Cornec C, Cordillet S, Bonan I

Ann Phys Rehabil Med. 2016 Sep;59S:e8. doi: 10.1016/j.rehab.2016.07.021.

OBJECTIVE: Children with hemiplegic cerebral palsy (HCP) have upper limb deficiencies and movement abnormalities causing difficulties in bimanual activities. The objective of this study was to analyze the abnormalities of movement and the kinematic asymmetry of both upper limbs during a bimanual grasp task in children with HCP.

PATIENTS AND METHODS: Seven hemiplegic children (mean age 13.7±2.4 years) were evaluated through 3D motion analysis during a bimanual and symmetrical grasp task. Different kinematic indexes were calculated to assess the severity of the movement deviation (Arm Profile Score [APS]) and the degree of asymmetry between the two upper limbs (Asym'APS). Kinematic data from hemiplegic children were compared to a 17 typically developing children (TDC) database (mean age 12.1±2.6 years).

RESULTS: The APS score was significantly higher for the impaired upper limb of children with HCP compared to the non-dominant limb of TDC (respectively 21.6° versus 12.8°). The Asym'APS score was significantly higher in the HCP children compared to the TDC (respectively 21.2° and 7.9°). The study of the indexes based on the joint level has made it clearer on which angles deviations and asymmetries were the highest and what compensation strategies were adopted by the unimpaired limb.

DISCUSSION/CONCLUSION: Hemiplegic children have an angular deviation of the impaired limb more severe and a more important asymmetry between the two upper limbs than typically developing children have during a bimanual and symmetrical grasp task.

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PMID: 27677010 [PubMed - as supplied by publisher]

Use of shear wave ultrasound elastography to quantify muscle properties in cerebral palsy.

Lee SS, Gaebler-Spira D, Zhang LQ, Rymer WZ, Steele KM.

Clin Biomech (Bristol, Avon). 2016 Jan;31:20-8. doi: 10.1016/j.clinbiomech.2015.10.006. Epub 2015 Oct 18.

BACKGROUND: Individuals with cerebral palsy tend to have altered muscle architecture and composition, but little is known about the muscle material properties, specifically stiffness. Shear wave ultrasound elastography allows shear wave speed, which is related to stiffness, to be measured in vivo in individual muscles. Our aim was to evaluate the material properties, specifically stiffness, as measured by shear wave speed of the medial gastrocnemius and tibialis anterior muscles in children with hemiplegic cerebral palsy across a range of ankle torques and positions, and fascicle strains.

METHOD: Shear wave speed was measured bilaterally in the medial gastrocnemius and tibialis anterior over a range of ankle positions and torques using shear wave ultrasound elastography in eight individuals with hemiplegic cerebral palsy. B-mode ultrasound was used to measure muscle thickness and fascicle strain.

RESULTS: Shear waves traveled faster in the medial gastrocnemius and tibialis anterior of the more-affected limb by 14% (P=0.024) and 20% (P=0.03), respectively, when the ankle was at 90°. Shear wave speed in the medial gastrocnemius increased as the ankle moved from plantarflexion to dorsiflexion (less affected: r(2)=0.82, P<0.001; more-affected: r(2)=0.69, P<0.001) and as ankle torque increased (less affected: r(2)=0.56, P<0.001; more-affected: r(2)=0.45, P<0.001). In addition, shear wave speed was strongly correlated with fascicle strain (less affected: r(2)=0.63, P<0.001; more-affected: r(2)=0.53, P<0.001).

INTERPRETATION: The higher shear wave speed in the more-affected limb of individuals with cerebral palsy indicates greater muscle stiffness, and demonstrates the clinical potential of shear wave elastography as a non-invasive tool for investigating mechanisms of altered muscle properties and informing diagnosis and treatment.

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DOI: 10.1016/j.clinbiomech.2015.10.006

Science Infos Paralyse Cérébrale, Septembre 2016, **FONDATION PARALYSIE CEREBRALE** 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
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Cognition

Managing the maintenance of gait stability during dual walking task: effects of age and neurological disorders.
Tramontano M, Morone G, Curcio A, Temperoni G, Medici A, Morelli D, Caltagirone C, Paolucci S, Iosa M.
Eur J Phys Rehabil Med. 2016 Aug 30. [Epub ahead of print]

BACKGROUND: Dual task paradigm is common mechanism of daily life, it is often used for investigating the effect on cognitive processing of motor behavior.

AIM: In the present study we investigate the dual task interference during walking on upright gait stability.

DESIGN: cross-sectional study.

SETTING: Inpatient neurorehabilitation unit and children neurorehabilitation unit.

POPULATION: Eighty-five subjects were enrolled, divided into five groups: healthy young, healthy elderly, children with typical development, children with cerebral palsy and adults with stroke in subacute phase.

METHODS: All subjects had to walk through a pathway during which they had to hear a sound, turn the head to watch a number and verbalize it. Subjects wore an accelerometer on their lumbar spine to measure upright gait stability have been assessed by means of the Root Mean Square (RMS) of the trunk acceleration.

RESULTS: All subjects showed a reduced speed when performing a dual task with respect to single task. This reduction was significantly different among groups ($F(4,81)=12.253$, $p<0.001$, $ES=0.377$). The RMS resulted increased along LL-axis, and reduced along AP- and CC-axes during the dual task walking.

CONCLUSION: These accelerations were significantly related to the changes in speed that were managed in a different way in subjects affected by cerebral palsy and stroke.

CLINICAL REHABILITATION IMPACT: The information obtained in this study may be used to support specific rehabilitation techniques in subjects with poor balance ability.

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PMID: 27575014 [PubMed - as supplied by publisher]

[Relationship between executive functioning and behaviour in children with cerebral palsy]. [Article in Spanish]

Muriel V, Garcia-Molina A, Aparicio-Lopez C, Ensenat A, Roig-Rovira T.
Rev Neurol. 2015 Oct 16;61(8):337-43.

INTRODUCTION: Cerebral palsy is defined as a group of developmental disorders of movement and posture that causes social and cognitive deficits, emotional, and behavior disturbances.

AIM: To study the relationship between executive functioning and behavior in children with cerebral palsy from the answers given by parents and teachers on the Behavior Rating Inventory of Executive Function (BRIEF) and on the System Assessment Adaptive Behavior (ABAS-II).

PATIENTS AND METHODS: The sample consisted on 46 children with CP with a mean age of 10.26 ± 2.95 years. Forty-four of the 46 children were distributed in Gross Motor Function Classification System (GMFCS) into level I (n = 16), level II (n = 3), level III (n = 11), level IV (n = 10) and level V (n = 4).

RESULTS: The results showed a relationship between BRIEF and ABAS-II.

Furthermore, discrepancies between the responses from parents and teachers, both in the ABAS-II and in the BRIEF, were obtained.

CONCLUSIONS: We found a significant relationship between executive functioning in children with cerebral palsy and adaptive behavior. We found discrepancies in the answers given by parents and teachers. Finally, the data showed that the higher motor impairment increases difficulties at home.

Publisher: Abstract available from the publisher.

[Free Article](#)

PMID: 26461126 [PubMed - indexed for MEDLINE]

Relationships between gross- and fine motor functions, cognitive abilities, and self-regulatory aspects of students with physical disabilities.

Varsamis P, Agaliotis I

Res Dev Disabil. 2015 Dec;47:430-40. doi: 10.1016/j.ridd.2015.10.009. Epub 2015 Oct 27.

This article reports research on self-regulatory aspects (i.e., goal-setting, self-efficacy and self-evaluation) of secondary and post-secondary students with congenital motor disabilities, who performed a ball-throwing-at-a-target task. Participants were divided into four subgroups presenting distinct combinations of motor and cognitive abilities (i.e., normal cognitive development and mild physical disabilities, normal cognitive development and severe physical disabilities, mild-to-moderate intellectual disability and mild physical disabilities, and mild-to-moderate intellectual disability and severe physical disabilities). Results showed that students presenting mild motor disabilities exhibited a positive self-concept and self-regulation profile, irrespective of their cognitive functioning. Students with considerable motor disabilities, but without cognitive challenges, presented a negative, though realistic self-concept and self-regulation profile. Finally, students with considerable motor disabilities and mild-to-moderate cognitive disabilities showed a positive, though unrealistic, self-regulation profile. The nature of the diverse relationship of motor and cognitive (dis)abilities to specific self-regulatory aspects are discussed, and important instructional implications are mentioned.

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PMID: 26519661 [PubMed - indexed for MEDLINE]

Traitement - Rééducation motrice et cognitive

Pediatric stroke rehabilitation: A review of techniques facilitating motor recovery.

Papathanasiou E, Chevignard M, Vuillerot C, Tiberghien A, Godard I(4).

Ann Phys Rehabil Med. 2016 Sep;59S:e2. doi: 10.1016/j.rehab.2016.07.008.

OBJECTIVE: Paediatric stroke is a relatively rare medical condition, but it often leads to long lasting motor and cognitive impairments. Rehabilitation of motor impairments has been widely studied, with most studies performed in children with cerebral palsy (CP). However, CP covers a variety of medical conditions, including brain lesions due to paediatric stroke occurring early in life, but not stroke occurring later on during childhood. The specificity of rehabilitation after paediatric stroke remains understudied. This paper aims to present current motor rehabilitation practices (from birth to age 18) and examine which of these techniques are applicable and efficient for paediatric stroke.

MATERIALS/PATIENTS AND METHODS: We first conducted searches using Ovid Database, for motor rehabilitation techniques used in childhood hemiplegia and/or CP. As a second step, a systematic search was conducted up to March 2016, combining the therapies retrieved in the first search AND key words referring to paediatric stroke. Separate searches were conducted for each rehabilitation technique previously identified, namely: constraint induced movement therapy (CIMT), hand arm bimanual training (HABIT), occupational therapy combined with botulinum toxin injections, non-invasive brain stimulation, virtual reality, robotics, action-observation therapy, functional electric stimulation and prismatic or mirror adaptations.

RESULTS: In paediatric stroke, studies on rehabilitation of lower limb present low or insufficient evidence, whereas most studies refer to rehabilitation of upper-limb disabilities. CIMT presents moderate to strong evidence, sometimes coupled with imaging studies examining the associated brain changes. Individual case studies propose CIMT for toddlers or infants, both for motor rehabilitation or unilateral spatial neglect. Contrary to CP literature, there is no available evidence on bimanual training or botulinum toxin injections, whereas there is a growing body of research on non-invasive brain stimulation, (tDCS or TMS) providing preliminary evidence on the efficacy, as well as safety and feasibility of such methods for older children. Novel approaches such as functional electric stimulation, robotic therapy, virtual reality and action-observation therapy present low or insufficient evidence, but may be promising for more severe upper limb deficits or early intervention.

DISCUSSION/CONCLUSION: Rehabilitation of motor deficits following paediatric stroke remains understudied, but a number of promising therapies are emerging.

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Report of a workshop on research gaps in the treatment of cerebral palsy.

Lungu C, Hirtz D, Damiano D, Gross P, Mink JW

Neurology. 2016 Aug 24. pii: 10.1212/WNL.0000000000003116. [Epub ahead of print]

Cerebral palsy (CP) is heterogeneous in etiology and manifestations, making research into relevant therapies difficult and limiting the generalizability of the results. We report here on the NIH CP symposium, where stakeholders from academic, clinical, regulatory, and advocacy backgrounds discussed the major challenges and needs for moving forward with clinical research in CP, and outlined priorities and action items. New information is constantly generated through research into pathogenesis and etiology. Clinical research and new therapeutic approaches need to keep pace, through large data registry integration and new research designs. Development of standardized data collection, increasing academic focus on CP research, and iterative approaches to treatment throughout the patients' lives, have all been identified as areas of focus. The workshop identified critical gaps and areas of focus to increase the evidence base for therapeutic approaches to determine which treatments work best for which patients in the near future. These include consolidation and optimization of databases and registries, updates to the research methodology, and better integration of resources and stakeholders.

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PMID: 27558377 [PubMed - as supplied by publisher]

Pharmacologie Efficacite Tolérance

A major improvement in social participation of two children with cerebral palsy by a single botulinum toxin injection.

Yalcin E, Kutlay S, Ilgu O, Akyuz M

Eur J Paediatr Neurol. 2016 Aug 29. pii: S1090-3798(16)30141-6. doi: 10.1016/j.ejpn.2016.08.007. [Epub ahead of print]

DOI: 10.1016/j.ejpn.2016.08.007

PMID: 27594069 [PubMed - as supplied by publisher]

A Randomized Controlled Trial on Effectiveness of Intermittent Serial Casting on Spastic Equinus Foot in Children with Cerebral Palsy After Botulinum Toxin-A Treatment.

Dursun N(1), Gokbel T, Akarsu M, Dursun E.

Am J Phys Med Rehabil. 2016 Sep 14. [Epub ahead of print]

OBJECTIVE: Physical therapy (PT) and botulinum toxin-A (BTX-A) injections are widely used in the treatment of spastic equinus foot due to cerebral palsy. The aim of this study was to show effects of intermittent serial casting (SC) in addition to standard treatment on spasticity, passive range of motion (PROM), and gait.

DESIGN: Fifty-one ambulatory patients, treated by BTX-A to plantar flexor muscles, were randomly assigned to casting or control groups in a 2:1 ratio. Both groups received PT for 3 weeks. Casting group additionally received intermittent SC during 3 consecutive weekends. Assessments included Modified Ashworth Scale (MAS), Tardieu Scale, Observational Gait Scale (OGS), and Physician Global Assessment at baseline and posttreatment weeks 4 and 12.

RESULTS: Significant improvements in PROM, MAS, Tardieu Scale, and OGS were recorded in both groups ($P < 0.001$ for all). Average changes in MAS, PROM, angle of catch, spasticity angle, and OGS of the casting group were significantly higher than those of the controls at week 4 ($P = 0.006$, $P = 0.002$, $P < 0.001$, $P = 0.005$, $P = 0.011$), and 12 ($P = 0.013$, $P < 0.001$, $P < 0.001$, $P = 0.011$, $P < 0.001$). Follow-up Physician Global Assessment also favored casting group ($P < 0.001$ for both).

CONCLUSIONS: Combining intermittent SC with BTX-A injections and PT might provide additional benefits for spastic equinus foot.

TO CLAIM CME CREDITS: Complete the self-assessment activity and evaluation online at <http://www.physiatry.org/JournalCME> CME OBJECTIVES: Upon completion of this article, the reader should be able to: (1) identify treatment options for spastic equinus gait in children with cerebral palsy; (2) explain different approaches of serial casting with an additional model of intermittent casting; and (3) describe the potential benefits of combined treatment modalities, including intermittent serial casting, for spastic equinus foot in children with cerebral palsy.

LEVEL: Advanced ACCREDITATION: The Association of Academic Physiatrists is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. The Association of Academic Physiatrists designates this activity for a maximum of 1.5 AMA PRA Category 1 Credit(s)[™]. Physicians should only claim credit commensurate with the extent of their participation in the activity.

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PMID: 27631386 [PubMed - as supplied by publisher]

A Retrospective Review of Unintended Effects After Single-Event Multi-Level Chemoneurolysis With Botulinum Toxin-A and Phenol in Children With Cerebral Palsy.

Ploypetch T, Kwon JY, Armstrong HF, Kim H

PM R. 2015 Oct;7(10):1073-80. doi: 10.1016/j.pmrj.2015.05.020. Epub 2015 May 29.

BACKGROUND: Single-event multi-level chemoneurolysis (SEMLC) is a single-session procedure that treats various limbs of patients with spasticity at multiple levels with chemoneurolytic agents. Phenol is used in combination with botulinum toxin A (BTX-A) to enable spastic muscles to be treated without overdosing with BTX-A.

OBJECTIVE: To review unintended effects (UEs) of SEMLC for children with spastic cerebral palsy (CP).

DESIGN: Retrospective chart review.

SETTING: Pediatric rehabilitation outpatient clinic at an academic medical center.

PARTICIPANTS: The study included 98 children with CP who underwent SEMLC on at least one occasion.

INTERVENTIONS: SEMLC.

MAIN OUTCOME MEASURES: UEs, the goal achievement for each SEMLC session, and the Gross Motor Function Classification System (GMFCS-ER).

RESULTS: A total of 98 subjects and 146 SEMLC procedures were reviewed. Patients had a mean age of 7.56 years (standard deviation, 4.28); 57% were male; and 14 had hemiplegia, 22 had diplegia, 8 had triplegia, and 54 had quadriplegia. Most SEMLCs (72%) were performed with a combination of BTX-A and 5% phenol in a session. UEs were reported for 31/146 (21%) of SEMLC sessions, with 16 of 31 UEs being temporary weakness. The overall incidence of UEs of the group that received combined agent treatment was not different from the group that received BTX-A only ($P = .267$). Transient pain occurred in 7 of 105 patients who were treated with the combined agents BTX-A and phenol. Dysesthesia did not develop in any of the patients. The type of CP, GMFCS level, number of muscles injected, and doses of medications were not correlated with the incidence of UEs.

CONCLUSIONS: SEMLC using combined BTX-A and phenol is a safe procedure for children with spastic CP. It could be a treatment option for patients with diffuse spasticity, because combining agents allowed more muscles to be treated without enduring or serious UEs. Patient and family education is essential to prepare them for the occurrence of common UEs, such as temporary weakness and pain.

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Adverse drug reactions of botulinum neurotoxin type A in children with cerebral palsy: a pharmaco-epidemiological study in VigiBase.

Montastruc J, Marque P, Moulis F, Bourg V, Lambert V, Durrieu G, Montastruc JL, Montastruc F

Dev Med Child Neurol. 2016 Sep 28. doi: 10.1111/dmcn.13286. [Epub ahead of print]

AIM: The aim of this study was to assess the risk of adverse drug reactions (ADRs) with botulinum neurotoxin type A (BoNT-A) in children with cerebral palsy (CP) using the World Health Organization global individual case safety report (ICSR) database, VigiBase.

METHOD: We extracted all children ICSRs for ADRs with BoNT-A used as anti-spastic drug in CP recorded between 1995 and 2015 in VigiBase. We also performed a case/non-case method (disproportionality analysis) to assess the link between exposure to BoNT-A and each ADR of interest in children and adults, calculating reporting odds ratios (RORs).

RESULTS: In VigiBase, 162 ICSRs were registered. They involved mainly males (n=95, 59%) and mean (SD) age was 7 years 11 months (4y 4mo). The most frequent ADR was dysphagia (27 ICSRs, 17%) followed by asthenia and muscular weakness (25 ICSRs each, 16%). Nineteen ICSRs (12%) were lethal. There was a significant association between BoNT-A and death in children (ROR=11.1 95%, confidence interval [CI] 7.0-17.7) but not in adults.

INTERPRETATION: In children with CP, most ADRs seem to be linked to a systemic spread of BoNT-A. Our study suggests a higher risk of ADRs with BoNT-A in children than in adults.

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Clinical and pharmacological properties of incobotulinumtoxinA and its use in neurological disorders.

Jost WH, Benecke R, Hauschke D, Jankovic J, Kaňovský P, Roggenkämper P, Simpson DM, Comella CL.

Drug Des Devel Ther. 2015 Apr 1;9:1913-26. doi: 10.2147/DDDT.S79193. eCollection 2015.

BACKGROUND: IncobotulinumtoxinA (Xeomin®) is a purified botulinum neurotoxin type A formulation, free from complexing proteins, with proven efficacy and good tolerability for the treatment of neurological conditions such as blepharospasm, cervical dystonia (CD), and post-stroke spasticity of the upper limb. This article provides a comprehensive overview of incobotulinumtoxinA based on randomized controlled trials and prospective clinical studies.

SUMMARY: IncobotulinumtoxinA provides clinical efficacy in treating blepharospasm, CD, and upper-limb post-stroke spasticity based on randomized, double-blind, placebo-controlled trials with open-label extension periods (total study duration up to 89 weeks). Adverse events were generally mild or moderate. The most frequent adverse events, probably related to the injections, included eyelid ptosis and dry eye in the treatment of blepharospasm, dysphagia, neck pain, and muscular weakness in patients with CD, and injection site pain and muscular weakness when used for treating spasticity. In blepharospasm and CD, incobotulinumtoxinA was investigated in clinical trials permitting flexible intertreatment intervals based on the individual patient's clinical need; the safety profile of intervals shorter than 12 weeks was comparable to intervals of 12 weeks and longer. There were no cases of newly formed neutralizing antibodies during the Phase III and IV incobotulinumtoxinA trials. Phase III head-to-head trials of incobotulinumtoxinA versus onabotulinumtoxinA for the treatment of blepharospasm and CD have demonstrated therapeutic equivalence of both formulations. Additional Phase III trials of incobotulinumtoxinA in conditions such as lower-limb spasticity, spasticity in children with cerebral palsy, and sialorrhea in various neurological disorders are ongoing.

CONCLUSION: IncobotulinumtoxinA is an effective, well-tolerated botulinum neurotoxin type A formulation. Data from randomized clinical trials and further observational studies are expected to help physicians to optimize treatment by tailoring the choice of formulation, dose, and treatment intervals to the patient's clinical needs.

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PMCID: PMC4389813

PMID: 25897202 [PubMed - indexed for MEDLINE]

Cost-minimization analysis in the treatment of spasticity in children with cerebral palsy with botulinum toxin type A: an observational, longitudinal, retrospective study.

Tapias G, García-Romero M, Crespo C, Cuesta M, Forné C, Pascual-Pascual SI

Farm Hosp. 2016 Sep 1;40(5):412-26. doi: 10.7399/fh.2016.40.5.10429.

OBJECTIVE: Cost-minimization analysis of onabotulinumtoxinA and abobotulinumtoxinA, taking into account the real dose administered to children with spasticity associated with dynamic equinus foot deformity due to cerebral palsy.

METHOD: A single centre, observational, longitudinal, and retrospective study which included spastic paediatric patients aged 2-to-18-years and treated with onabotulinumtoxinA or abobotulinumtoxinA from December 1995 to October 2012, in the Paediatric Neurology Unit of a first-level Spanish hospital. A longitudinal analysis of spasticity

Science Infos Paralysie Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue

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severity was made to confirm the similar efficacy of both treatments. Cost minimization was analyzed using the dose administered and the direct costs (pharmacological and medical visits costs) from the perspective of the National Health System (in euros from 2016).

RESULTS: We analyzed 895 patients with paediatric spasticity: 543 were treated only with onabotulinumtoxinA, 292 only with abobotulinumtoxinA, and 60 with both treatments. The mean doses administered were 5.44 U/kg (SD = 2.17) for onabotulinumtoxinA, and 14.73 U/kg (5.26) for abobotulinumtoxinA. The total annual direct cost (pharmacological and medical visits) was € 839.56 for onabotulinumtoxinA and € 631.23 for abobotulinumtoxinA, which represents a difference of € 208.34 per year in favour of treatment with abobotulinumtoxinA.

CONCLUSIONS: It has been demonstrated that in real clinical practice, the cost per patient and year for treatment of paediatric spasticity was lower when abobotulinumtoxinA was used.

Publisher: Abstract available from the publisher.

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DOI: 10.7399/fh.2016.40.5.10429

PMID: 27570991 [PubMed - in process]

Electrical Stimulation Following Botulinum Toxin A in Children With Spastic Diplegia: A Within-Participant Randomized Pilot Study.

Mudge A, Harvey LA, Lancaster A, Lowe K

Phys Occup Ther Pediatr. 2015;35(4):342-53. doi: 10.3109/01942638.2014.990548. Epub 2014 Dec 20.

AIMS: To determine whether electrical stimulation (ES) following botulinum toxin A (BoNT/A) injection increases passive extensibility of the hamstring muscles in children with spastic diplegia.

METHODS: Six children undergoing bilateral BoNT/A injections to the hamstrings participated in this within-participant single blind randomized controlled trial. One leg of each child was randomised to the experimental condition and the other to the control condition. The experimental leg received daily stretch and ES to the hamstrings for 12 weeks, while the control leg received only daily stretch. The primary outcome was passive hamstring extensibility reflected by popliteal angle measured with a standardised torque. Secondary outcomes were two goniometric measures of popliteal angle using the Modified Tardieu Scale (R1 and R2), and parents' perceptions of treatment effectiveness. Outcomes were measured at baseline, 4 weeks, 12 weeks and 6 months.

RESULTS: The mean between-group difference (95% CI) at 4 weeks was 2° (-2 to 5) for popliteal angle measured with a standardised torque, favouring the experimental leg. Tardieu results for R1 and R2 were 0° (-4 to 3) and 7° (0 to 14), respectively.

CONCLUSION: ES does not improve passive extensibility of the hamstring muscles at 4 weeks over any possible effects of BoNT/A alone.

DOI: 10.3109/01942638.2014.990548

PMID: 25529410 [PubMed - indexed for MEDLINE]

Evidence-based review of safety and efficacy in cerebral palsy.

Tilton AH

Toxicon. 2015 Dec 1;107(Pt A):105-8. doi: 10.1016/j.toxicon.2015.09.020. Epub 2015 Sep 25.

The introduction of botulinum toxin has been a major advance in the care of children with cerebral palsy. Clinically the positive effects of treatment with botulinum toxin are seen in patients with all levels of GMFCS. Botulinum toxin has been established in multiple studies to reduce spasticity in the upper and lower extremities, although there is some conflicting evidence regarding function. The medication is felt to be generally safe with a low incidence of adverse events which are temporary and self-limited. However there is the recognition that severe weakness may rarely occur. Ultimately it is incumbent upon the physician to consider both risks and benefits in determining the best treatment plan for the individual patient.

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DOI: 10.1016/j.toxicon.2015.09.020

PMID: 26403867 [PubMed - indexed for MEDLINE]

Intrathecal Baclofen Pump Migration Into the Peritoneal Cavity: A Case Report.

Science Infos Paralysie Cérébrale, Septembre 2016, [FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org](#)

Kovanda TJ, Pestereva E, Lee A

Anesth Pain Med. 2016 Mar 12;6(3):e33031. doi: 10.5812/aapm.33031. eCollection 2016.

INTRODUCTION: Intrathecal baclofen pumps are valuable treatment options for those with cerebral palsy. Although subfascial baclofen pump placement is generally preferred over a subcutaneous pump placement due to lower infection rates, rare complications can occur with the subfascial approach such as pump migration.

CASE PRESENTATION: The authors here describe a case of baclofen pump migration into the peritoneal cavity of a 26-year-old male patient with cerebral palsy, shunted hydrocephalus, and epilepsy. Because the patient's pump could not be palpated on exam and hence refilled, imaging was undertaken, but did not reveal clear evidence of pump migration. Surgery afterward confirmed that the pump had migrated into the peritoneal cavity through a fascial defect. Baclofen pump had to be replaced instead subcutaneously as well as the patient later had to be readmitted for 2 ventriculoperitoneal shunt revisions due to progression of his hydrocephalus.

CONCLUSIONS: Intraperitoneal migration of a subfascially placed baclofen pump is a rare, yet serious complication, which has been reported only once in the literature. We advise neurosurgeons to have a low level of threshold in confirming the location of a baclofen pump with imaging and surgical exploration if necessary in order to avoid detrimental outcomes such as bowel perforation.

[Free PMC Article](#)

DOI: 10.5812/aapm.33031

PMCID: PMC5018100

PMID: 27642571 [PubMed]

Ketamine-based procedural sedation and analgesia for botulinum toxin A injections in children with cerebral palsy.

Chow C, Choong CT

Eur J Paediatr Neurol. 2016 Mar;20(2):319-22. doi: 10.1016/j.ejpn.2015.11.009. Epub 2015 Nov 27.

INTRODUCTION: Adequate procedural sedation and analgesia (PSA) is essential to reduce pain and distress for children undergoing intramuscular botulinum toxin (BoNT-A) injections. This study describes our institution's experience with ketamine-based PSA in terms of safety and efficacy in children with cerebral palsy receiving BoNT-A injections.

MATERIAL AND METHODS: This is an analysis of ketamine-based PSA for children undergoing BoNT-A injections between January 2000 and October 2014. All patients received PSA according to our institution's sedation protocol. From 2000 to 2012, intravenous ketamine and midazolam PSA was administered. From 2013 onwards, intravenous ketamine was used as a sole agent for PSA.

RESULTS: A total of 152 BoNT-A procedures were performed successfully on 87 children. The median age of the children was 5 years 5 months with 9 children younger than 36 months. Ten procedures (6.6%) were associated with acute transient self-limiting side effects: Four developed rashes, three had nausea and vomiting, one child had limb tremors and another child complained of mild headache. One child reported nightmares on the evening of the procedure during the two-week post-procedure review. No child experienced serious adverse events.

CONCLUSION: Administration of ketamine-based PSA for intramuscular BoNT-A procedures in children can be both safe and efficacious.

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PMID: 26640079 [PubMed - indexed for MEDLINE]

Profound Bradycardia After Intrathecal Baclofen Injection in a Patient With Hydranencephaly.

Sechrist C, Kinsman S, Cain N

Pediatr Neurol. 2015 Dec;53(6):532-4. doi: 10.1016/j.pediatrneurol.2015.08.010. Epub 2015 Aug 28.

BACKGROUND: Intrathecal baclofen is often used to treat medically intractable spasticity of cerebral or spinal origin. Complications are rare but close monitoring is routinely performed with intrathecal test doses and before pump implantation.

METHODS: We describe a 6 year-old girl with hydranencephaly who underwent an intrathecal baclofen test dose and developed severe bradycardia.

RESULTS: A 6 year-old girl with hydranencephaly, quadriplegic cerebral palsy, and severe spasticity was a candidate for an intrathecal baclofen pump. She underwent an intrathecal baclofen test dose and within 4 hours developed a heart rate between 30-40 beats per minute and mild hypotension without neurological side effects. Vital signs subsequently normalized, and she was discharged home within 48 hours of admission.

CONCLUSIONS: Although neurological side effects such as drowsiness and weakness are commonly associated with intrathecal baclofen test doses, attention should also be focused on possible hemodynamic complications including significant bradycardia, especially in vulnerable patients such as those with possible or known hypothalamic dysfunction.

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PMID: 26411756 [PubMed - indexed for MEDLINE]

Physiological anatomy of botulinum toxin effect on the spastic muscle of children with cerebral palsy.

Mietton C, Schaeffer L, Streichenberger N, Cunin V, Kassai B, Poirot I

Ann Phys Rehabil Med. 2016 Sep;59S:e6. doi: 10.1016/j.rehab.2016.07.015.

OBJECTIVE: Botulinum toxin is one of the treatments available to treat spasticity in patients with cerebral palsy (CP) from 2 years of age. The long-term action of the toxin on the neuromuscular junction (NMJ) and muscle structure is still unknown. We formulated the hypothesis that repeated injections of botulinum toxin could modify muscle structure. The main aim of our 3-year monocentric descriptive study is to evaluate the long-term effect of repeated injections of botulinum toxin on the muscle and the neuromuscular junction in patients with CP.

MATERIAL AND METHODS: Histopathological features and molecular biology were studied on muscle biopsies taken during scheduled orthopaedic surgeries. Evaluation criteria were the presence of fragmented neuromuscular junctions (both qualitative and quantitative) and axonal sprouting (qualitative).

RESULTS: Two muscle biopsies were performed in 2 children aged respectively 7 and 10 years. The biopsies were located respectively in the right gracilis (after 1 injection) and in the right sural triceps (after 3 injections). Histological features found were fragmented neuromuscular junctions (between 1 to 6), lack of axonal sprouting at the junction, the presence of CD56 satellite cells and presence of molecules suggesting the presence of denervated fibers. Whereas type I and type II fiber atrophy and fibrosis were found on the first biopsy, on the second were seen signs of atrophy of undifferentiated fibers without any sign of fibrosis. Additional results will be available soon.

DISCUSSION/CONCLUSION: This study should improve knowledge about the effects of long-term botulinum toxin on muscle (and therefore its safety in use) on the NMJ and on the physiopathology of the muscle of children with CP.

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DOI: 10.1016/j.rehab.2016.07.015

PMID: 27676961 [PubMed - as supplied by publisher]

The Effect of Botulinum Toxin A Injections in the Spine Muscles for Cerebral Palsy Scoliosis, Examined in a Prospective, Randomized Triple-blinded Study.

Wong C, Pedersen SA, Kristensen BB, Gosvig K, Sonne-Holm S.

Spine (Phila Pa 1976). 2015 Dec;40(23):E1205-11. doi: 10.1097/BRS.0000000000001049.

STUDY DESIGN: A prospective, randomized triple-blinded cross-over design treating with either botulinum toxin A (BXT) or saline (NaCl).

OBJECTIVE: To examine the efficacy of BTX treatment in cerebral palsy scoliosis (CPS).

SUMMARY OF BACKGROUND DATA: Intramuscular injections with BTX have been used off label in treating CPS. 1 prospective study has been conducted, demonstrating in both radiological and clinical improvement, whereas showing no side effects or complications.

METHODS: Subjects (brace-treated CPS between 2 and 18 yr) were injected using ultrasonic-guidance with either NaCl or BTX in selected spine muscles with 6 mo intervals (block randomization, sealed envelope). Radiographs of the spine and clinical follow-up were captured before and 6 weeks after each injection. Primary outcome parameter was radiological change in Cobb angle, where a 7° change was regarded as an effect (1 SD). Radiological parameters were measured before and 6 weeks after treatment by 3 experienced doctors separately. Moreover, clinical results were evaluated by the pediatric quality of life score and systematic open questioning of the parents about the child's

wellbeing. Subjects, researchers, and monitors were blinded during the trial. Appropriate permissions (2008-004584-19) and no funding were obtained.

RESULTS: 16 cerebral palsy patients (GFMCS III-V) with CPS were consecutively included, whereas 6 patients were excluded. There were no drop-outs to follow-up, but 1 possible serious adverse event of pneumonia resulting in death was recorded and the study was terminated. No significant radiological or clinical changes were detected when compared with NaCl injections using Wilcoxon matched pair signed-rank test.

CONCLUSION: No positive radiological or clinical effects were demonstrated by this treatment, except for the parent's initial subjective but positive appraisal of the effect. However, the study was terminated due to 1 possible severe adverse event and scheduled numbers needed to treat (hence power) were not reached.

LEVEL OF EVIDENCE: 1.

DOI: 10.1097/BRS.0000000000001049

PMID: 26165216 [PubMed - indexed for MEDLINE]

Ultrasound-Guided Botulinum Toxin Type A Salivary Gland Injection in Children for Refractory Sialorrhea: 10-Year Experience at a Large Tertiary Children's Hospital.

Lungren MP, Halula S, Coyne S, Sidell D, Racadio JM, Patel MN

Pediatr Neurol. 2016 Jan;54:70-5. doi: 10.1016/j.pediatrneurol.2015.09.014. Epub 2015 Sep 28.

BACKGROUND: Sialorrhea is problematic for neurologically impaired children, and botulinum toxin A salivary gland injection has been reported as effective in reducing sialorrhea. This article assesses the success and safety of ultrasound-guided weight-based botulinum toxin A injection for the management of sialorrhea in children.

METHODS: A total of 111 patients (63 males; 48 females; average age 7 years) with refractory sialorrhea were treated with ultrasound-guided botulinum toxin type A salivary gland injections (144 procedures) from July 1, 2004, to July 1, 2014, using a single weight-based protocol. Patient history, procedural records, and clinical follow-up documents were retrospectively reviewed. Clinical data were compared with reported effectiveness and complications using odds ratios.

RESULTS: A total of 144 procedures were performed in 111 patients with refractory sialorrhea. Cerebral palsy was the most common underlying etiology for sialorrhea (29%), whereas others included encephalopathy (5%), anoxic brain injury (4%), and a variety of chromosomal anomalies (5%). There was a 100% technical success rate. Overall treatment effectiveness was 68%. Repeat injections were not associated with increased clinical success. No procedure-related deaths or major complications were identified; the minor complication rate was less than 2%.

CONCLUSIONS: The protocol used for ultrasound-guided injection of botulinum toxin A proved to be safe and effective in children suffering from sialorrhea. Image guidance technique may lead to a reduction in rates of adverse events reported in other series. Subsequent procedures do not improve upon initial efficacy.

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PMID: 26706481 [PubMed - indexed for MEDLINE]

Chirurgie

Ablative neurosurgery for movement disorders related to cerebral palsy.

Sitthinamsuwan B, Nunta-Aree S.

J Neurosurg Sci. 2015 Dec;59(4):393-404.

This article aims to describe the roles, operative strategies and outcomes of neuroablative procedures in treatment of movement disorders related to cerebral palsy (CP). The authors reviewed relevant medical literatures concerning ablative neurosurgical procedures for CP. Neurosurgery is an appropriate option for treatment of intractable movement disorders in CP. Destructive therapies can be selectively operated upon, on the brain, spinal cord, nerve root and peripheral nerve. Because all of them carry irreversible properties, presurgical evaluation and decision making for the surgery are critical. Selection of the procedures should be tailored for individual cases. Selective dorsal rhizotomy (SDR) is mostly suitable for CP children with spastic diplegia who are potential ambulators. Selective peripheral neurotomy (SPN) aims to diminish localized hypertonia. Intractable painful spasticity in an entire useless limb can be effectively treated by dorsal root entry zone lesion (DREZotomy). Stereotactic coagulation of specific targets in the brain is appropriate for more diffuse movement disorders or hyperkinesias confined to one

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side of the body. Combined surgery should be employed in management of more complicated abnormalities or coexisting neurologic and orthopedic disorders. Neuroablation remains an alternative to neuromodulation therapy, especially in circumstances when the latter is unavailable.

PMID: 26635190 [PubMed - indexed for MEDLINE]

Combined selective dorsal rhizotomy and scoliosis correction procedure in patients with cerebral palsy.

Muquit S, Ammar A, Nasto L, Moussa AA, Mehdian H, Vloeberghs MH

Eur Spine J. 2016 Feb;25(2):372-6. doi: 10.1007/s00586-015-4179-4. Epub 2015 Aug 20. Comment in *Eur Spine J.* 2016 Feb;25(2):377-8.

Intrathecal baclofen (ITB) therapy for spasticity has been suggested to accelerate the development of scoliosis. We present the case of a 17-year-old female patient with cerebral palsy who had ITB therapy from the age of 11 years. During this period, she developed a severe scoliosis measuring 86° from T11 to L4, with pain due to costo-pelvic impingement. Her baclofen pump had reached its end of life and required replacement if ITB therapy was to continue. This coincided with plans for scoliosis corrective surgery.

METHODS: We performed scoliosis correction along with removal of baclofen pump and selective dorsal rhizotomy (SDR), as a single combined procedure. SDR was performed instead of ITB pump replacement for management of spasticity.

RESULTS: Following surgery, scoliosis improved to 24°. At 6 month follow-up, there was significant improvement in spasticity and quality of life.

CONCLUSIONS: This report illustrates the feasibility of a combined procedure to correct scoliosis and manage spasticity with SDR. We present the case details, our management and review of the published literature regarding the factors influencing treatment of scoliosis and spasticity.

DOI: 10.1007/s00586-015-4179-4

PMID: 26289633 [PubMed - indexed for MEDLINE]

Correction of hip internal rotation in walking cerebral palsy adolescent using a soft tissue procedure an alternative to femoral rotation osteotomy.

Dohin B, Haddad E, Al Khoury Salem H, Merhez Kilani M

Ann Phys Rehabil Med. 2016 Sep;59S:e8. doi: 10.1016/j.rehab.2016.07.020.

OBJECTIVE: Hip internal rotation (HIR) during gait is one of the main functional disorders related to cerebral palsy (CP) in children. Most of the procedures proposed rotational osteotomy of the femur (FRO), (and/or tibia). However, multilevel surgery (SEMLS) including bone procedure, implicates more difficult and longer rehabilitation. When bone deformity is moderate, the authors hypothesized that FRO could be avoided. They developed a soft tissues procedure to improve HIR. The aim of the study was assessment of the procedure.

PATIENTS AND METHODS: In walking CP the authors selected patients presented with femoral anteversion less than 40° who were proposed for soft tissue procedure alone. Patients were previously tested with botulinum toxin injection of the hamstring muscles. The soft tissue procedure was: lengthening of semimembranosus, transfer of semitendinosus associated with tenotomy of the gracilis and gluteus minimus muscles. All the patients with pre and postoperative full data (clinical, kinematics and kinetics) were included. Data (i.e. foot intoeing, dynamic hip internal rotation in stance phase, hip rotation moment) were collected. Follow-up was at least one year after SEMLS.

RESULTS: We collected 20 selected patients with 24 lower limbs studied. Rotation of the pelvis did not differ significantly (P=0.21). Hip rotation in stance phase (50%), presented significant improvement from 16.5° intoeing to 0.5° external rotation (P<0.0001). Feet angulation related to walking direction was significantly improved, from 13° intoeing to 0.5° external rotation (P<0.0001).

DISCUSSION/CONCLUSION: HIR is a frequent gait disorder in CP. The etiology of the HIR seems to be related to muscles contractures and spasticity. Recently, soft tissue procedures were reported of interest in HIR. The soft tissue procedures presented improved significantly HIR making pointless FRO. Rehabilitation should be making easier.

RELEVANCE: the authors improve significantly the HIR using a soft tissues procedure and advocated reducing indication for FRO in internal rotation of lower limbs in order to make easier rehabilitation after SEMLS.

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PMID: 27677011 [PubMed - as supplied by publisher]

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Correction of Tibial Torsion in Children With Cerebral Palsy by Isolated Distal Tibia Rotation Osteotomy: A Short-term, In Vivo Anatomic Study.

Andrisevic E, Westberry DE, Pugh LI, Bagley AM, Tanner S, Davids JR.

J Pediatr Orthop. 2016 Oct-Nov;36(7):743-8. doi: 10.1097/BPO.0000000000000525.

BACKGROUND: Excessive internal or external tibial torsion is frequently present in children with cerebral palsy. Several surgical techniques have been described to correct excessive tibial torsion, including isolated distal tibial rotation osteotomy (TRO). The anatomic changes surrounding this technique are poorly understood. The goal of the study was to examine the anatomic relationship between the tibia and fibula following isolated distal TRO in children with cerebral palsy.

METHODS: Twenty patients with 29 limbs were prospectively entered for study. CT scans of the proximal and distal tibiofibular (TF) articulations were obtained preoperatively, at 6 weeks, and 1 year postoperatively. Measurements of tibia and fibula torsion were performed at each interval. Qualitative assessments of proximal and distal TF joint congruency were also performed.

RESULTS: The subjects with internal tibia torsion (ITT, 19 limbs) showed significant torsional changes for the tibia between preoperative, postoperative, and 1 year time points (mean torsion 13.21, 31.05, 34.84 degrees, respectively). Measurement of fibular torsion in the ITT treatment group also showed significant differences between time points (mean -36.77, -26.77, -18.54 degrees, respectively). Proximal and distal TF joints remained congruent at all time points in the study. Subjects with external tibia torsion (ETT, 10 limbs) showed significant differences between preoperative and postoperative tibial torsion, but not between postoperative and 1 year (mean torsion 54, 19.3, 23.3 degrees, respectively). Measurement of fibular torsion in the ETT treatment group did not change significantly between preoperative and postoperative, but did change significantly between postoperative and 1 year (mean torsion -9.8, -16.9, -30.7 degrees, respectively). Nine of 10 proximal TF joints were found to be subluxated at 6 weeks postoperatively. At 1 year, all 9 of these joints had reduced.

CONCLUSIONS: Correction of ITT by isolated distal tibial external rotation osteotomy resulted in acute external fibular torsion. The fibular torsion alignment remodeled over time to accommodate the corrected tibial torsional alignment and reduce the strain associated with the plastic deformity of the fibula. Correction of ETT by isolated distal internal TRO resulted in acute subluxation of the proximal TF articulation in almost all cases. Subsequent torsional remodeling of the fibula resulted in correction of the TF subluxation in all cases. Acute correction of TT by isolated distal TRO occurs by distinct mechanisms, based upon the direction of rotational correction.

LEVEL OF EVIDENCE: Level II-Diagnostic.

DOI: 10.1097/BPO.0000000000000525

PMID: 27603097 [PubMed - in process]

Factors predicting postoperative complications following spinal fusions in children with cerebral palsy scoliosis.

Nishnianidze T, Bayhan IA, Abousamra O, Sees J, Rogers KJ, Dabney KW, Miller F

Eur Spine J. 2016 Feb;25(2):627-34. doi: 10.1007/s00586-015-4243-0. Epub 2015 Sep 26.

PURPOSE: The purpose of this study was to review the postoperative complications after posterior spinal fusion (PSF) in cerebral palsy (CP) scoliosis and identify the predictive preoperative risk factors.

METHODS: All PSFs consecutively performed for CP scoliosis between 2004 and 2013 were reviewed. Preoperative risk score (ORS) and postoperative complications score (POCS) were used as measures of all recorded preoperative risk factors and postoperative complications, respectively.

RESULTS: The review included 303 children with a mean age of 14.6 ± 3.0 years. Mean hospitalization was 16 days. Dependence on G-tube feeding was associated with higher POCS ($P = 0.027$). Postoperative fever, seizures, and septicemia were associated with higher ORS ($P < 0.01$). Specifically, postoperative pancreatitis and deep wound infections were more common in children with G-tube.

CONCLUSION: This study suggests that G-tube dependence is a predictive risk factor of complications after PSF in CP scoliosis. Children with G-tube need special perioperative care. No other specific preoperative risk factor predicted postoperative complications.

DOI: 10.1007/s00586-015-4243-0

PMID: 26410446 [PubMed - indexed for MEDLINE]

[Femoral Derotation in Children with Cerebral Palsy - Does the Result Depend on the Age at Operation and the Kind of Surgery?].

[Article in German]

Braatz F, Poljuchow J, Klotz MC, Heitzmann DW, Wolf SI, Dreher T

Z Orthop Unfall. 2015 Dec;153(6):636-42. doi: 10.1055/s-0035-1557934. Epub 2015 Oct 15.

INTRODUCTION: Patients with spastic cerebral palsy GMFCS I-III often develop gait dysfunctions. One of the most prevalent gait dysfunctions is the intoeing gait. Femoral derotation osteotomy is the common treatment for internal rotation gait in cerebral palsy. We now present 3D-gait analysis data of the hip rotation in gait before and after femoral derotation osteotomy. We analysed the influence of the age at the index operation on the risk of recurrence and the surgical technique.

METHODS: We included 48 patients treated with femoral derotation osteotomy during a single event of multi-level surgery. Mean hip rotation in standing was measured before and after femoral derotation osteotomy (FDO). The patients were divided into two groups of different age and in a second analysis into two groups with the osteotomy in different locations, either inter-trochanteric (DO proximal) or supracondylar (DO distal).

RESULTS: Age at FDO and surgical technique had no influence on the results. However, the variance of the results was very high. Differences were found in the walking speed between the DO proximal and DO distal groups. The walking speed in the group of distal femoral osteotomy was higher. This difference was not significant, but there was a trend to proximal osteotomy in slower walkers. Significant improvements in IRG after FDO were found in our investigation. Our results indicate that FDO as a part of single-event multilevel surgery SEMLS provides a satisfactory mean overall correction of IRG. The results were independent of the age at the index operation and the location of the osteotomy.

Georg Thieme Verlag KG Stuttgart · New York.

DOI: 10.1055/s-0035-1557934

PMID: 26468922 [PubMed - indexed for MEDLINE]

Fixator-augmented flexible intramedullary nailing for osteopenic femoral shaft fractures in children.

Kong H, Sabharwal S.

J Pediatr Orthop B. 2016 Jan;25(1):11-6. doi: 10.1097/BPB.0000000000000237.

Children with underlying metabolic bone diseases, such as osteogenesis imperfecta and spastic cerebral palsy, pose a challenge in the treatment of femoral shaft fractures. We performed flexible intramedullary nailing with supplemental monolateral external fixation in a subgroup of such patients. The external fixator assists in controlling angulation and rotation at the fracture site, and avoids the need for supplemental casting with its associated problems such as skin breakdown and difficulty with personal hygiene. We describe the surgical technique, pitfalls, and outcomes in a series of four patients with underlying osteopenia treated with external fixator-augmented flexible nailing for femoral shaft fractures.

DOI: 10.1097/BPB.0000000000000237

PMID: 26426508 [PubMed - indexed for MEDLINE]

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 Article](#)

DOI: 10.1097/MD.0000000000005033

PMID: 27684879 [PubMed - in process]

Long-term changes in femoral anteversion and hip rotation following femoral derotational osteotomy in children with cerebral palsy.

Boyer E, Novacheck TF, Rozumalski A, Schwartz MH

Gait Posture. 2016 Sep 8;50:223-228. doi: 10.1016/j.gaitpost.2016.09.004. [Epub ahead of print]

BACKGROUND: Excessive femoral anteversion is common in cerebral palsy (CP), is often associated with internal hip rotation during gait, and is frequently treated with a femoral derotational osteotomy (FDO). Concerns exist regarding long-term maintenance of surgical outcomes. Past studies report varying rates of recurrence, but none have employed a control group.

METHODS: We conducted a retrospective analysis examining long-term (~5 years) changes in anteversion and hip rotation following FDO in children with CP. We included a control group that was matched for age and exhibited excessive anteversion ($>30^\circ$) but did not undergo an FDO. Anteversion, mean stance hip rotation, and rates of problematic remodeling and recurrence were assessed ($>15^\circ$ change and final level outside of normal limits).

RESULTS: The control group was reasonably well matched, but exhibited 9° less anteversion and 3° less internal hip rotation at the pre time point. At a five year follow-up, the FDO group had less anteversion than the control group (20° vs. 35° , $p < 0.05$). The mean stance phase hip rotation did not differ between the groups (4° vs. 5° , $p = 0.17$). Over one third of limbs remained excessively internal in both groups (FDO: 34%, Control: 37%). Rates of problematic recurrence and remodeling were low (0%-11%).

CONCLUSIONS: An FDO is an effective way to correct anteversion in children with CP. Long-term hip rotation is not fully corrected by the procedure, and is not superior to a reasonably well matched control group. Rates of problematic recurrence and remodeling are low, and do not differ between the groups.

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DOI: 10.1016/j.gaitpost.2016.09.004

PMID: 27653149 [PubMed - as supplied by publisher]

[Modified PemberSal osteotomy technique with lyophilized human allograft]. [Article in German]

Druschel C, Heck K, Kraft C, Placzek R

Oper Orthop Traumatol. 2016 Sep 14. [Epub ahead of print]

OBJECTIVE: PemberSal osteotomy to improve femoral head coverage by rotating the acetabular roof ventrally and laterally.

INDICATIONS: Insufficient coverage of the femoral head, and can be combined with other surgical procedures such as femoral intertrochanteric varus-derotation osteotomy and open reduction for developmental dysplasia and dislocation of the hip or to improve sphericity and containment in Legg-Calvé-Perthes disease. This specific acetabuloplasty can only be performed in patients with an open epiphyseal growth-plate.

CONTRAINDICATIONS: Increased bleeding tendency (e.g., inherited or iatrogenic); elevated anesthetic risk such as in cerebral palsy, arthrogryposis multiplex congenital, trisomies; syndromes require explicit interdisciplinary clarification to reduce perioperative risks; infections as in other elective surgeries; diseases/deformities making postoperative spica casting impossible or impractical (e.g., deformities of spinal cord or urogenital system, hernias requiring treatment); closed epiphyseal plate requires complex three-dimensional corrections of the acetabular roof (e.g., triple/periacetabular osteotomy).

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SURGICAL TECHNIQUE: Osteotomy from the iliac bone to the posterior ilioischial arm of the epiphyseal growth-plate cartilage; controlled fracture of the cancellous bone without breaking the medial cortex of the iliac bone for ventrocaudal rotation of the acetabular roof. To refill and stabilize the osteotomy site, an allogenic bone-wedge is interponated and secured by a resorbable screw or kirschner wire. This method also allows more complex reconstructions of the acetabular roof, e.g., by including the pseudo-cup in a modified Rejholec technique.

POSTOPERATIVE MANAGEMENT: A spica cast is applied to immobilize the hip for 6 weeks. Afterwards physiotherapy can be performed under weight-bearing as tolerated. Radiographic check-ups every 6 months.

DOI: 10.1007/s00064-016-0468-2

PMID: 27628762 [PubMed - as supplied by publisher]

Percutaneous Adductor Release in Nonambulant Children with Cerebral Palsy.

Sahu RL

JNMA J Nepal Med Assoc. 2014 Jan-Mar;52(193):702-6.

INTRODUCTION: Adductor spasticity at hips is the main barrier in functional activities and rehabilitation of spastic cerebral palsy patients. The aim of this study is to evaluate the results of percutaneous adductor release under general anaesthesia.

METHODS: From July 2005 to July 2010, 64 hips in 32 patients (19 males and 13 females) were recruited from outpatient department having adductor contracture at hips in cerebral palsy children. All children were operated under general anaesthesia. All children were followed for twenty-four months. The clinical results were evaluated radiologically, including measurement of CE- angle, AC-index and femoral head coverage and in terms of activity level of children.

RESULTS: Of the thirty-two children, twenty-eight showed marked and immediate improvement. None of our children was functionally worse at follow-up. The CE-angle and femoral head coverage did not change significantly. The AC-index improved significantly ($P = 0.01$). The results were excellent in 12.5% children, good in 50%, fair in 25% and poor in 12.5%.

CONCLUSIONS: Bilateral mini-invasive adductor release can be an effective treatment for children suffering from adductor contracture refractory to nonoperative management and early adductor release can prevent subluxation and possibly the need for future bony procedure on the proximal femur and pelvis.

PMID: 26905552 [PubMed - indexed for MEDLINE]

Percutaneous needle tenotomy in the treatment of neuro-orthopedic complications of upper limb related to central nervous system impairment: Open study on 12 patients.

Coroian F, Coulet B, Jourdan C, Choquet O, Laffont I

Ann Phys Rehabil Med. 2016 Sep;59S:e143. doi: 10.1016/j.rehab.2016.07.320.

OBJECTIVE: The musculotendinous retractions are common complications of central neurological damage with consequences for comfort and function. Treatment of uncomfortable retractions is often surgical, mainly based on tendon gestures. The objective of this study was to evaluate the efficiency of percutaneous needle tenotomy in these indications.

MATERIAL/PATIENTS AND METHODS: The indication was accepted at a medical-surgical consultation. Tenotomy was performed using an 18 Gauge needle. The patients were older than 18 years, had a history of central neurological disease, and had a musculotendinous retraction regarding a superficial tendon of upper limb. The primary endpoint was the Goal Attainment Scale (GAS). Secondary outcomes were pain, the pulp-palm distance and range of motion gain. The evaluation was conducted in pre-tenotomy, immediately post-tenotomy, 3 months and 6 months.

RESULTS: Twelve patients (8 women) were included in our study. The mean age was 62.91 years (28-87). Neuro-orthopedic disorders were related to a stroke ($n=4$), head trauma ($n=2$), to Parkinsonian syndrome ($n=3$) at a cerebral palsy ($n=3$). The objectives identified were nursing ($n=12$), pain ($n=11$), the skin condition ($n=5$), gripping ($n=2$), posture ($n=1$) and dressing ($n=1$). The targets were achieved in all cases. The average score GAS per patient ranged from 0 to 2. GAS score was unchanged at 3 months and 6 months.

DISCUSSION-CONCLUSION: Our experience confirms the locations already described for percutaneous needle tenotomy of the flexor of the fingers. We also report the effectiveness of percutaneous tenotomy in the wrist and elbow flexors without vascular and nerve injury elbow.

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DOI: 10.1016/j.rehab.2016.07.320

PMID: 27676802 [PubMed - as supplied by publisher]

Surgical correction of scoliosis in patients with severe cerebral palsy.

Beckmann K, Lange T, Gosheger G, Bövingloh AS, Borowski M, Bullmann V, Liljenqvist U, Schulte TL
Eur Spine J. 2016 Feb;25(2):506-16. doi: 10.1007/s00586-015-4107-7. Epub 2015 Jul 9.

INTRODUCTION: There is a lack of data in the literature on surgical correction of severe neuromuscular scoliosis in patients with serious extent of cerebral palsy. The purpose of this retrospective cohort study was to analyze the radiological and clinical results after posterior-only instrumentation (group P) and combined anterior-posterior instrumentation (group AP) in severe scoliosis in patients with Gross Motor Function Classification System grades IV and V.

MATERIALS AND METHODS: All eligible patients who underwent surgery in one institution between 1997 and 2012 were analyzed, and charts, surgical reports, and radiographs were evaluated with a minimum follow-up period of 2 years.

RESULTS: Fifty-seven patients were included (35 in group P, 22 in group AP), with a median follow-up period of 4.1 years. The preoperative mean Cobb angles were 84° (34 % flexibility) in group P and 109° (27 % flexibility) in group AP. In group P, the Cobb angle was 39° (54 % correction) at discharge and 43° at the final follow-up, while in group AP the figures were 54° (50 % correction) at discharge and 56° at the final follow-up. Major complications occurred in 23 vs. 46 % of the patients, respectively. Preoperative curve flexibility was an important predictor for relative curve correction, independently of the type of surgery.

CONCLUSION: Posterior-only surgery appears to lead to comparable radiological results, with shorter operating times and shorter intensive-care unit and hospital stays than combined surgery. The duration of surgery was a relevant predictor for complications.

DOI: 10.1007/s00586-015-4107-7

PMID: 26155897 [PubMed - indexed for MEDLINE]

Réadaptation fonctionnelle

Adding parent-delivered therapy does not improve upper limb function more than repeated practice alone in children with cerebral palsy [commentary].

Johnston LM

J Physiother. 2016 Aug 1. pii: S1836-9553(16)30037-6. doi: 10.1016/j.jphys.2016.07.001. [Epub ahead of print

[Free Article](#)

DOI: 10.1016/j.jphys.2016.07.001

PMID: 27634167 [PubMed - as supplied by publisher]

Cerebral palsy in adult patients: constraint-induced movement therapy is effective to reverse the nonuse of the affected upper limb.

Oliveira AC, Freitas Cd, Eras-Garcia R, Matuti GS, Santos JF, Oliveira CB

Arq Neuropsiquiatr. 2016 Jan;74(1):18-21. doi: 10.1590/0004-282X20150195. Epub 2015 Dec 22.

OBJECTIVE: To determine if the original protocol of Constraint-Induced Movement Therapy (CIMT), is adequate to reverse the nonuse of the affected upper limb (AUL) in patients with Cerebral Palsy (CP) in adulthood.

METHOD: The study included 10 patients diagnosed with CP hemiparesis had attended the adult protocol CIMT, from January/August 2009/2014.

RESULTS: Average age 24.6 (SD 9.44); MAL average pretreatment How Often (HO) = 0.72 and How Well (HW) = 0.68 and post-treatment HO = 3.77 and HW = 3.60 ($p \leq 0.001$) and pretreatment WMFT average = 21.03 and post-treatment average = 18.91 ($p = 0.350$).

CONCLUSION: The constraint-induced movement therapy is effective to reverse the nonuse learn of the AUL in adult patients with CP.

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DOI: 10.1590/0004-282X20150195

PMID: 26690842 [PubMed - indexed for MEDLINE]

Child-Focused and Context-Focused Behaviors of Physical and Occupational Therapists during Treatment of Young Children with Cerebral Palsy.

Kruijssen-Terpstra AJ, Ellens M, Ketelaar M, Verschuren O, Di Rezze B, Gorter JW, Visser-Meily AM, Jongmans MJ

Phys Occup Ther Pediatr. 2016 Sep 3:1-13. [Epub ahead of print]

AIMS: To (1) describe the child- and context-focused behaviors of physical and occupational therapists, and (2) compare the behaviors of therapists in a standard therapy session with those of therapists trained to deliver child- and context-focused services.

METHOD: Videos of 49 therapy sessions provided by 36 therapists were analyzed using the intervention domains of the Paediatric Rehabilitation Observational measure of Fidelity (PROF) to examine the therapeutic behaviors of physical and occupational therapists with young children with cerebral palsy (CP) (24 to 48 months) in a Dutch rehabilitation setting. The PROF ratings of 18 standard therapy sessions were compared with the ratings of 16 child- and 15 context-focused therapy sessions.

RESULTS: Therapists who provided standard therapy demonstrated a mix of child- and context-focused behaviors. PROF ratings indicated fewer child- and context-focused behaviors during standard therapy sessions compared with sessions where therapists were instructed to use either child- or context-focused behaviors.

CONCLUSIONS: A sample of Dutch physical and occupational therapists of young children with CP demonstrated a mix of child- and context-focused therapy behaviors during standard therapy. Further research is recommended on clinical reasoning and the effect of setting to better understand therapists' use of child- and context-focused behaviors during therapy sessions.

DOI: 10.1080/01942638.2016.1202877

PMID: 27593569 [PubMed - as supplied by publisher]

Early childhood constraint therapy for sensory/motor impairment in cerebral palsy: a randomised clinical trial protocol.

Chorna O, Heathcock J, Key A, Noritz G, Carey H, Hamm E, Nelin MA, Murray M, Needham A, Slaughter JC, Maitre NL

BMJ Open. 2015 Dec 7;5(12):e010212. doi: 10.1136/bmjopen-2015-010212.

INTRODUCTION: Cerebral palsy (CP) is the most common physical disability in childhood. It is a disorder resulting from sensory and motor impairments due to perinatal brain injury, with lifetime consequences that range from poor adaptive and social function to communication and emotional disturbances. Infants with CP have a fundamental disadvantage in recovering motor function: they do not receive accurate sensory feedback from their movements, leading to developmental disregard. Constraint-induced movement therapy (CIMT) is one of the few effective neurorehabilitative strategies shown to improve upper extremity motor function in adults and older children with CP, potentially overcoming developmental disregard.

METHODS AND ANALYSIS: This study is a randomised controlled trial of children 12-24 months corrected age studying the effectiveness of CIMT combined with motor and sensory-motor interventions. The study population will comprise 72 children with CP and 144 typically developing children for a total of N=216 children. All children with CP, regardless of group allocation will continue with their standard of care occupational and physical therapy throughout the study. The research material collected will be in the form of data from high-density array event-related potential scan, standardised assessment scores and motion analysis scores.

ETHICS AND DISSEMINATION: The study protocol was approved by the Institutional Review Board. The findings of the trial will be disseminated through peer-reviewed journals and scientific conferences.

TRIAL REGISTRATION NUMBER: NCT02567630.

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PMCID: PMC4679990

PMID: 26644127 [PubMed - indexed for MEDLINE]

Science Infos Paralysie Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
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Early vibration assisted physiotherapy in toddlers with cerebral palsy – a randomized controlled pilot trial.

Stark C, Herkenrath P, Hollmann H, Waltz S, Becker I, Hoebing L, Semler O, Hoyer-Kuhn H, Duran I, Hero B, Hadders-Algra M, Schoenau E.

J Musculoskelet Neuronal Interact. 2016 Sep 7;16(3):183-92.

OBJECTIVES: to investigate feasibility, safety and efficacy of home-based side-alternating whole body vibration (sWBV) to improve motor function in toddlers with cerebral palsy (CP).

METHODS: Randomized controlled trial including 24 toddlers with CP (mean age 19 months (SD±3.1); 13 boys).

INTERVENTION: 14 weeks sWBV with ten 9-minute sessions weekly (non-individualized). Group A started with sWBV, followed by 14 weeks without; in group B this order was reversed. Feasibility (≥70% adherence) and adverse events were recorded; efficacy evaluated with the Gross Motor Function Measure (GMFM-66), Pediatric Evaluation of Disability Inventory (PEDI), at baseline (T0), 14 (T1) and 28 weeks (T2).

RESULTS: Developmental change between T0 and T1 was similar in both groups; change scores in group A and B: GMFM-66 2.4 (SD±2.1) and 3.3 (SD±2.9) (p=0.412); PEDI mobility 8.4 (SD±6.6) and 3.5 (SD±9.2) (p=0.148), respectively. In two children muscle tone increased post-sWBV. 24 children received between 67 and 140 sWBV sessions, rate of completed sessions ranged from 48 to 100% and no dropouts were observed.

CONCLUSION: A 14-week home-based sWBV intervention was feasible and safe in toddlers with CP, but was not associated with improvement in gross motor function.

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PMID: 27609033 [PubMed - in process]

Effects of an Off-Axis Pivoting Elliptical Training Program on Gait Function in Persons With Spastic Cerebral Palsy: A Preliminary Study.

Tsai LC, Ren Y, Gaebler-Spira DJ, Revivo GA, Zhang LQ.

Am J Phys Med Rehabil. 2016 Sep 22. [Epub ahead of print]

This preliminary study examined the effects of off-axis elliptical training on reducing transverse-plane gait deviations and improving gait function in 8 individuals with cerebral palsy (CP) (15.5 ± 4.1 years) who completed an training program using a custom-made elliptical trainer that allows transverse-plane pivoting of the footplates during exercise. Lower-extremity off-axis control during elliptical exercise was evaluated by quantifying the root-mean-square and maximal angular displacement of the footplate pivoting angle. Lower-extremity pivoting strength was assessed. Gait function and balance were evaluated using 10-m walk test, 6-minute-walk test, and Pediatric Balance Scale. Toe-in angles during gait were quantified. Participants with CP demonstrated a significant decrease in the pivoting angle (root mean square and maximal angular displacement; effect size, 1.00-2.00) and increase in the lower-extremity pivoting strength (effect size = 0.91-1.09) after training. Reduced 10-m walk test time (11.9 ± 3.7 seconds vs. 10.8 ± 3.0 seconds; P = 0.004; effect size = 1.46), increased Pediatric Balance Scale score (43.6 ± 12.9 vs. 45.6 ± 10.8; P = 0.042; effect size = 0.79), and decreased toe-in angle (3.7 ± 10.5 degrees vs. 0.7 ± 11.7 degrees; P = 0.011; effect size = 1.22) were observed after training. We present an intervention to challenge lower-extremity off-axis control during a weight-bearing and functional activity for individuals with CP. Our preliminary findings suggest that this intervention was effective in enhancing off-axis control, gait function, and balance and reducing in-toeing gait in persons with CP.

DOI: 10.1097/PHM.0000000000000632

PMID: 27661216 [PubMed - as supplied by publisher]

Effects of Intensive versus Non-Intensive Physical Therapy on Children with Cerebral Palsy.

Rahman MA, Zaman MM, Rahman MM, Moniruzzaman M, Ahmed B, Chhobi FK, Rahman N, Akter MR.

Mymensingh Med J. 2016 Jul;25(3):421-4.

Cerebral Palsy (CP) is one of the most common causes of all childhood disorders. There are tone, posture and movements difficulty due to non-progressive damage to the immature brain in CP. The hallmark of CP is a disability in the development of gross motor function (GMF). The influence of gross motor development on fine motor development is more important in early developmental period, specially under three years old and in children with CP. Various therapeutic interventions have been used in the management of GMF development. Among them

physical therapy is the most common intervention in CP and is usually a component of mandated programs. Physical therapy means physical stimulations in the form of various therapeutic exercises, touch, massage, limbs and trunk movement, balancing and coordination training, gait and ambulation training, cognitive stimulation as well as speech, language and occupational therapy. Our study focused to see the effect by short term intensive versus non-intensive physical therapy on children GMF development by using gross motor function measure (GMFM) Score sheet, GMFM-88, version 1.0. Study provides the information that physical therapy intervention is effective in GMF development and intensive interventions are more effective in children with spastic CP than non-intensive one. Study also inform that the more early treatment the more effective result.

PMID: 27612885 [PubMed - in process]

Feasibility of a self-rehabilitation program by mirror therapy in children with hemiplegic cerebral palsy.

Pasquet T, Gaillard F, Newman CJ, Jequier Gygax M, Le Cornec C, Bonan I, Rauscent H

Ann Phys Rehabil Med. 2016 Sep;59S:e9. doi: 10.1016/j.rehab.2016.07.023.

OBJECTIVE: In children with hemiplegic cerebral palsy (HCP), some studies have shown an improvement in manual function following a self-rehabilitation program by mirror therapy. However, adherence to this protocol has not been reported. So, we studied the feasibility and compliance of this self-rehabilitation program in the hemiplegic child.

MATERIAL AND METHODS: The aim of this study was to evaluate the effect of mirror therapy on the upper limb of children with HCP. Twenty-eight children (11.9±2.7 years) went through a self-rehabilitation program by mirror therapy at home. This program was developed by the Swiss team of Newman and Gigax. It consists of 7 exercises, for a total of 15min, repeated 5 days per week for 5 weeks. A diary was given to each child to note the daily time spent on the protocol and the number of series actually done for each exercise. Adherence was assessed by the number of series performed. Difficulties and adverse events that occurred during this period were also collected.

RESULTS: All the children have achieved the 5 week protocol and all were satisfied with their participation. The global observance of the protocol is good with 86.3% of the exercises performed on the average of five weeks (SD±12.6). There is no significant difference between the observance of the first week and that of the fifth week (87% vs. 81%) (P=0.22). It exists a significant decrease in the average length of time spent on the protocol between the first and the fifth week (18min 24 vs. 12min 42) (P<0.05). No event or significant adverse effects was detected during the protocol.

DISCUSSION/CONCLUSION: This self-rehabilitation protocol by mirror therapy shows good feasibility and good compliance. Self-rehabilitation seems to be an interesting tool easy to implement and well accepted by the children with HCP.

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PMID: 27677029 [PubMed - as supplied by publisher]

Gastrocnemius operating length with ankle foot orthoses in cerebral palsy.

Choi H, Wren TA, Steele KM

Prosthet Orthot Int. 2016 Sep 9. pii: 0309364616665731. [Epub ahead of print]

BACKGROUND: Many individuals with cerebral palsy wear ankle foot orthoses during daily life. Orthoses influence joint motion, but how they impact muscle remains unclear. In particular, the gastrocnemius is commonly stiff in cerebral palsy. Understanding whether orthoses stretch or shorten this muscle during daily life may inform orthosis design and rehabilitation.

OBJECTIVES: This study investigated the impact of different ankle foot orthoses on gastrocnemius operating length during walking in children with cerebral palsy.

STUDY DESIGN: Case series, within subject comparison of gastrocnemius operating length while walking barefoot and with two types of ankle foot orthoses.

METHODS: We performed gait analyses for 11 children with cerebral palsy. Each child was fit with two types of orthoses: a dynamic ankle foot orthosis (Cascade dynamic ankle foot orthosis) and an adjustable dynamic response ankle foot orthosis (Ultraflex ankle foot orthosis). Musculoskeletal modeling was used to quantify gastrocnemius musculotendon operating length and velocity with each orthosis.

RESULTS: Walking with ankle foot orthoses could stretch the gastrocnemius more than barefoot walking for some individuals; however, there was significant variability between participants and orthoses. At least one type of orthosis stretched the gastrocnemius during walking for 4/6 and 3/5 of the Gross Motor Functional Classification System Level I and III participants, respectively. AFOs also reduced peak gastrocnemius lengthening velocity compared to barefoot walking for some participants, with greater reductions among the Gross Motor Functional Classification System Level III participants. Changes in gastrocnemius operating length and lengthening velocity were related to changes in ankle and knee kinematics during gait.

CONCLUSION: Ankle foot orthoses impact gastrocnemius operating length during walking and, with proper design, may assist with stretching tight muscles in daily life.

CLINICAL RELEVANCE: Determining whether ankle foot orthoses stretch tight muscles can inform future orthotic design and potentially provide a platform for integrating therapy into daily life. However, stretching tight muscles must be balanced with other goals of orthoses such as improving gait and preventing bone deformities.

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PMID: 27613590 [PubMed - as supplied by publisher]

Kinematic and EMG Responses to Pelvis and Leg Assistance Force during Treadmill Walking in Children with Cerebral Palsy.

Wu M, Kim J, Arora P, Gaebler-Spira DJ, Zhang Y

Neural Plast. 2016;2016:5020348. doi: 10.1155/2016/5020348. Epub 2016 Aug 29.

Treadmill training has been used for improving locomotor function in children with cerebral palsy (CP), but the functional gains are relatively small, suggesting a need to improve current paradigms. The understanding of the kinematic and EMG responses to forces applied to the body of subjects during treadmill walking is crucial for improving current paradigms. The objective of this study was to determine the kinematics and EMG responses to the pelvis and/or leg assistance force. Ten children with spastic CP were recruited to participate in this study. A controlled assistance force was applied to the pelvis and/or legs during stance and swing phase of gait through a custom designed robotic system during walking. Muscle activities and spatial-temporal gait parameters were measured at different loading conditions during walking. In addition, the spatial-temporal gait parameters during overground walking before and after treadmill training were also collected. Applying pelvis assistance improved step height and applying leg assistance improved step length during walking, but applying leg assistance also reduced muscle activation of ankle flexor during the swing phase of gait. In addition, step length and self-selected walking speed significantly improved after one session of treadmill training with combined pelvis and leg assistance.

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DOI: 10.1155/2016/5020348

PMCID: PMC5019900

PMID: 27651955 [PubMed - in process]

Pediatric rehabilitation with the reachMAN's modular handle.

Tong LZ, Ong HT, Tan JX, Lin J, Burdet E, Ge SS, Teo CL.

Conf Proc IEEE Eng Med Biol Soc. 2015;2015:3933-6. doi: 10.1109/EMBC.2015.7319254.

This paper presents the results of a preliminary study with one cerebral palsy child using the ReHaptic Handle, a novel robotic device for the pediatric rehabilitation of upper limb function. The device has two degrees-of-freedom to train pinching, forearm supination/pronation and wrist flexion/extension movements. Interactive computer games have been implemented to increase subjects' participation and engagement, thus promoting motor recovery. Pinching, with the index finger and thumb, forearm supination/pronation as well as wrist flexion/extension were trained two or three times a week for 15 minutes each. An increase in forearm supination/pronation movement precision and smoothness was observed with the subject, as well as a reduction in the movement duration.

DOI: 10.1109/EMBC.2015.7319254

PMID: 26737154 [PubMed - indexed for MEDLINE]

Randomized controlled trial of a web-based multi-modal therapy program for executive functioning in children and adolescents with unilateral cerebral palsy.

Science Infos Paralysie Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
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M Piovesana A, Ross S, Lloyd O, Whittingham K, Ziviani J, Ware RS, Boyd RN
Disabil Rehabil. 2016 Sep 24;1-8. [Epub ahead of print]

Purpose state: Determine the efficacy of Move-it-to-improve-it (Mitii™), a multi-modal web-based program, in improving Executive Function (EF) in children with unilateral cerebral palsy (UCP).

METHOD: Participants (n = 102) were matched in pairs then randomized to: intervention (Mitii™ for 20 weeks; n = 51; 26 males; mean age = 11 years 8 months (SD = 2 years 4 months); Full Scale IQ = 84.65 (SD = 15.19); 28 left UCP; GMFCS-E&R (I = 20, II = 31) or waitlist control (n = 50; 25 males; mean age = 11 years 10 months (SD = 2 years 5 months); Full Scale IQ = 80.75 (SD = 19.81); 20 left UCP; GMFCS-E&R (I = 25, II = 25). Mitii™ targeted working memory (WM), visual processing (VP), upper limb co-ordination and physical activity. EF capacity was assessed: attentional control (DSB; WISC-IV); cognitive flexibility (inhibition and number-letter sequencing DKEFS); goal setting (D-KEFs Tower Test); and information processing (WISC-IV Symbol Search and Coding). EF performance was assessed via parent report (BRIEF). Groups were compared at 20 weeks using linear regression (SPSS 21).

RESULTS: There were no significant between group differences in attentional control (DSB; p = 0.20; CI= -0.40,1.87); cognitive flexibility (Inhibition, p = 0.34; CI= -0.73,2.11; number/letter sequencing, p = 0.17; CI= -0.55,2.94); problem solving (Tower; p = 0.28; CI= -0.61,2.09), information processing (Symbol; p = 0.08; CI= -0.16, 2.75; Coding; p = 0.07; CI= -0.12,2.52) or EF performance (p = 0.13; CI= -10.04,1.38).

CONCLUSION: In a large RCT, Mitii(TM) did not lead to significant improvements on measures of EF or parent ratings of EF performance in children with UCP. Implications for rehabilitation A large RCT of the multi-modal web based training; Move It to Improve It (Mitii(TM)) improves motor processing, visual perception, and physical capacity but does demonstrate statistically significant improvements or clinical significance in executive function in children with mild to moderate unilateral cerebral palsy (UCP). Mitii(TM) training completed by an intervention group was highly variable with few children reaching the target dosage of 60 h. Technical issues including server and internet connectively problems lead to disengagement with the program. Web-based training delivered in the home has the potential to increase therapy dose and accessibility, however, Mitii(TM) needs to be tailored to include tasks involving goal-setting, more complex problem solving using multi-dimensional strategies, mental flexibility, switching between two cognitively demanding tasks, and greater novelty in order to increase the cognitive component and challenge required to drive changes in EF.

DOI: 10.1080/09638288.2016.1213899

PMID: 27665941 [PubMed - as supplied by publisher]

The Effects of Acute Intense Physical Exercise on Postural Stability in Children With Cerebral Palsy.

Leineweber MJ, Wyss D, Dufour SK, Gane C, Zabjek K, Bouyer LJ, Maltais DB, Voisin JI, Andrysek J.

Adapt Phys Activ Q. 2016 Jul;33(3):271-82. doi: 10.1123/APAQ.2015-0115.

This study evaluated the effects of intense physical exercise on postural stability of children with cerebral palsy (CP). Center of pressure (CoP) was measured in 9 typically developing (TD) children and 8 with CP before and after a maximal aerobic shuttle-run test (SRT) using a single force plate. Anteroposterior and mediolateral sway velocities, sway area, and sway regularity were calculated from the CoP data and compared between pre- and postexercise levels and between groups. Children with CP demonstrated significantly higher pre-SRT CoP velocities than TD children in the sagittal (18.6 ± 7.6 vs. 6.75 ± 1.78 m/s) and frontal planes (15.4 ± 5.3 vs. 8.04 ± 1.51 m/s). Post-SRT, CoP velocities significantly increased for children with CP in the sagittal plane (27.0 ± 1.2 m/s), with near-significant increases in the frontal plane (25.0 ± 1.5 m/s). Similarly, children with CP evidenced larger sway areas than the TD children both pre- and postexercise. The diminished postural stability in children with CP after short but intense physical exercise may have important implications including increased risk of falls and injury.

DOI: 10.1123/APAQ.2015-0115

PMID: 27623610 [PubMed - in process]

Three Case Reports of Successful Vibration Therapy of the Plantar Fascia for Spasticity Due to Cerebral Palsy-Like Syndrome, Fetal-Type Minamata Disease.

Usuki F, Tohyama S.

Medicine (Baltimore). 2016 Apr;95(15):e3385. doi: 10.1097/MD.0000000000003385.

Fetal-type Minamata disease is caused by the exposure to high concentrations of methylmercury in the fetal period and shows cerebral palsy-like clinical features. Relief of spasticity is a major task of rehabilitation to improve their activities of daily living. Here we report the effect of long-term vibration therapy on bilateral lower-limb spasticity in 3 patients with fetal-type Minamata disease. We used a simple, inexpensive, and noninvasive approach with hand-held vibration massagers, which were applied to the plantar fascia at 90 Hz for 15 minutes. The effect was observed soon after the first treatment and resulted in better performance of the repetitive facilitation. Vibration therapy for 1 year improved Modified Ashworth Scale for the ankle flexors in 2 cases. The labored gait improved and gait speed increased in another case. Continued vibration therapy for another 1 year further improved Modified Ashworth Scale score and range of motion of ankle dorsiflexion in 1 case. This case showed the decreased amplitude of soleus H-reflex after the 15-minute vibration therapy, suggesting that α -motor neuron excitability was suppressed. Vibration therapy using a hand-held vibration massager may offer safe and effective treatment for lower-limb spasticity in patients with chronic neurological disorders.

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DOI: 10.1097/MD.0000000000003385

PMCID: PMC4839852

PMID: 27082608 [PubMed - indexed for MEDLINE]

Orthèses

An exploratory study of gait and functional outcomes after neuroprosthesis use in children with hemiplegic cerebral palsy.

Bailes AF, Caldwell C, Clay M, Tremper M, Dunning K, Long J

Disabil Rehabil. 2016 Sep 16:1-9. [Epub ahead of print]

PURPOSE: To evaluate the immediate orthotic, total and therapeutic effects of functional electrical stimulation (FES) neuroprosthesis use on clinic based measures of gait and function in children with hemiplegic cerebral palsy.

METHODS: Eleven children (mean 9 years 11 months) participated in an FES neuroprosthesis (Ness L300) intervention (4 week accommodation period followed by 12 weeks of daily use) and were assessed at baseline and post in stimulation off and stimulation on conditions. Measures included clinic based outcomes of gait and function.

RESULTS: No significant immediate orthotic effects were observed. Significant ($p < 0.01$) total effects were noted for dorsiflexion at initial contact, Six-Minute Walk Test (6MWT), and walking speed. A significant therapeutic effect was found for steps off path on the Standardized Walking Obstacle Course (SWOC).

CONCLUSIONS: Results support previous findings of neuroprosthesis total effects on gait and provide some evidence for effects on function. Therapeutic effects remain unclear. Implications for Rehabilitation In this study, children with hemiplegic CP did not demonstrate immediate improvements in gait or function at their first clinic visit using the FES neuroprosthesis device suggesting one visit using the device is not sufficient to determine potential benefits. Over time with daily use of the FES neuroprosthesis, ankle dorsiflexion in swing and at initial contact, walking speed and endurance increased with the device worn. Overtime, no carryover effects in ankle dorsiflexion in swing and at initial contact were noted at the end of the intervention period with the device off. Clinicians should consider purchasing units to loan or rent to individuals to trial a device at home before determining long-term potential for benefit.

DOI: 10.1080/09638288.2016.1225827

PMID: 27636551 [PubMed - as supplied by publisher]

Changes of Plantar Pressure and Gait Parameters in Children with Mild Cerebral Palsy Who Used a Customized External Strap Orthosis: A Crossover Study.

Chang WD, Chang NJ, Lin HY, Lai PT

Biomed Res Int. 2015;2015:813942. doi: 10.1155/2015/813942. Epub 2015 Nov 10.

Toe-in gait and crouch gait can make children with mild cerebral palsy fall and suffer improper balance during walking or ambulation training. A customized external strap orthosis for correcting leg alignment was used to resolve this problem. The purpose of this study was to research the immediate effects while wearing the customized external strap orthosis. Pressure platform was used to assess the plantar pressure through static and dynamic assessments and to record the changes in path of pressure trajectory. Motion image analysis system was used to record the gait parameters, which included gait speed, stride length, and cadence. The influence of both wearing and

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removing the orthosis on the dominant leg of children with mild cerebral palsy was analyzed. Nine children with mild cerebral palsy, who all had a dominant right leg, were recruited. After wearing the orthosis, all gait parameters improved, and foot motion changed in the stance phase of the gait cycle. The path of pressure trajectory closing to the midline was also observed during dynamic assessment. Changes in plantar pressure and path of pressure trajectory were observed and the orthosis device could provide immediate assistance to correct the leg alignment and improve the gait performance in children with mild cerebral palsy.

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DOI: 10.1155/2015/813942

PMCID: PMC4657403

PMID: 26640796 [PubMed - indexed for MEDLINE]

Effect of ankle-foot orthoses on gait in children with cerebral palsy: A meta-analysis.

Bourseul JS, Lintanf M, Saliou P, Brochard S, Pons C

Ann Phys Rehabil Med. 2016 Sep;59S:e6. doi: 10.1016/j.rehab.2016.07.016.

OBJECTIVE: Different ankle-foot orthoses (AFO) are often prescribed in children with cerebral palsy (PC) although their efficiency on gait remains unclear.

PURPOSE: (1) To determine the effect of AFOs on gait in children with CP and (2) to evaluate the effect of each types of AFO.

MATERIAL AND METHODS: Studies in English with control condition (barefoot or shoes) assessing effect of AFO about children with CP gait were search on the Pubmed, CINAHL+, Web of Science, Cochrane Library databases. Quality of each study was assessed by modified PEDRO scale. Only studies with a score more than 4 were selected. 10 gait parameters were extracted in each study. Effect size and 95% confidence interval were calculated for each parameter.

RESULTS: Seventeen studies (490 subjects) were included. Comparing AFOs to control condition, stride length increased (15 studies) $d=1.04$ [95% CI: 0.69; 1.38], velocity increased (16 studies) $d=0.27$ [95% CI: 0.14; 0.41], cadence decreased (15 studies) $d=-0.69$, [95% CI: -0.95; -0.43]. Ankle dorsiflexion increased at initial contact (11 studies) $d=1.64$, [95% CI: 1.16; 2.11] and in swing phase (7 studies) $d=5.21$, [95% CI: 1.91; 8.52]. Ankle power generation in stance phase decreased (6 studies) $d=-0.26$, [95% CI: -0.38; -0.14]. The duration of tibialis anterior activation and energy data did not changed significantly. Four types of orthosis were found: dynamic AFO, hinged AFO, solid AFO, supra-malleolar orthosis. Hinged AFO was the orthosis that improved the greater number of gait parameters and was the only one to improve velocity with an effect size >0.8 (large effect).

DISCUSSION/CONCLUSION: This study shows clinically significant effect of AFO on stride length, ankle dorsiflexion at initial contact and swing phase. Hinged AFO seems to have the greatest effect on gait. New data are needed to refine the choice of the orthosis according to the child gait pattern.

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Gastrocnemius operating length with ankle foot orthoses in cerebral palsy.

Choi H, Wren TA, Steele KM

Prosthet Orthot Int. 2016 Sep 9. pii: 0309364616665731. [Epub ahead of print]

BACKGROUND: Many individuals with cerebral palsy wear ankle foot orthoses during daily life. Orthoses influence joint motion, but how they impact muscle remains unclear. In particular, the gastrocnemius is commonly stiff in cerebral palsy. Understanding whether orthoses stretch or shorten this muscle during daily life may inform orthosis design and rehabilitation.

OBJECTIVES: This study investigated the impact of different ankle foot orthoses on gastrocnemius operating length during walking in children with cerebral palsy.

STUDY DESIGN: Case series, within subject comparison of gastrocnemius operating length while walking barefoot and with two types of ankle foot orthoses.

METHODS: We performed gait analyses for 11 children with cerebral palsy. Each child was fit with two types of orthoses: a dynamic ankle foot orthosis (Cascade dynamic ankle foot orthosis) and an adjustable dynamic response

ankle foot orthosis (Ultraflex ankle foot orthosis). Musculoskeletal modeling was used to quantify gastrocnemius musculotendon operating length and velocity with each orthosis.

RESULTS: Walking with ankle foot orthoses could stretch the gastrocnemius more than barefoot walking for some individuals; however, there was significant variability between participants and orthoses. At least one type of orthosis stretched the gastrocnemius during walking for 4/6 and 3/5 of the Gross Motor Functional Classification System Level I and III participants, respectively. AFOs also reduced peak gastrocnemius lengthening velocity compared to barefoot walking for some participants, with greater reductions among the Gross Motor Functional Classification System Level III participants. Changes in gastrocnemius operating length and lengthening velocity were related to changes in ankle and knee kinematics during gait.

CONCLUSION: Ankle foot orthoses impact gastrocnemius operating length during walking and, with proper design, may assist with stretching tight muscles in daily life.

CLINICAL RELEVANCE: Determining whether ankle foot orthoses stretch tight muscles can inform future orthotic design and potentially provide a platform for integrating therapy into daily life. However, stretching tight muscles must be balanced with other goals of orthoses such as improving gait and preventing bone deformities.

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Robots – Exosquelette

An ecological evaluation of the metabolic benefits due to robot-assisted gait training.

Peri E, Biffi E, Maghini C, Marzorati M, Diella E, Pedrocchi A, Turconi AC, Reni G.

Conf Proc IEEE Eng Med Biol Soc. 2015 Aug;2015:3590-3. doi: 10.1109/EMBC.2015.7319169.

Cerebral palsy (CP), one of the most common neurological disorders in childhood, features affected individual's motor skills and muscle actions. This results in elevated heart rate and rate of oxygen uptake during sub-maximal exercise, thus indicating a mean energy expenditure higher than healthy subjects. Rehabilitation, currently involving also robot-based devices, may have an impact also on these aspects. In this study, an ecological setting has been proposed to evaluate the energy expenditure of 4 children with CP before and after a robot-assisted gait training. Even if the small sample size makes it difficult to give general indications, results presented here are promising. Indeed, children showed an increasing trend of the energy expenditure per minute and a decreasing trend of the energy expenditure per step, in accordance to the control group. These data suggest a metabolic benefit of the treatment that may increase the locomotion efficiency of disabled children.

DOI: 10.1109/EMBC.2015.7319169

PMID: 26737069 [PubMed - indexed for MEDLINE]

Feasibility and reliability of using an exoskeleton to emulate muscle contractures during walking.

Attias M, Bonnefoy-Mazure A, De Coulon G, Cheze L, Armand S

Gait Posture. 2016 Sep 19;50:239-245. doi: 10.1016/j.gaitpost.2016.09.016. [Epub ahead of print]

Contracture is a permanent shortening of the muscle-tendon-ligament complex that limits joint mobility. Contracture is involved in many diseases (cerebral palsy, stroke, etc.) and can impair walking and other activities of daily living. The purpose of this study was to quantify the reliability of an exoskeleton designed to emulate lower limb muscle contractures unilaterally and bilaterally during walking. An exoskeleton was built according to the following design criteria: adjustable to different morphologies; respect of the principal lines of muscular actions; placement of reflective markers on anatomical landmarks; and the ability to replicate the contractures of eight muscles of the lower limb unilaterally and bilaterally (psoas, rectus femoris, hamstring, hip adductors, gastrocnemius, soleus, tibialis posterior, and peroneus). Sixteen combinations of contractures were emulated on the unilateral and bilateral muscles of nine healthy participants. Two sessions of gait analysis were performed at weekly intervals to assess the reliability of the emulated contractures. Discrete variables were extracted from the kinematics to analyse the reliability. The exoskeleton did not affect normal walking when contractures were not emulated. Kinematic reliability varied from poor to excellent depending on the targeted muscle. Reliability was good for the bilateral and unilateral gastrocnemius, soleus, and tibialis posterior as well as the bilateral hamstring and unilateral

hip adductors. The exoskeleton can be used to replicate contracture on healthy participants. The exoskeleton will allow us to differentiate primary and compensatory effects of muscle contractures on gait kinematics.

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DOI: 10.1016/j.gaitpost.2016.09.016

PMID: 27665088 [PubMed - as supplied by publisher]

"You gotta try it all": Parents' Experiences with Robotic Gait Training for their Children with Cerebral Palsy.

Beveridge B, Feltracco D, Struyf J, Strauss E, Dang S, Phelan S, Wright FV, Gibson BE

Phys Occup Ther Pediatr. 2015;35(4):327-41. doi: 10.3109/01942638.2014.990547. Epub 2014 Dec 20.

AIMS: Innovative robotic technologies hold strong promise for improving walking abilities of children with cerebral palsy (CP), but may create expectations for parents pursuing the "newest thing" in treatment. The aim of this qualitative study was to explore parents' values about walking in relation to their experiences with robotic gait training for their children.

METHODS: Semi-structured interviews were conducted with parents of five ambulatory children with CP participating in a randomized trial investigating robotic gait training effectiveness.

RESULTS: Parents valued walking, especially "correct" walking, as a key component of their children's present and future well-being. They continually sought the "next best thing" in therapy and viewed the robotic gait trainer as a potentially revolutionary technology despite mixed experiences.

CONCLUSIONS: The results can help inform rehabilitation therapists' knowledge of parents' values and perspectives, and guide effective collaborations toward meeting the therapeutic needs of children with CP.

DOI: 10.3109/01942638.2014.990547

PMID: 25529412 [PubMed - indexed for MEDLINE]

Stimulation cérébrale - Stimulation neurosensorielle

Effects of anodal transcranial direct current stimulation combined with virtual reality for improving gait in children with spastic diparetic cerebral palsy: a pilot, randomized, controlled, double-blind, clinical trial.

Collange Grecco LA), de Almeida Carvalho Duarte N, Mendonça ME, Galli M, Fregni F, Oliveira CS

Clin Rehabil. 2015 Dec;29(12):1212-23. doi: 10.1177/0269215514566997. Epub 2015 Jan 20.

OBJECTIVE: To compare the effects of anodal vs. sham transcranial direct current stimulation combined with virtual reality training for improving gait in children with cerebral palsy.

DESIGN: A pilot, randomized, controlled, double-blind, clinical trial.

SETTING: Rehabilitation clinics.

SUBJECTS: A total of 20 children with diparesis owing to cerebral palsy.

INTERVENTIONS: The experimental group received anodal stimulation and the control group received sham stimulation over the primary motor cortex during virtual reality training. All patients underwent the same training programme involving a virtual reality (10 sessions). Evaluations were performed before and after the intervention as well as at the one-month follow-up and involved gait analysis, the Gross Motor Function Measure, the Pediatric Evaluation Disability Inventory and the determination of motor evoked potentials.

RESULTS: The experimental group had a better performance regarding gait velocity (experimental group: 0.63 ±0.17 to 0.85 ±0.11 m/s; control group: 0.73 ±0.15 to 0.61 ±0.15 m/s), cadence (experimental group: 97.4 ±14.1 to 116.8 ±8.7 steps/minute; control group: 92.6 ±10.4 to 99.7 ±9.7 steps/minute), gross motor function (dimension D experimental group: 59.7 ±12.8 to 74.9 ±13.8; control group: 58.9 ±10.4 to 69.4 ±9.3; dimension E experimental group: 59.0 ±10.9 to 79.1 ±8.5; control group: 60.3 ±10.1 to 67.4 ±11.4) and independent mobility (experimental group: 34.3 ±5.9 to 43.8 ±7.3; control group: 34.4 ±8.3 to 37.7 ±7.7). Moreover, transcranial direct current stimulation led to a significant increase in motor evoked potential (experimental group: 1.4 ±0.7 to 2.6 ±0.4; control group: 1.3 ±0.6 to 1.6 ±0.4).

CONCLUSION: These preliminary findings support the hypothesis that anodal transcranial direct current stimulation combined with virtual reality training could be a useful tool for improving gait in children with cerebral palsy.

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PMID: 25604912 [PubMed - indexed for MEDLINE]

Effect of Transcranial Direct Current Stimulation Combined With Virtual Reality Training on Balance in Children With Cerebral Palsy: A Randomized, Controlled, Double-Blind, Clinical Trial.

Lazzari RD, Politti F, Belina SF, Collange Grecco LA, Santos CA(Dumont AJ, Lopes JB, Cimolin V, Galli M, Santos Oliveira C

J Mot Behav. 2016 Sep 20:1-8. [Epub ahead of print]

The authors' aim was to investigate the effects of continuous transcranial direct current stimulation (tDCS) combined with virtual reality training on static and functional balance in children with cerebral palsy (CP). Twenty children with CP (6 girls and 14 boys; M age = 7 years 6 months \pm 2 years) were randomly allocated to two groups. The experimental group received active tDCS and the control group received sham stimulation during the 10 sessions of virtual reality mobility training protocols. The children were evaluated on 3 occasions (preintervention, postintervention, and 1-month follow-up). Static balance was evaluated using a force plate under 4 conditions: feet on force plate with (a) eyes open and (b) with eyes closed, and feet on foam mat with (c) eyes open and (d) with eyes closed. Functional balance was evaluated using the Pediatric Balance Scale and the Timed Up and Go Test. The analyses demonstrated statistically significant postintervention and follow-up effects favoring the experimental group over the control group with regard to the Pediatric Balance Scale, Timed Up and Go Test, and area of oscillation of the center of pressure when standing on the force plate with eyes open. The present findings suggest that tDCS can potentiate the effects of virtual reality training on static and functional balance among children with CP.

DOI: 10.1080/00222895.2016.1204266

PMID: 27644454 [PubMed - as supplied by publisher]

The Effect of Vestibular Stimulation on Motor Functions of Children With Cerebral Palsy.

Tramontano M, Medici A, Iosa M, Chiariotti A, Fusillo G, Manzari L, Morelli D

Motor Control. 2016 Aug 19:1-23. [Epub ahead of print]

BACKGROUND: Cerebral palsy (CP) has been defined as a non-progressive disease of movement and posture development. Physical therapy techniques use different forms of sensory stimulation to improve neuromotor development.

AIM: The aim of this study was to assess the efficacy of a vestibular stimulation training in improving motor functions in cerebral palsy.

POPULATION: Fourteen children with CP were randomly separated into two different groups in a cross-over trial.

METHODS: Over a period of 10 weeks, each group performed 10 sessions of 50 minutes of neurodevelopmental treatment (NDT) and 10 sessions of vestibular training (VR). Children were evaluated with the Gross Motor Function Measurement-88 scale, the Goal Attainment Scale and the root mean square of head accelerations.

RESULTS: A significant improvement in the GAS-score ($p=0.003$) was noted after NDT+VR. **CONCLUSIONS:** Vestibular stimulation integrated with NDT proved to be an effective complementary strategy for facilitating motor functioning.

DOI: 10.1123/mc.2015-0089

PMID: 27633076 [PubMed - as supplied by publisher]

What parents think and feel about deep brain stimulation in paediatric secondary dystonia including cerebral palsy: A qualitative study of parental decision-making.

Austin A, Lin JP, Selway R, Ashkan K Owen T

Eur J Paediatr Neurol. 2016 Sep 6. pii: S1090-3798(16)30145-3. doi: 10.1016/j.ejpn.2016.08.011. [Epub ahead of print]

BACKGROUND: Dystonia is characterised by involuntary movements and postures. Deep Brain Stimulation (DBS) is effective in reducing dystonic symptoms in primary dystonia in childhood and to lesser extent in secondary dystonia. How families and children decide to choose DBS surgery has never been explored.

AIMS: To explore parental decision-making for DBS in paediatric secondary dystonia.

METHODS: Data was gathered using semi-structured interviews with eight parents of children with secondary dystonia who had undergone DBS. Interviews were analysed using Interpretative Phenomenological Analysis.

RESULTS: For all parents the decision was viewed as significant, with life altering consequences for the child. These results suggested that parents were motivated by a hope for a better life and parental duty. This was weighed

against consideration of risks, what the child had to lose, and uncertainty of DBS outcome. Decisions were also influenced by the perspectives of their child and professionals.

CONCLUSIONS: The decision to undergo DBS was an ongoing process for parents, who ultimately were struggling in the face of uncertainty whilst trying to do their best as parents for their children. These findings have important clinical implications given the growing referrals for consideration of DBS childhood dystonia, and highlights the importance of further quantitative research to fully establish the efficacy of DBS in secondary dystonia to enhance informed decision-making.

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PMID: 27658770 [PubMed - as supplied by publisher]

Réalité virtuelle - Jeux video

Change in functional balance after an exercise program with Nintendo Wii in Latino patients with cerebral palsy: a case series.

Gatica-Rojas V, Cartes-Velásquez R, Méndez-Rebolledo G, Olave-Godoy F, Villalobos-Rebolledo D

J Phys Ther Sci. 2016 Aug;28(8):2414-7. doi: 10.1589/jpts.28.2414. Epub 2016 Aug 31.

[Purpose] This study aimed to explore the possibility of improving functional balance using an exercise program with Nintendo and the Balance Board peripheral in subjects with cerebral palsy. [Subjects and Methods] This study included 4 male outpatients of a neurological center. All participants received an exercise program based on the use of Nintendo with the Balance Board peripheral. Training consisted of three 25-min sessions per week for 6 weeks. Each session was guided by a physical therapist. Timed up-and-go and one-leg standing tests were conducted before and after the intervention. [Results] All subjects showed significant improvements in the results of the timed up-and-go test. However, there were no significant changes in the results of the one-leg standing test.

[Conclusion] The exercise protocol involving Nintendo with the Balance Board peripheral appears to improve functional dynamic balance in patients with cerebral palsy. However, static functional balance does not improve after 6 weeks of training.

DOI: 10.1589/jpts.28.2414

PMCID: PMC5011610

PMID: 27630446 [PubMed]

Motor Improvement Using Motion Sensing Game Devices for Cerebral Palsy Rehabilitation.

Camara Machado FR, Antunes PP, Souza JM, Santos AC, Levandowski DC, Oliveira AA

J Mot Behav. 2016 Sep 3:1-8. [Epub ahead of print]

The authors aimed to investigate the effects of an intervention based on interactive game set with the movement sensor Kinect on children with cerebral palsy (CP). Twenty-eight participants were recruited. Their age was between 3 and 12 years old, and rated as level I, II, or III on the Gross Motor Function Classification System. They played two games from the Xbox 360 Kinect system and were evaluated using the Gross Motor Function Measure (GMFM) after a period of 8 weeks. The intervention led to significant motor function improvement as increase of the global scores on the GMFM ($p < .001$). Rehabilitation interventions using the Xbox 360 Kinect interactive games may represent useful tools for children with CP.

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PMID: 27593342 [PubMed - as supplied by publisher]

Using health games for rehabilitation of patients with infantile cerebral palsy.

Lee WC, Reyes-Fernández MC, Posada-Gómez R, Juárez-Martínez U, Martínez-Sibaja A, Alor-Hernández G

J Phys Ther Sci. 2016 Aug;28(8):2293-8. doi: 10.1589/jpts.28.2293. Epub 2016 Aug 31.

[Purpose] The purposes of this study were to evaluate whether the therapeutic games developed by the study team are significantly effective for upper limb rehabilitation of patients with cerebral palsy and to assess the development of the games and the evolution of patients throughout the therapy sessions.

[Subjects and Methods] This study demonstrates the results of using therapeutic games in patients with infantile cerebral palsy. The therapies were performed in 30-minute sessions for about 1 to 4 months. This study shows the progress of five children with cerebral palsy during the sessions. The time it took the children on each road and the times required to complete a task were measured. In addition, the level of difficulty of the games was gradually increased at each session.

[Results] Results have shown good progress on the accuracy of the movements and an increase in concentration level during the execution of the games, showing an improvement in the patients' performance by 40-55% faster.

[Conclusions] Health games encourage children to comply with therapy. The advantage of the game is that the patient can perform the therapy at home, which could help achieve further progress in patients.

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DOI: 10.1589/jpts.28.2293

PMCID: PMC5011581

PMID: 27630417 [PubMed]

Thérapie cellulaire Médecine régénérative

A Need for Renewed and Cohesive US Policy on Cord Blood Banking.

Matsumoto MM, Matthews KR

Stem Cell Rev. 2015 Dec;11(6):789-97. doi: 10.1007/s12015-015-9613-9.

Stem cells obtained from umbilical cord blood (CB) are used to treat more than 80 different diseases and are a standard treatment for many types of leukemias, lymphomas, myelodysplasias, and inherited immune system disorders. CB transplants have been carried out in humans for over 25 years, and hundreds of clinical trials are currently underway investigating CB's therapeutic potential for a wide range of disorders, including autism, diabetes, cerebral palsy, and spinal cord injury. Extensive storage facilities have been established in the United States and around the world to collect, test, and freeze CB for later use in medical procedures. However, a divide between two different banking models-public versus private-has emerged, presenting several policy challenges. While the Food and Drug Administration currently regulates CB storage and use in the United States, other state and federal guidelines on CB education, awareness, and ethical considerations remain variable, and no mandatory international guidelines exist. In addition, federal funding for an important CB collection initiative that specifically targets minority populations is set to expire by the end of FY2015. To help organize and coordinate efforts across the United States and other nations, policymakers should implement regulations for: high quality standards for both private and public CB banks, a commitment to ethical practices, and an investment in educational campaigns and training programs for all steps of the CB banking process.

DOI: 10.1007/s12015-015-9613-9

PMID: 26239848 [PubMed - indexed for MEDLINE]

Autres

Osteopathic manipulative treatment in neurological diseases: Systematic review of the literature.

Cerritelli F, Ruffini N, Lacorte E, Vanacore N

J Neurol Sci. 2016 Oct 15;369:333-41. doi: 10.1016/j.jns.2016.08.062. Epub 2016 Aug 30.

OBJECTIVE: The aim of the present systematic review is to critically evaluate the effectiveness of OMT as an adjuvant therapy in the management of patients with neurological diseases.

METHODS: A systematic review was conducted and the findings were reported following the PRISMA statement. Twelve databases were searched for articles reporting the use of osteopathic manipulative treatment in neurological disorders. Each article was assessed using the Cochrane risk of bias tool and the Jadad score.

RESULTS: 10 articles were included. OMT was used to test its efficacy and/or effectiveness in treating tension-type headache, migraine, cerebral palsy and gait analysis in patients affected by Parkinson's Disease. The general quality of the included trials ranged from very low, to low and moderate according to Cochrane standards. High heterogeneity between studies was found for the type of intervention, control and outcome measures used.

CONCLUSION: Results showed that studies on the efficacy and/or effectiveness of OMT treatments are scarce, heterogeneous, and of low methodological quality. Further studies should be conducted including a more pragmatic methodology, an exhaustive description of all investigated and concurrent interventions, and a systematic report of adverse events, so as to obtain robust and generalizable results.

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DOI: 10.1016/j.jns.2016.08.062

PMID: 27653920 [PubMed - in process]

The effects of hippotherapy on postural balance and functional ability in children with cerebral palsy.

J Phys Ther Sci. 2016 Aug;28(8):2220-6. doi: 10.1589/jpts.28.2220. Epub 2016 Aug 31.

Moraes AG, Copetti F, Angelo VR, Chiavoloni LL, David AC

[Purpose] This study evaluated the effects of hippotherapy on seated postural balance, dynamic balance, and functional performance in children with cerebral palsy and compared the effects of 12 and 24 sessions on seated postural balance.

[Subjects and Methods] This study included 15 children with cerebral palsy aged between 5 and 10 years. INTERVENTIONS: A hippotherapy protocol was performed for 30 minutes, twice a week, for 12 weeks. Postural balance in a sitting position was measured using an AMTI AccuSway Plus force platform 1 week before initiating the hippotherapy program and after 12 and 24 weeks. The Berg Balance Scale (BBS) and Pediatric Evaluation of Disability Inventory (PEDI) were used before and after 24 sessions.

[Results] Significant differences were observed for center of pressure (COP) variables, including medio-lateral (COPml), anteroposterior displacement (COPap), and velocity of displacement (VelCOP), particularly after 24 sessions. There were also significant differences in BBS scores and PEDI score increases associated with functional skills (self-care, social function, and mobility), caregiver assistance (self-care, social function, and mobility).

[Conclusion] Hippotherapy resulted in improvement in postural balance in the sitting position, dynamic balance, and functionality in children with cerebral palsy, an effect particularly significant after 24 hippotherapy sessions.

DOI: 10.1589/jpts.28.2220

PMCID: PMC5011565

PMID: 27630401 [PubMed]

Langage – Communication

Relationship between brain lesion characteristics and communication in preschool children with cerebral palsy.

Coleman A, Fiori S, Weir KA, Ware RS, Boyd RN

Res Dev Disabil. 2016 Nov;58:55-64. doi: 10.1016/j.ridd.2016.08.015. Epub 2016 Sep 1

BACKGROUND: MRI shows promise as a prognostic tool for clinical findings such as gross motor function in children with cerebral palsy (CP), however the relationship with communication skills requires exploration.

AIMS: To examine the relationship between the type and severity of brain lesion on MRI and communication skills in children with CP.

METHODS AND PROCEDURES: 131 children with CP (73 males (56%)), mean corrected age (SD) 28(5) months, Gross Motor Functional Classification System distribution: I=57(44%), II=14(11%), III=19(14%), IV=17(13%), V=24(18%). Children were assessed on the Communication and Symbolic Behavioral Scales Developmental Profile (CSBS-DP) Infant-Toddler Checklist. Structural MRI was analysed with reference to type and semi-quantitative assessment of the severity of brain lesion. Children were classified for motor type, distribution and GMFCS. The relationships between type/severity of brain lesion and communication ability were analysed using multivariable tobit regression.

OUTCOMES AND RESULTS: Children with periventricular white matter lesions had better speech than children with cortical/deep grey matter lesions ($\beta=-2.6$, 95%CI=-5.0, -0.2, $p=0.04$). Brain lesion severity on the semi-quantitative scale was related to overall communication skills ($\beta=-0.9$, 95%CI=-1.4, -0.5, $p<0.001$). Motor impairment better accounted for impairment in overall communication skills than brain lesion severity.

IMPLICATIONS: Structural MRI has potential prognostic value for communication impairment in children with CP.

WHAT THIS PAPER ADDS?: This is the first paper to explore important aspects of communication in relation to the type and severity of brain lesion on MRI in a representative cohort of preschool-aged children with CP. We found a

relationship between the type of brain lesion and communication skills, children who had cortical and deep grey matter lesions had overall communication skills >1 SD below children with periventricular white matter lesions. Children with more severe brain lesions on MRI had poorer overall communication skills. Children with CP born at term had poorer communication than those born prematurely and were more likely to have cortical and deep grey matter lesions. Gross motor function better accounted for overall communication skills than the type of brain lesion or brain lesion severity.

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PMID: 27591975 [PubMed - in process]

Story retelling and language ability in school-aged children with cerebral palsy and speech impairment.

Nordberg A, Dahlgren Sandberg A, Miniscalco C

Int J Lang Commun Disord. 2015 Nov-Dec;50(6):801-13. doi: 10.1111/1460-6984.12177. Epub 2015 Jul 27.

BACKGROUND: Research on retelling ability and cognition is limited in children with cerebral palsy (CP) and speech impairment.

AIMS: To explore the impact of expressive and receptive language, narrative discourse dimensions (Narrative Assessment Profile measures), auditory and visual memory, theory of mind (ToM) and non-verbal cognition on the retelling ability of children with CP and speech impairment.

METHODS & PROCEDURES: Fifteen speaking children with speech impairment (seven girls, eight boys) (mean age = 11 years, SD = 1;4 years), and different types of CP and different levels of gross motor and cognitive function participated in the present study. Story retelling skills were tested and analysed with the Bus Story Test (BST) and the Narrative Assessment Profile (NAP). Receptive language ability was tested with the Test for Reception of Grammar-2 (TROG-2) and the Peabody Picture Vocabulary Test - IV (PPVT-IV). Non-verbal cognitive level was tested with the Raven's coloured progressive matrices (RCPM), memory functions assessed with the Corsi block-tapping task (CB) and the Digit Span from the Wechsler Intelligence Scale for Children-III. ToM was assessed with the false belief items of the two story tests "Kiki and the Cat" and "Birthday Puppy".

OUTCOMES & RESULTS: The children had severe problems with retelling ability corresponding to an age-equivalent of 5;2-6;9 years. Receptive and expressive language, visuo-spatial and auditory memory, non-verbal cognitive level and ToM varied widely within and among the children. Both expressive and receptive language correlated significantly with narrative ability in terms of NAP total scores, so did auditory memory.

CONCLUSION & IMPLICATIONS: The results suggest that retelling ability in the children with CP in the present study is dependent on language comprehension and production, and memory functions. Consequently, it is important to examine retelling ability together with language and cognitive abilities in these children in order to provide appropriate support.

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DOI: 10.1111/1460-6984.12177

PMID: 26216752 [PubMed - indexed for MEDLINE]

Douleur

Assessing and treating pain associated with stroke, multiple sclerosis, cerebral palsy, spinal cord injury and spasticity. Evidence and recommendations from the Italian Consensus conference on Pain in Neurorehabilitation.

Paolucci S(1), Martinuzzi A, Scivoletto G, Smania N, Solaro C, Aprile I, Armando M, Bergamaschi R, Berra E, Berto G, Carraro E, Cella M, Gandolfi M, Masciullo M, Molinari M, Pagliano E, Pecchioli C, Roncari L, Torre M, Trabucco E, Vallies G, Zerbinati P, Tamburin S; Italian Consensus Conference on Pain in Neurorehabilitation (ICCPN).

Eur J Phys Rehabil Med. 2016 Aug 31. [Epub ahead of print]

Pain is a common and disabling symptom in patients with stroke, multiple sclerosis (MS), cerebral palsy (CP), spinal cord injury (SCI) and other conditions associated with spasticity, but data on its prevalence, and natural history, as well as guidelines on its assessment and treatment in the field of neurorehabilitation, are largely lacking. The Italian Consensus Conference on Pain in Neurorehabilitation (ICCPN) searched and evaluated current evidence on the frequency, evolution, predictors, assessment, and pharmacological and non-pharmacological treatment of pain in

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patients with stroke, MS, CP, SCI and other conditions associated with spasticity. Patients with stroke, MS, CP, and SCI may suffer from pain related to spasticity, as well as nociceptive and neuropathic pain (NP), whose prevalence, natural history, impact on functional outcome, and predictors are only partially known. Diagnosis and assessment of the different types of pain in these patients is important, because their treatment may differ. Botulinum neurotoxin is the first choice treatment for spasticity, while some antidepressant and antiepileptic drugs may be effective on NP, but pharmacological treatment varies according to the underlying disease. In most cases, a single therapy is not sufficient to treat pain, and a multidisciplinary approach, which include pharmacological and non-pharmacological treatments is needed. Further studies, and in particular randomized controlled trials, are needed on these topics.

[Free Article](#)

PMID: 27579581 [PubMed - as supplied by publisher]

The prevalence, location, severity, and daily impact of pain reported by youth and young adults with cerebral palsy.

Brunton L, Hall S, Passingham A, Wulff J, Delitala R

J Pediatr Rehabil Med. 2016 Sep 2;9(3):177-83. doi: 10.3233/PRM-160379.

PURPOSE: To describe the prevalence, location, severity, and daily impact of pain reported by youth and young adults with cerebral palsy (CP). A secondary aim was to identify any significant associations between the constructs of interest.

METHOD: An observational study of 112 participants with CP to understand their experience of pain through a questionnaire. Participants were 56 males and 55 females with a mean age of 18y 9mo (SD 4y 5mo).

RESULTS: Pain was reported by 75% of males and 89% of females. Both severity and impact of pain were significantly greater in females. In addition, severity and impact of pain were significantly different between specific GMFCS levels. There were no significant differences in location of pain by gender or GMFCS level. A strong positive correlation between the severity and impact of pain was observed ($r_s = 0.80$).

CONCLUSION: The gender differences in the severity and impact of pain and the overall and high prevalence of pain reported here provide healthcare practitioners with an increased awareness of pain distribution/characteristics among young adults with CP. Understanding the impact of pain on daily life can assist practitioners to efficiently manage pain and improve the quality of life for individuals with CP.

DOI: 10.3233/PRM-160379

PMID: 27612077 [PubMed - in process]

Autres Troubles /troubles concomitants

✚ Troubles respiratoires

Tracheostomy Complications in Institutionalized Children with Long-term Tracheostomy and Ventilator Dependence.

Wilcox LJ, Weber BC, Cunningham TD, Baldassari CM

Otolaryngol Head Neck Surg. 2016 Apr;154(4):725-30. doi: 10.1177/0194599816628486. Epub 2016 Feb 16.

OBJECTIVES: (1) To identify tracheostomy complications in institutionalized children with chronic tracheostomy. (2) To determine factors that predispose to development of tracheostomy complications in institutionalized children with chronic tracheostomy.

STUDY DESIGN: Case series with chart review over 10 years.

SETTING: Tertiary children's hospital.

SUBJECTS AND METHODS: Children were included if they underwent tracheostomy before 21 years of age and resided at a pediatric nursing facility. Most children were ventilator dependent and had severe comorbid medical conditions, including developmental delay and cerebral palsy. The number of tracheostomy complications and unplanned hospital admissions were recorded. Interventions for tracheostomy complications were also reviewed.

RESULTS: Thirty-two institutionalized children with chronic tracheostomy were included. The mean age at time of tracheostomy was 5.4 years, with a mean duration of institutionalization of 9.1 years. Twenty-seven children (84%) experienced tracheostomy complications. The total number of complications was 79. The most common tracheostomy complications identified were peristomal granulation (n = 13) and suprastomal granulation (n = 12). Age at time of tracheostomy, duration of institutionalization, and ventilator dependence did not predict the likelihood of developing a complication. Of 32 patients, 20 were evaluated in the emergency room during the study, and there were 48 unplanned admissions for tracheostomy-related complications during the study. Forty-five urgent direct laryngoscopy and bronchoscopy procedures were performed in a total of 20 children with tracheostomy complications.

CONCLUSIONS: Tracheostomy complications are common in institutionalized children with chronic tracheostomy and are challenging to manage. Further research is necessary to determine novel ways to reduce tracheostomy complications in this population.

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DOI: 0.1177/0194599816628486

PMID: 26884369 [PubMed - indexed for MEDLINE]

Troubles musculosquelettiques, des tissus conjonctifs et osseux

Differential Analysis of Bone Density in Children and Adolescents with Neuromuscular Disorders and Cerebral Palsy.

Razmdjou S, Seufert J, Rensing-Zimmermann C, Kirschner J, Korinthenberg R

Neuropediatrics. 2015 Dec;46(6):385-91. doi: 10.1055/s-0035-1563695. Epub 2015 Sep 26.

Determinants that affect bone density in disabled children and adolescents with neuromuscular disorders have not been differentially investigated well. We performed dual-energy X-ray absorptiometry of the lumbar spine in three groups (Duchenne muscular dystrophy, n = 16; other neuromuscular diseases, n = 11; and cerebral palsy, n = 18) providing height-age- and sex-adjusted z scores. Mobility was assessed by functional tests. Seven Duchenne patients were taking glucocorticoids; two reported previous treatment. We documented vitamin D blood levels and markers of bone turnover. Many patients presented low bone density for height-age (mean z score = -0.86 ± 1.47). Areal bone density increased with age in the cerebral palsy and "other neuromuscular disease" groups, however, the Duchenne group demonstrated a decrease of z scores ($r = -0.622$, $p = 0.010$). Tanner stage, body mass index, and mobility were independent variables affecting bone density. Vitamin D levels were low, but similar to those reported in healthy children. We conclude that bone mineral density in disabled children is mainly determined by their level of physical maturity, thriving, and mobility.

Georg Thieme Verlag KG Stuttgart · New York.

DOI: 10.1055/s-0035-1563695

PMID: 26408797 [PubMed - indexed for MEDLINE]

Effects of bisphosphonates to treat osteoporosis in children with cerebral palsy: a meta-analysis.

Kim MJ, Kim SN, Lee IS, Chung S, Lee J, Yang Y, Lee I, Koh SE.

J Pediatr Endocrinol Metab. 2015 Nov 1;28(11-12):1343-50. doi: 10.1515/jpem-2014-0527.

BACKGROUND: In childhood and adolescence, some patients with cerebral palsy (CP) have long-term limited mobility, which can lead to secondary osteoporosis. Prevention and treatment strategies have been evaluated for the management of low bone mineral density (BMD) and fragility fractures. Currently, however, there are no established guidelines for the stratification and individualization of therapeutic interventions. Recently, an increasing number of studies have reported on the use of bisphosphonates to increase BMD in various pediatric conditions, and bisphosphonates have been suggested as a method to treat osteoporosis and prevent fractures.

PURPOSE: We performed the current meta-analysis to assess the effects of bisphosphonates on increasing BMD in children who have CP with secondary osteoporosis.

MATERIALS AND METHODS: A search of PubMed, Cochrane, and Embase from inception to April 2014 was performed with the following keywords: (bone disease, metabolic OR osteoporosis OR osteopenia) AND (child OR

pediatric OR adolescent) AND (cerebral palsy) AND (bisphosphonate). Four studies were ultimately included in the meta-analysis: one randomized, double-blinded, placebo-controlled study and three case-controlled studies.

RESULTS: The Z-score of lumbar spine was significantly improved after bisphosphonates treatment compared with pre-treatment values (standardized mean difference [SMD], 0.799; 95% confidence interval [CI], 0.499-1.100; $p < 0.001$). The Z-score of femur was also improved significantly compared with that of the baseline value (SMD, 0.748; 95% CI, 0.382-1.114; $p < 0.001$).

CONCLUSIONS: Bisphosphonates have a significant effect on improving BMD in children with CP. Further standardization of treatment protocols including treatment dosage and duration needs to be established, and long-term follow up studies are needed.

DOI: 10.1515/jpem-2014-0527

PMID: 26214607 [PubMed - indexed for MEDLINE]

Troubles cardio vasculaires

Associations of non-invasive measures of arterial structure and function, and traditional indicators of cardiovascular risk in adults with cerebral palsy.

McPhee PG, Gorter JW, Cotie LM, Timmons BW, Bentley T, MacDonald MJ

Atherosclerosis. 2015 Dec;243(2):462-5. doi: 10.1016/j.atherosclerosis.2015.09.035. Epub 2015 Oct 9.

BACKGROUND: Persons with cerebral palsy (CP) have mobility limitations and may be at increased risk for cardiovascular disease (CVD).

AIMS: To determine the feasibility of assessing novel CVD risk indicators and to identify predictors of CVD risk in a clinic-based group of adults with CP.

METHODS: In an observational study, we examined 42 adults with CP (mean age 33.5 ± 12.3 yr). Traditional (resting blood pressure, smoking status and lipids) and novel CVD risk indicators (endothelial function, arterial stiffness, and carotid wall thickness) were assessed.

RESULTS: Measures of endothelial function and central arterial stiffness were conducted in 100% and 83% of participants, respectively. Age was the strongest independent predictor of vascular health (cIMT, Age, $R^2 = 0.576$, $p = 0.001$).

CONCLUSION: Non-invasive measures of arterial structure and function are feasible to assess and may assist in the prediction of CVD risk in adults with CP.

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DOI: 10.1016/j.atherosclerosis.2015.09.035

PMID: 26520900 [PubMed - indexed for MEDLINE]

Nutrition – Troubles nutritionnels

Caloric Requirements of Patients With Brain Impairment and Cerebral Palsy Who Are Dependent on Chronic Ventilation.

Gale R, Namestnic J, Singer P, Kagan I

JPEN J Parenter Enteral Nutr. 2016 Aug 15. pii: 0148607116662970. [Epub ahead of print]

BACKGROUND AND OBJECTIVE: Israeli law mandates chronic ventilator support for children and adolescents who are severely brain impaired and show minimal responses. Feeding protocols in these cases have been based on the caloric requirements of healthy children, deducting calories for lack of activity as well as an individual adjustment according to the cerebral palsy growth curves. However, patients are still inclined to gain excessive weight. Our objective was to determine the caloric requirements of these patients.

DESIGN AND METHOD: Sixteen patients hospitalized in a dedicated unit who were ventilated through tracheostomies and fed via gastrostomies were included. Patients were aged 3-24 years; duration of ventilation was 1-7.5 years; and diagnoses included congenital genetic or brain malformations ($n = 9$), hypoxic accidents ($n = 4$), and

postbacterial or postviral encephalitis (n = 3). Resting energy expenditure (REE) was determined by indirect calorimetry. REE values were compared with the caloric requirements of age-comparable healthy children and the calories actually delivered. Data were analyzed with paired t tests, Pearson correlations, and linear regression.

RESULTS: The REE of our patients was 46% lower than the estimated caloric requirements of healthy children. In practice, patients received 32% more calories than that measured by REE. These findings were not affected by age, weight, diagnosis, or length of hospitalization.

CONCLUSIONS: The caloric expenditure of these patients is very low. A diet guided by indirect calorimetry is proposed to aid in providing optimal nutrition support for this unique population to avoid overfeeding and obesity.

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Dietary Intakes and Nutritional Issues in Neurologically Impaired Children.

Penagini F, Mameli C, Fabiano V, Brunetti D, Dilillo D, Zuccotti GV

Nutrients. 2015 Nov 13;7(11):9400-15. doi: 10.3390/nu7115469.

Neurologically impaired (NI) children are at increased risk of malnutrition due to several nutritional and non-nutritional factors. Among the nutritional factors, insufficient dietary intake as a consequence of feeding difficulties is one of the main issues. Feeding problems are frequently secondary to oropharyngeal dysphagia, which usually correlates with the severity of motor impairment and presents in around 90% of preschool children with cerebral palsy (CP) during the first year of life. Other nutritional factors are represented by excessive nutrient losses, often subsequent to gastroesophageal reflux and altered energy metabolism. Among the non-nutritional factors, the type and severity of neurological impairment, ambulatory status, the degree of cognitive impairment, and use of antiepileptic medication altogether concur to determination of nutritional status. With the present review, the current literature is discussed and a practical approach for nutritional assessment in NI children is proposed. Early identification and intervention of nutritional issues of NI children with a multidisciplinary approach is crucial to improve the overall health and quality of life of these complex children.

[Free PMC Article](#)

DOI: 10.3390/nu7115469

PMCID: PMC4663597

PMID: 26580646 [PubMed - indexed for MEDLINE]



Longitudinal Growth, Diet, and Physical Activity in Young Children With Cerebral Palsy.

Oftedal S, Davies PS, Boyd RN, Stevenson RD, Ware RS, Keawutan , Benfer KA, Bell KL

Pediatrics. 2016 Sep 7. pii: e20161321. [Epub ahead of print]

OBJECTIVES: To describe the longitudinal relationship between height-for-age z score (HZ), growth velocity z score, energy intake, habitual physical activity (HPA), and sedentary time across Gross Motor Function Classification System (GMFCS) levels I to V in preschoolers with cerebral palsy (CP).

METHODS: Children with CP (n = 175 [109 (62.2%) boys]; mean recruitment age 2 years, 10 months [SD 11 months]; GMFCS I = 83 [47.2%], II = 21 [11.9%], III = 28 [15.9%], IV = 19 [10.8%], V = 25 [14.2%]) were assessed 440 times between the age of 18 months and 5 years. Height/length ratio was measured or estimated via knee height. Population-based standards were used to calculate HZ and growth velocity z-score by age and sex categories. Feeding method (oral or tube) and gestational age at birth (GA) were collected from parents. Three-day ActiGraph and food diary data were used to measure HPA/sedentary time ratio and energy intake, respectively. Oropharyngeal dysphagia was rated with the Dysphagia Disorder Survey (part 2, Pediatric). Analysis was undertaken with mixed-effects regression models.

RESULTS: For GMFCS level I, height and growth velocity did not differ from population-level growth standards. Children in levels II to V were significantly shorter, and those in levels III to V grew significantly more slowly than those in level I. There was a significant positive association between HZ and GA at all GMFCS levels. Energy intake,

HPA, sedentary time, Dysphagia Disorder Survey score, and feeding method were not significantly associated with either height or growth velocity once GMFCS level was accounted for.

CONCLUSIONS: Functional status and GA should be considered when assessing the growth of a child with CP. Research into interventions aimed at increasing active movement in GMFCS levels III to V and their efficacy in improving growth and health outcomes is warranted.

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PMID: 27604185 [PubMed - as supplied by publisher]

Sphère bucco-dentaire – Troubles de la déglutition

Associated factors to erosive tooth wear and its impact on quality of life in children with cerebral palsy.

Abanto J, Shitsuka C, Murakami C, Ciamponi AL, Raggio DP, Bönecker M.

Spec Care Dentist. 2014 Nov-Dec;34(6):278-85. doi: 10.1111/scd.12070. Epub 2014 Apr 17.

To evaluate the presence and associated factors of erosive tooth wear (ETW) in children with cerebral palsy (CP), as well as its impact on the oral health-related quality of life (OHRQoL). Parents of 60 CP children, between 6 and 14 years of age, answered the Brazilian version of the parental-caregivers perception questionnaire (P-CPQ). The ETW diagnosis was performed by a single calibrated examiner according to the O'Brien's modified index. Associated factors such as family income, behavioral factors, and type of CP were also collected. OHRQoL was measured through P-CPQ domains and total score, and Poisson regression was used to correlate ETW to associated factors and to the scores. ETW was present in 48.3% of the children. The multivariate adjusted model showed that the presence of ETW was associated with more than 2 days of soft drink intake per week ($p = 0.003$), daily intake of powdered juice ($p = 0.002$) and reported gastroesophageal reflux ($p = 0.016$). The family income higher than one Brazilian minimum wage showed a positive impact on the CP children's OHRQoL ($RR = 0.53$; $p \leq 0.001$). ETW in CP children is associated to frequent consumption of soft drinks, powdered juices, and reported gastroesophageal reflux; however, ETW has not a negative impact on the OHRQoL.

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DOI: 10.1111/scd.12070

PMID: 24738748 [PubMed - indexed for MEDLINE]

Differences between the activity of the masticatory muscles of adults with cerebral palsy and healthy individuals while at rest and in function.

Matsui MY, Giannasi LC, Batista SR, Amorim JB, Oliveira CS, Oliveira LV, Gomes MF

Arch Oral Biol. 2016 Sep 1;73:16-20. doi: 10.1016/j.archoralbio.2016.08.035. [Epub ahead of print]

OBJECTIVE: The aim of the present study was to compare the electromyographic activity of masticatory muscles of adult patients with different degrees of oral motor impairment (cerebral palsy) with the electromyographic activity of healthy individuals in a control group. Electromyographic activity was compared when the masticatory muscles were at rest and in motion.

DESIGN: Thirty adult patients with cerebral palsy and 30 subjects without neuromotor disorders were enrolled in the present study. Oral motor function impairment was classified for each subject according to the Orofacial Motor Function Assessment Scale. Surface electromyography was bilaterally recorded in the masseter and anterior temporalis muscles at rest, during maximal voluntary clench and mouth opening. Comparisons between the groups were statistically assessed using Mann-Whitney test.

RESULTS: At rest and mouth opening, electromyographic values were higher among patients with cerebral palsy than control group. During maximal voluntary clench, the opposite occurred. The degree of oral motor impairment affected mouth opening.

CONCLUSION: There are significant differences in masticatory muscle activity between adult patients with CP and healthy individuals, and the degree of oral motor impairment is important. SIGNIFICANCE: To improve the masticatory function of these patients, muscle therapy should approach rest, mouth opening and clenching differently.

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Science Infos Paralysie Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
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PMID: 27648849 [PubMed - as supplied by publisher]

Oral health behaviors of preschool children with cerebral palsy: a case-control community-based study.

Du RY, McGrath CP, Yiu CK, King NM.

Spec Care Dentist. 2014 Nov-Dec;34(6):298-302. doi: 10.1111/j.1754-4505.2012.00295.x. Epub 2012 Dec 20.

To describe and compare the oral health behaviors of preschool children with and without cerebral palsy (CP), and to assess the oral health knowledge and attitudes of their primary caregivers (PCGs). Seventy-two preschool children with CP were recruited from 23 Special Child Care Centers in Hong Kong. An age- (± 3 months) and gender-matched sample of children from mainstream preschools was recruited as a "control group." Assessment of children's oral health behaviors and the PCGs' oral health knowledge and attitudes was conducted using questionnaires. Preschool children with CP were less likely to have ever attended a dentist ($p < 0.05$). Tooth brushing frequency was similar between the two groups ($p > 0.05$), but PCGs of children with CP more frequently reported provision of tooth brushing assistance to their children ($p < 0.001$). PCGs in both groups had similar oral health knowledge and attitudes ($p > 0.05$). Difference in oral health behaviors existed between preschool children with and without CP. PCGs of children with and without CP had similar oral health knowledge and attitudes.

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PMID: 25350600 [PubMed - indexed for MEDLINE]

Oral Health Quality of Life in Children with Cerebral Palsy: Parental Perceptions.

El Ashiry EA, Alaki SM, Nouri SM.

J Clin Pediatr Dent. 2016;40(5):375-87. doi: 10.17796/1053-4628-40.5.375.

OBJECTIVE: To assess the parents' perception of the oral health-related quality of life (OHRQOL) in children with Cerebral Palsy (CP) and compare it with normally developing children.

STUDY DESIGN: 63 children with CP were recruited from 8 disability centers, and 99 healthy controls were recruited from 5 elementary schools. The ages of the children in both groups were from 6-12 years. The Franciscan Hospital for Children Oral Health-Related Quality of Life (FHC-OHRQOL) was used to measure the OHRQOL and an oral examination was conducted in the schools/centers of the children to assess the teeth, gingival health, and oral hygiene.

RESULTS: The FHC-OHRQOL showed a significant difference in 3 out of 4 sections indicating lower OHRQOL in the CP group. The examination showed no significant difference in the dental and gingival health and in the level of oral hygiene.

CONCLUSION: The OHRQOL of children with CP is significantly lower than that of normally developing children although the oral health status of children with CP is not significantly different from that of normally developing children.

DOI: 10.17796/1053-4628-40.5.375

PMID: 27617378 [PubMed - in process]

Oropharyngeal dysphagia in children with cerebral palsy: comparisons between a high- and low-resource country.

Benfer KA, Weir KA, Bell KL, Nahar B, Ware RS, Davies PS, Boyd RN

Disabil Rehabil. 2016 Sep 26:1-9. [Epub ahead of print]

PURPOSE: There is paucity of research investigating oropharyngeal dysphagia (OPD) in young children with cerebral palsy (CP), and most studies explore OPD in high-resource countries. This study aimed at determining the proportion and severity of OPD in preschool children with CP in Bangladesh, compared to Australia.

METHOD: Cross-sectional, comparison of two cohorts. Two hundred and eleven children with CP aged 18-36 months, 81 in Bangladesh (mean = 27.6 months, 61.7% males), and 130 in Australia (mean = 27.4 months, 62.3% males). The Dysphagia Disorders Survey (DDS) - Part 2 was the primary OPD outcome for proportion and severity of OPD. Gross motor skills were classified using the Gross Motor Function Classification System (GMFCS), motor type/distribution.

RESULTS: (i) Bangladesh sample: proportion OPD = 68.1%; severity = 10.4 SD = 7.9. Australia sample: proportion OPD = 55.7%; severity = 7.0 SD = 7.5. (ii) There were no differences in the proportion or severity of OPD between samples when stratified for GMFCS (OR = 2.4, $p = 0.051$ and $\beta = 1.2$, $p = 0.08$, respectively).

CONCLUSIONS: Despite overall differences in patterns of OPD between Bangladesh and Australia, proportion and severity of OPD (when adjusted for the functional gross motor severity of the samples) were equivalent. This provides support for the robust association between functional motor severity and OPD proportion/severity in children with CP, regardless of the resource context. Implications for Rehabilitation The proportion and severity of OPD according to gross motor function level were equivalent between high- and low-resource countries (LCs). Literature from high-resource countries may be usefully interpreted by rehabilitation professionals for low-resource contexts using the GMFCS as a framework. The GMFCS is a useful classification in LCs to improve earlier detection of children at risk of OPD and streamline management pathways for optimal nutritional outcomes. Rehabilitation professionals working in LCs are likely to have a caseload weighted towards GMFCS III-V, with less compensatory OPD management options available (such as non-oral nutrition through tubes).

DOI: 10.1080/09638288.2016.1229363

PMID: 27669884 [PubMed - as supplied by publisher]

Ultrasound-Guided Botulinum Toxin Type A Salivary Gland Injection in Children for Refractory Sialorrhea: 10-Year Experience at a Large Tertiary Children's Hospital.

Lungren MP, Halula S, Coyne S, Sidell D, Racadio JM, Patel MN

Pediatr Neurol. 2016 Jan;54:70-5. doi: 10.1016/j.pediatrneurol.2015.09.014. Epub 2015 Sep 28.

BACKGROUND: Sialorrhea is problematic for neurologically impaired children, and botulinum toxin A salivary gland injection has been reported as effective in reducing sialorrhea. This article assesses the success and safety of ultrasound-guided weight-based botulinum toxin A injection for the management of sialorrhea in children.

METHODS: A total of 111 patients (63 males; 48 females; average age 7 years) with refractory sialorrhea were treated with ultrasound-guided botulinum toxin type A salivary gland injections (144 procedures) from July 1, 2004, to July 1, 2014, using a single weight-based protocol. Patient history, procedural records, and clinical follow-up documents were retrospectively reviewed. Clinical data were compared with reported effectiveness and complications using odds ratios.

RESULTS: A total of 144 procedures were performed in 111 patients with refractory sialorrhea. Cerebral palsy was the most common underlying etiology for sialorrhea (29%), whereas others included encephalopathy (5%), anoxic brain injury (4%), and a variety of chromosomal anomalies (5%). There was a 100% technical success rate. Overall treatment effectiveness was 68%. Repeat injections were not associated with increased clinical success. No procedure-related deaths or major complications were identified; the minor complication rate was less than 2%.

CONCLUSIONS: The protocol used for ultrasound-guided injection of botulinum toxin A proved to be safe and effective in children suffering from sialorrhea. Image guidance technique may lead to a reduction in rates of adverse events reported in other series. Subsequent procedures do not improve upon initial efficacy.

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PMID: 26706481 [PubMed - indexed for MEDLINE]

Troubles de l'audition

Auditory deficits in neurological disorders.

Przewoźny T, Gójska-Grymajło A, Szmuda T, Markiet K

Otolaryngol Pol. 2015;69(5):29-43. doi: 10.5604/00306657.1170416.

Neurological diseases present with diverse and often complex symptomatology. Focal neurological signs such as paresis, aphasia or visual field deficits together with often serious general state of a neurological patient usually push auditory symptoms into the background. Here, we present a review of literature on central and peripheral auditory disturbances that can appear in the course of most common neurological diseases. We present: cerebral stroke, cochleovestibular nerve compression syndrome, cerebral palsy, multiple sclerosis, epilepsy, myasthenia gravis and

brain tumors. We focus on the neuroanatomical basis of auditory dysfunctions, their character and prevalence typical for the abovementioned diseases. Theoretical considerations are supported by broad audiological and neuroimaging studies of our patients. Auditory symptoms in neurological diseases seem to be rare. However, knowledge of these symptoms and Their origin can be helpful in proper diagnosis and comprehensive patient management.

DOI: 10.5604/00306657.1170416

PMID: 26537643 [PubMed - indexed for MEDLINE]

Psychologie – Psychiatrie

Behavioral and emotional problems in children and adults with cerebral palsy.

Weber P, Bolli P, Heimgartner N, Merlo P, Zehnder T, Kätterer C

Eur J Paediatr Neurol. 2016 Mar;20(2):270-4. doi: 10.1016/j.ejpn.2015.12.003. Epub 2015 Dec 21.

OBJECTIVE: In patients with cerebral palsy (CP), psychological problems influence their participation in society. Little is known about the persistence of behavioral and social problems into adulthood.

MATERIALS AND METHODS: In a two-center cross-sectional study, caregivers of 121 adults and 88 children were asked to assess behavior of the patients through the parent/caregiver forms of the Child Behavior Checklist (CBCL), the Strengths and Difficulties Questionnaire (SDQ), and the Vineland Adaptive Behavior Scale II (VABS). Questionnaires were returned from 43 adults and 39 children.

RESULTS: In both groups we found the same frequency of abnormalities in attention problems (32.4 vs. 36.1%, $p = 0.826$) and social interaction problems (32.3 vs. 33.3%; $p = 0.926$) in the CBCL, and peer problems (38.9 vs. 75.7%; $p = 0.115$) in the SDQ. Children show a lower percentage of abnormal prosocial behavior (41.7 vs. 16.2%, $p = 0.016$) and lower abnormal rates of communication (88.2 vs. 61.5; $p = 0.01$) and daily living skills (90.0 vs. 71.8; $p = 0.041$), whereas the level of abnormalities in both groups in these dimensions of VABS notably high.

CONCLUSION: The persistence of psychological and social problems from childhood into adulthood underlines the importance of focusing on early intervention.

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DOI: 10.1016/j.ejpn.2015.12.003

PMID: 26748599 [PubMed - indexed for MEDLINE]

Troubles du Sommeil

Sleep concerns in children and young people with cerebral palsy in their home setting.

McCabe SM, Blackmore AM, Abbiss CR, Langdon K, Elliott C

J Paediatr Child Health. 2015 Dec;51(12):1188-94. doi: 10.1111/jpc.12933. Epub 2015 Jun 4.

AIMS: The aims were to identify in-home concerns about sleep in children and young people with cerebral palsy (CP) across age and Gross Motor Function Classification Scale (GMFCS) levels.

METHODS: This was a retrospective review of clinical notes of 154 children and young people with CP, aged 1-18 years ($M = 7.8$; standard deviation = 5.4) who received a home-based sleep service. Reported concerns were synthesised, for analysis according to age groups (1-5, 6-13, 14-18) and GMFCS levels.

RESULTS: Sixteen factors of concern were derived from the home-based assessment reports. Most children and young people had multiple factors of concern. These varied across age groups and GMFCS levels. Body position was of concern across all age groups, for over 90% at GMFCS levels IV and V, and for 10% at GMFCS level I. Settling routines were of concern for more than 90% at GMFCS levels I and II, but for less than 50% at GMFCS levels IV and V. Settling routines were of concern to over 65% of those under 6 years but less than 25% of those over 14 years. Conversely, pain and pressure care concerned less than 10% of children under 6, and more than 35% of those over 14 years.

CONCLUSIONS: Concerns about sleep vary across ages and GMFCS levels of children and young people with CP. Concerns relate to impairment of body structure and function, activity, environment, and personal supports. Multi-disciplinary, home-based assessment and interventions are recommended to address these concerns.

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and Child Health Division (Royal Australasian College of Physicians).

DOI: 10.1111/jpc.12933

PMID: 26045018 [PubMed - indexed for MEDLINE]

Qualité de vie et rapport au monde

+Qualité de vie

Psychometric properties and validation of the Polish CP QOL-Child questionnaire: a pilot study.

Dmitruk E, Mirska A, Kułak W, Kalinowska AK, Okulczyk K, Wojtkowski J.

Scand J Caring Sci. 2014 Dec;28(4):878-84. doi: 10.1111/scs.12095. Epub 2013 Nov 11.

IM: Translate, determine the psychometric properties and validate the Polish CP QOL-Child questionnaire.

MATERIALS AND METHODS: A double translation of the questionnaire from English into Polish and back was executed. The questionnaire was distributed to 55 parents/legal guardians of children with cerebral palsy aged 4-12 years. The psychometric properties of the questionnaire were determined on the basis of its internal consistency and the internal consistency of each of the investigated aspects, as well as on the assessment of the relationship between quality of life and such data as child's age, parent's age, place of residence and GMFCS level.

RESULTS: The results showed high levels of internal consistency of the Polish version of the CP QOL-Child questionnaire - Cronbach's α was between 0.77 and 0.82, which is comparable to the original scale, where it was 0.74-0.92. In addition, we found no relationship between child's age and parent's age and the child's quality of life. Whereas we determined dependencies between the child's GMFCS level and quality of life in areas such as emotional state ($p = 0.025$), pain and the effects of disability ($p = 0.033$), and to a lesser extent participation in social life ($p = 0.045$). However, Spearman test presented that only domain pain and impact of disability reported positive correlation $r = 0.43$.

CONCLUSION: Studies showed that English language the CP QOL-Child questionnaire was successful translated into Polish which is confirmed by the results of the assessment of the psychometric properties and validation of the Polish language questionnaire. The results of our study indicate that the Polish language version of the CP QOL-Child questionnaire is an appropriate tool to assess the quality of life of Polish-speaking children with cerebral palsy aged 4-12 years.

2013 Nordic College of Caring Science.

DOI: 10.1111/scs.12095

PMID: 24215571 [PubMed - indexed for MEDLINE]

The impact of the World Health Organization 8-steps in wheelchair service provision in wheelchair users in a less resourced setting: a cohort study in Indonesia.

Toro ML, Eke C, Pearlman J

BMC Health Serv Res. 2016 Jan 22;16:26. doi: 10.1186/s12913-016-1268-y.

BACKGROUND: For people who have a mobility impairment, access to an appropriate wheelchair is an important step towards social inclusion and participation. The World Health Organization Guidelines for the Provision of Manual Wheelchairs in Less Resourced Settings emphasize the eight critical steps for appropriate wheelchair services, which include: referral, assessment, prescription, funding and ordering, product preparation, fitting and adjusting, user training, and follow-up and maintenance/repairs. The purpose of this study was to investigate how the provision of wheelchairs according to the World Health Organization's service provision process by United Cerebral Palsy Wheels for Humanity in Indonesia affects wheelchair recipients compared to wait-listed controls.

METHODS: This study used a convenience sample ($N = 344$) of Children, Children with proxies, Adults, and Adults with proxies who were on a waiting list to receive a wheelchair as well as those who received one. Interviews were

conducted at baseline and a 6 month follow-up to collect the following data: Demographics and wheelchair use questions, the World Health Organization Quality of Life-BREF, Functional Mobility Assessment, Craig Handicap Assessment Recording Technique Short Form. The Wheelchair Assessment Checklist and Wheelchair Skills Test Questionnaire were administered at follow up only.

RESULTS: 167 participants were on the waiting list and 142 received a wheelchair. Physical health domain in the World Health Organization Quality of Life-BREF improved significantly for women who received a wheelchair ($p = 0.044$) and environmental health improved significantly for women and men who received a wheelchair as compared to those on the waiting list ($p < 0.017$). Satisfaction with the mobility device improved significantly for Adults with proxies and Children with proxies as compared to the waiting list ($p < 0.022$). Only 11 % of Adults who received a wheelchair reported being able to perform a "wheelie". The condition of Roughrider wheelchairs was significantly better than the condition of kids wheelchairs for Children with proxies as measured by the Wheelchair Assessment Checklist ($p = 0.019$).

CONCLUSIONS: Wheelchair provision according to World Health Organization's 8-Steps in a less-resourced setting has a range of positive outcomes including increased satisfaction with the mobility device and better quality of life. Wheelchair provision service could be improved by providing more hours of wheelchair skills training. There is a need for outcome measures that are validated across cultures and languages.

DOI: 10.1186/s12913-016-1268-y

[Free PMC Article](#)

PMCID: PMC4722611

PMID: 26801984 [PubMed - indexed for MEDLINE]

Vie quotidienne

Stability of leisure participation from school-age to adolescence in individuals with cerebral palsy.

Majnemer A Shikako-Thomas K, Schmitz N, Shevell M, Lach L.

Res Dev Disabil. 2015 Dec;47:73-9. doi: 10.1016/j.ridd.2015.08.009. Epub 2015 Sep2.

With increasing age, youth with disabilities are at risk for decreased participation in leisure activities, a key component for physical and mental health. This prospective study describes changes in leisure participation and leisure preferences from school-age to adolescence in children with cerebral palsy (CP). Participants were recruited at school-age (6-12 years) for a study on participation and reassessed for a second study on adolescents (12-19 years) if >12 years. Thirty-eight children (24 males) with CP who could actively participate in the completion of the Children's Assessment of Participation and Enjoyment (CAPE) and the Preferences for Activities of Children (PAC) comprised the sample. Average time between assessments was 5.0 ± 1.3 years. Most children were ambulatory (32/38 Gross Motor Function Classification System I-II). In addition to the CAPE and PAC, children were evaluated using the Gross Motor Function Measure-66 and parents completed a socio-demographic questionnaire. Paired t-tests revealed a significant decline in leisure participation diversity and intensity (CAPE) for recreation ($p < .0001$), skill-based ($p < .0001$) and self-improvement ($p < .05$) activities, whereas social participation remained stable ($p > .05$). Diversity of active-physical activities increased modestly ($p = .06$) although intensity of participation in this activity domain decreased ($p = .003$). There was also a decline in enjoyment of leisure activities. Preferences for these leisure activities remained unchanged between school-age and adolescence, except for recreational activities. Gender, maternal education, family income and gross motor ability were not related to differences in CAPE/PAC scores with increasing age. Findings suggest that over time, children with CP's participation in leisure activities diminishes, which is of concern to their functioning and well-being. Parents may be more involved in early childhood in facilitating participation whereas in adolescence, youth may be faced with more environmental barriers and a greater awareness of challenges to participation. Adolescents demonstrated a persisting desire to do these activities, challenging rehabilitation specialists to prioritize strategies to promote greater participation as children transition to adolescence.

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DOI: 10.1016/j.ridd.2015.08.009

PMID: 26342327 [PubMed - indexed for MEDLINE]

The Comparison of Participation in School-Aged Cerebral Palsy Children and Normal Peers: A Preliminary Study.

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Hassani Mehraban A, Hasani M, Amini M

Iran J Pediatr. 2016 May 10;26(3):e5303. doi: 10.5812/ijp.5303. eCollection 2016.

BACKGROUND: Participation in daily activities during childhood is an important aspect for health and social development.

OBJECTIVES: This study was designed to investigate the participation of children with cerebral palsy aged 8 to 14 years, and their normal peers.

PATIENTS AND METHODS: In this cross-sectional study, 30 children with cerebral palsy, and 30 normal children were selected via the non-probability convenience sampling. Their participation was evaluated with children's assessment of participation and enjoyment (CAPE) through interviews.

RESULTS: Significant differences were found between the means of the two groups regarding the diversity, intensity, overall participation ($P = 0.000$) and all types of the activities except the recreational activities. The children with cerebral palsy took part in the skill-based activities and overall activities individually compared to the normal peers. The children with cerebral palsy, in comparison with their normal peers, often performed most of the activities inside the house. The main effect of gender and the interaction between gender and groups were not statistically significant in any of the variables of the CAPE test.

CONCLUSIONS: Physical disability can influence the children's daily activities and socialization. Understanding the participation of physically disabled children can help health care professionals in designing and introducing appropriate treatment according to their needs.

[Free PMC Article](#)

DOI: 10.5812/ijp.5303

PMCID: PMC4988102

PMID: 27617075 [PubMed]

Passage à l'âge adulte – Vieillesse

Improving transition for young people with cerebral palsy.

[No authors listed]

Nurs Child Young People. 2016 Sep 12;28(7):19. doi: 10.7748/ncyp.28.7.19.s20.

Background Transitioning from child to adult healthcare services can be difficult and distressing for families. The co-ordination and communication between services needs to be improved.

DOI: 10.7748/ncyp.28.7.19.s20

PMID: 27615583 [PubMed - in process]

Co-ordinated and individualised transition planning for young people with complex needs.

[No authors listed]

Nurs Child Young People. 2016 Sep 12;28(7):19. doi: 10.7748/ncyp.28.7.19.s21.

Effective transition services can help young people with long-term conditions, such as cerebral palsy, and learning disabilities to learn to practise self-care and develop healthy behaviours. But transition is complicated if multiple specialist services are required.

DOI: 10.7748/ncyp.28.7.19.s21

PMID: 27615582 [PubMed - in process]

Activité physique - Sport

Barriers and facilitators to participation in physical activity: The experiences of a group of South African adolescents with cerebral palsy.

Conchar L, Bantjes J, Swartz L, Derman W

J Health Psychol. 2016 Feb;21(2):152-63. doi: 10.1177/1359105314523305. Epub 2014 Mar 6.

Participation in regular physical activity promotes physical health and psychosocial well-being. Interventions are thus needed to promote physical activity, particularly among groups of individuals, such as persons with disability, who are marginalised from physical activity. This study explored the experiences of a group of South African adolescents with cerebral palsy. In-depth semi-structured interviews were conducted with 15 adolescents with cerebral palsy. The results provided insight into a range of factors that promote and hinder participation in physical activity among adolescents with cerebral palsy in resource-scarce environments.

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DOI: 10.1177/1359105314523305

PMID: 24607923 [PubMed - indexed for MEDLINE]

Children with cerebral palsy do not achieve healthy physical activity levels.

Bratteby Tollerz LU, Forslund AH, Olsson RM, Lidström H, Holmbäck U

Acta Paediatr. 2015 Nov;104(11):1125-9. doi: 10.1111/apa.13141. Epub 2015 Sep 9.

AIM: This study compared daily activity energy expenditure (AEE) in children with cerebral palsy with a control group and investigated whether the children achieved healthy levels of physical activity.

METHODS: We enrolled eight children with bilateral cerebral palsy, from eight to 10 years of age, and a group of controls matched for age and gender. For three days, physical activity was simultaneously measured by accelerometers and self-reports using a diary. The daily AEE results were compared between groups and methods. The number of children that achieved healthy physical activity levels in each group was explored.

RESULTS: Children with cerebral palsy had significantly lower daily AEE, as measured by accelerometers, than the controls, and they did not achieve the healthy moderate to heavy physical activity level defined in the Nordic Nutrition Recommendations. Self-reports using the diaries resulted in an overestimation of physical activity compared with the ankle accelerometer measurements in both groups.

CONCLUSION: Our investigation of physical activity in children with cerebral palsy and controls using accelerometers and a diary found low levels of daily AEE and physical activity, and these results were most prominent in the group with cerebral palsy. The diaries overestimated physical activity in both groups.

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DOI: 10.1111/apa.13141

PMID: 26215755 [PubMed - indexed for MEDLINE]

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.

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 - in process]

Health benefits of seated speed, resistance, and power training for an individual with spastic quadriplegic cerebral palsy: A case report.

Gannotti ME, Fuchs RK, Roberts DE, Hobbs N, Cannon IM

J Pediatr Rehabil Med. 2015;8(3):251-7. doi: 10.3233/PRM-150336.

Children with moderate to severe cerebral palsy are at risk for low bone mass for chronological age, which compounds risk in adulthood for progressive deformity and chronic pain. Physical activity and exercise can be a key

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component to optimizing bone health. In this case report we present a young adult male with non-ambulatory, spastic quadriplegia CP whom began a seated speed, resistance, and power training exercise program at age 14.5 years. Exercise program continued into adulthood as part of an active lifestyle. The individual had a history of failure to thrive, bowel and bladder incontinence, reduced bone mineral density (BMD) for age, and spinal deformity at the time exercise was initiated. Participation in the exercise program began once a week for 1.5-2 hours/session, and progressed to 3-5 times per week after two years. This exercise program is now a component of his habitual lifestyle. Over the 6 years he was followed, lumbar spine and total hip BMD Z-scores did not worsen, which may be viewed as a positive outcome given his level of gross motor impairment. Additionally, the individual reported less back pain, improved bowel and bladder control, increased energy level, and never sustained an exercise related injury. Findings from this case report suggest a regular program of seated speed, resistance, power training may promote overall well-being, are safe, and should be considered as a mechanism for optimizing bone health.

DOI: 10.3233/PRM-150336

PMID: 26410068 [PubMed - indexed for MEDLINE]

Prediction of peak oxygen consumption from the multistage field test in elite wheelchair rugby players.

Weissland T, Leprêtre PM, Bruere S, Troadec G, Terrefond M

Ann Phys Rehabil Med. 2016 Sep;59S:e54. doi: 10.1016/j.rehab.2016.07.124.

OBJECTIVE: Evaluations of physical fitness and efficiency to wheelchair propulsion are common in rehabilitation center. The multistage field test (MFT) was developed for wheelchair users and predicts the peak value of oxygen consumption [Formula: see text], independently of their impairment [1]. In an earlier study, we did not find significant difference between VO₂peak estimated by the Vanderthommen's formula and measured VO₂peak [2] of trained wheelchair basketball players.

MATERIAL/PATIENTS AND METHODS: Comparatively to wheelchair basketball, the athlete's cardio-respiratory and muscular limitations are greater higher in wheelchair rugby. Thus, the objective of this study was to compare the measured [Formula: see text] with ambulatory analyzer with its predicted value according the MFT score. Twelve elite wheelchair rugby players (all are members in French team, 6.1±2.1years training duration, 1.7±0.9 points according to international classification) performed MFT in their competitive wheelchair. [Formula: see text] were measured with a Metamax 3B ambulatory system and also calculated from the end-MFT scores.

RESULTS: A significant correlation between both [Formula: see text] values was found ($r=0.96$; $R(2)=0.91$; $P<0.0001$) and no significant difference between [Formula: see text] values measured and estimated (28.7 ± 13.6 vs. 27.9 ± 3.4 mL/min/kg; $P=0.66$). Bland-Altman plot revealed a poor agreement [-21.6 to 20.1 in mL/min/kg] (mean bias of -0.79, i. e., 72%) between both [Formula: see text] values. Player classification was significantly correlated with [Formula: see text] measured ($r=0.87$, $R(2)=0.75$; $P<0.0001$).

DISCUSSION-CONCLUSION: Players ranked to high and low limits of the international classification (close to 1 or 3 points) have predicted [Formula: see text] outside of the 95% limits of Bland-Altman plot agreement. The different etiologies presented in the population (tetraplegia, amputee, cerebral palsy, Charcot-Marie-Tooth disease) can explain the magnitude of the cardiorespiratory responses. Considering these limitations, with no technical equipment, MFT provides an estimate of physical fitness to elite wheelchair players.

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Validation of Accelerometer Cut-Points in Children With Cerebral Palsy Aged 4 to 5 Years.

Keawutan P(1), Bell KL, Oftedal S, Davies PS, Boyd RN.

Pediatr Phys Ther. 2016 Winter;28(4):427-34. doi: 10.1097/PEP.0000000000000291.

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 Science Infos Paralyse Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue cdoumergue@lafondationmotrice.org

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 - in process]

Variability of total step activity in children with cerebral palsy: influence of definition of a day on participant retention within the study.

Wilson NC, Mudge S, Stott NS

BMC Res Notes. 2016 Aug 20;9:411. doi: 10.1186/s13104-016-2218-9.

BACKGROUND: Activity monitoring is important to establish accurate daily physical activity levels in children with cerebral palsy (CP). However, few studies address issues around inclusion or exclusion of step count data; in particular, how a valid day should be defined and what impact different lengths of monitoring have on retention of participant data within a study. This study assessed how different 'valid day' definitions influenced inclusion of participant data in final analyses and the subsequent variability of the data.

RESULTS: Sixty-nine children with CP were fitted with a StepWatch™ Activity Monitor and instructed to wear it for a week. Data analysis used two broad definitions of a day, based on either number of steps in a 24 h monitoring period or the number of hours of recorded activity in a 24 h monitoring period. Eight children either did not use the monitor, or used it for only 1 day. The remaining 61 children provided 2 valid days of monitoring defined as >100 recorded steps per 24 h period and 55 (90 %) completed 2 valid days of monitoring with ≥10 h recorded activity per 24 h period. Performance variability in daily step count was lower across 2 days of monitoring when a valid day was defined as ≥10 h recorded activity per 24 h period (ICC = 0.765) and, higher when the definition >100 recorded steps per 24 h period (ICC = 0.62). Only 46 participants (75 %) completed 5 days of monitoring with >100 recorded steps per 24 h period and only 23 (38 %) achieved 5 days of monitoring with ≥10 h recorded activity per 24 h period. Datasets of participants who functioned at GMFCS level II were differentially excluded when the criteria for inclusion in final analysis was 5 valid days of ≥10 h recorded activity per 24 h period, leaving datasets available for only 8 of 32 participant datasets retained in the study.

CONCLUSION: We conclude that changes in definition of a valid day have significant impacts on both inclusion of participant data in final analysis and measured variability of total step count.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4992568/>

DOI: 10.1186/s13104-016-2218-9

PMCID: PMC4992568

PMID: 27544209 [PubMed - in process]

Prise en charge et Accompagnant/Accompagnement

Depression and anxiety in mothers of children with cerebral palsy: Comparative study.

Tougui E(1), Jemni S(2), Samia F(2), Lazreg N(2), Mtaouaa S(2), Khachnaoui F(2).

Ann Phys Rehabil Med. 2016 Sep;59S:e9. doi: 10.1016/j.rehab.2016.07.024.

OBJECTIVE: The aim of this study is to examine depression in mothers of children with CP, with hypothesis to have an elevated risk of anxiety and depressive profile among mothers of children with cerebral palsy.

PATIENTS AND METHODS: This study is a descriptive cross-sectional survey conducted at The Physical and Rehabilitation Department of Sahloul Hospital in Tunisia. Where included 62 children with cerebral palsy with their mothers. The inclusion criteria for the study were being the mothers of a child having a CP and aged more than two years. Mothers with history of psychiatric disorder were not included. Seventy-three mothers of normal children, serving as the control group for comparing with case group, filled in the same questionnaires.

RESULTS: This study included 62 children including 45 boys (sex ratio 2.6). An evaluation of the functional status by the Gross Motor Function Classification System (GMFCS) of the children with CP was done, 27.4% were level II, 20.9% were level IV and 19.4% were level V. Moreover, 58.1% of the children were tetraplegic, and 24.2% were

diplegic. Mothers of children were evaluated by the Hospital Anxiety and Depression Scale (HADS). Mothers had a normal depression score in 29%, a borderline score in 25.8% and an abnormal score in 45.2%. Concerning anxiety, mothers had a normal score in 12.9%, a borderline score in 27.4% and an abnormal score in 59.7%. There were significant differences in the mean depression scores ($P=0.002$) between the two groups. The results also shown that the severity of the GMFCS was not associated with the HADS ($P=0.230$). The clinical presentation of the CP was also not associated with the HADS ($P=0.129$).

DISCUSSION/CONCLUSION: It seems that having a child with CP is probably associated with higher prevalence and severity of depression in mothers. Caring for children with CP (regardless to the severity of the clinical form) increases considerably the risk of emotional distress among mothers.

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Health network Breizh PC impact on the management of patients with cerebral palsy and professional practice.

Colin A, Nicolas B, Durufle A, Lepape L, Achille S, Gallien P

Ann Phys Rehabil Med. 2016 Sep;59S:e7-e8. doi: 10.1016/j.rehab.2016.07.019.

OBJECTIVE: For 10 years the Breizh PC network has developed a training policy for health professionals based on the analysis of the medical needs of patients with cerebral palsy and professional practices. Several studies have highlighted various health problems. We detail the main actions and their impact on the satisfaction of users and professionals.

MATERIAL AND METHODS: Since the creation of the network regulatory triennial assessments led us to perform satisfaction surveys among users and professional members of the network. We present the evolution of these results over the past decade.

RESULTS: Near 1000 users have benefited from the actions of the network, a secure shared medical folder has been put in place in order to improve the quality of care. In parallel, network activity concerned 2840 health professionals through various training and information sessions. Over the years, an increase in patient satisfaction with respect to the quality of care is noted with 65% of patients a feeling of improving their quality of life, against 40% in 2006. In parallel, professionals report a positive impact on their professional practice in the management of patients with cerebral palsy in particular, but also in other pathologies.

DISCUSSION/CONCLUSION: Since its creation the network has put in place training, information, and therapeutic education concerning different professional caregivers and community health involved in the management of cerebral palsy. The evaluation for more than 10 years shows both a satisfaction of professionals and patients. These results confirm the interest of the creation of this network of care.

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PMID: 27676983 [PubMed - as supplied by publisher]

[Impact of a psychosocial intervention in caregiver burden of children with cerebral palsy].

[Article in Spanish]

Martínez Lazcano F, Avilés Cura M, Ramírez Aranda JM, Riquelme Heras H, Garza Elizondo T, Barrón Garza F

Aten Primaria. 2014 Oct;46(8):401-7. doi: 10.1016/j.aprim.2013.12.005. Epub 2014 Feb 26.

OBJECTIVE: To demonstrate that problem-solving therapy is effective in reducing the burden on caregivers of children with cerebral palsy.

DESIGN: Randomized clinical trial.

LOCATION: Check primary care within a private nonprofit association.

PARTICIPANTS: 140 caregivers divided into control group (CG) and experimental group (EG).

INTERVENTIONS: We performed in both groups a psychosocial intervention with a frequency of one session per week for three weeks to complete 120 minutes. In the EG performed a shortened form of problem-solving therapy with a focus on caregiver burden and the CG performed an educational intervention focusing on respiratory diseases.

MAIN MEASURES: The response variable corresponds to the score obtained by Zarit questionnaire. The independent variable accounted for psychosocial intervention.

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RESULTS: In the EG according to Zarit questionnaire score was obtained by averaging 45.0 points pre intervention against 45.3 points in the CP after intervention Zarit was obtained by averaging 29.8 points in the EG and 44.3 points in the CG ($P < .0001$). The catalog groups according to their score Zarit in charge: none, mild, moderate and severe impact differences were found in the different intervention categories (Wilcoxon test $Z = 6.281$, $P < .00001$).

CONCLUSIONS: Problem solving therapy is effective in reducing the burden on caregivers of children with cerebral palsy.

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DOI: 10.1016/j.aprim.2013.12.005

PMID: 24581894 [PubMed - indexed for MEDLINE]

'Learn From Every Patient': implementation and early results of a learning health system.

Lowes LP, Noritz GH, Newmeyer A, Embi PJ, Yin H, Smoyer WE; 'Learn from Every Patient' Study Group. Collaborators: Tidball A, Love L, Schmidt J, Golias J, Miller M.

Dev Med Child Neurol. 2016 Aug 22. doi: 10.1111/dmnc.13227. [Epub ahead of print]

AIM: The convergence of three major trends in medicine, namely conversion to electronic health records (EHRs), prioritization of translational research, and the need to control healthcare expenditures, has created unprecedented interest and opportunities to develop systems that improve care while reducing costs. However, operationalizing a 'learning health system' requires systematic changes that have not yet been widely demonstrated in clinical practice. METHOD: We developed, implemented, and evaluated a model of EHR-supported care in a cohort of 131 children with cerebral palsy that integrated clinical care, quality improvement, and research, entitled 'Learn From Every Patient' (LFEP).

RESULTS: Children treated in the LFEP Program for a 12-month period experienced a 43% reduction in total inpatient days ($p = 0.030$ vs prior 12mo period), a 27% reduction in inpatient admissions, a 30% reduction in emergency department visits ($p = 0.001$), and a 29% reduction in urgent care visits ($p = 0.046$). LFEP Program implementation also resulted in reductions in healthcare costs of 210% (US\$7014/child) versus a Time control group, and reductions of 176% (\$6596/child) versus a Program Activities control group. Importantly, clinical implementation of the LFEP Program has also driven the continuous accumulation of robust research-quality data for both publication and implementation of evidence-based improvements in clinical care.

INTERPRETATION: These results demonstrate that a learning health system can be developed and implemented in a cost-effective manner, and can integrate clinical care and research to systematically drive simultaneous clinical quality improvement and reduced healthcare costs.

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Moving from parent "consultant" to parent "collaborator": one pediatric research team's experience.

Bartlett D, Chiarello LA, Hjørngaard T, Sieck Taylor B

Disabil Rehabil. 2016 Sep 27:1-8. [Epub ahead of print]

We share our experiences as academic physical therapists and parents of young people with cerebral palsy working together as a research team, describe and critically review how our working relationship has evolved and propose further enhancements to realize our shared vision. This manuscript is informed by a call for "family-centered research," transcripts of face-to-face meetings held over a period of 1(1/2) days, the INVOLVE document and our experiences over almost a decade, as well as other related literature. Authentic collaborative research partnerships between academic researchers and parents embodying trust, mutual respect and shared social responsibility take time and effort to develop and sustain. Rehabilitation research is more meaningful and may be more impactful when strong collaborative partnerships between researchers and health service users are in place. Implications for Rehabilitation Involving service users in rehabilitation research is important, but not without challenges. Attaining authentic collaboration requires face-to-face meetings, time, effort, and ongoing open communication. Research processes are superior and outcomes may be improved with service user involvement. Impact of research on rehabilitation practice is anticipated to be more meaningful with service user involvement.

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PMID: 27670419 [PubMed - as supplied by publisher]

Perceived effectiveness, tolerance of cares in children and adults with cerebral palsy.

Houx L, Saudreau H, Galien P, Pons C, Roquet M, Garlantezec R, Brochard S Groupe de recherche sur la paralysie cérébrale en Bretagne.

Ann Phys Rehabil Med. 2016 Sep;59S:e5-e6. doi: 10.1016/j.rehab.2016.07.014.

OBJECTIVE: A better understanding of the perception of the rehabilitative and medical care's by persons with cerebral palsy (CP) and their families may help in providing better adherence to these cares. The main objective of this study was to assess overall satisfaction, self-perception of effectiveness and tolerance of the rehabilitative and medical cares in individuals with CP.

MATERIAL AND METHODS: This was a cross-sectional questionnaire-based study. A total of 950 questionnaires were sent to French Britain children and adults with CP. Perceived effectiveness and tolerance were evaluated for each types of care using a Likert scale from 1 to 7 and overall satisfaction by a visual analog scale. Comparison of means and uni-and-multivariate analyzes for correlation analysis were carried out.

RESULTS: A total of 512 (53.9%) questionnaires were analyzed; 230 (44.9%) were children and 54% were walkers (GMFCS I, II or III). The overall satisfaction was 6.83/10 (SD 2.21). Orthoptic, orthosis and physical therapy were reported to be the most effective cares (5.34/5.30/5.29) while botulinum toxins, intrathecal baclofen, and speech therapy the least effective (4.42/4.52/5.02). Intrathecal baclofen, orthosis and botulinum toxin were the less well-tolerated therapies (4.75/5.11/5.28). Antiepileptic drugs were reported to be the most effective and best-tolerated drug contrary to analgesics. Overall, satisfaction was inversely correlated to the GMFCS in the multivariate analysis (P=0.013). The perceived effectiveness of occupational therapy, botulinum toxin injections and physiotherapy are inversely related to GMFCS in the univariate analyzes. The tolerance and effectiveness of the orthosis have a positive correlation with the GMFCS in the uni-and-multivariate analyzes.

DISCUSSION/CONCLUSION: This study shows a good overall satisfaction on medical and paramedical care but highlights a large discrepancy between user self-perception and evidence base medicine. More communication about the therapies between professionals and individuals with cerebral palsy is needed and comparing opinions of patients and their families to literature can give us the keys to improve communication around these therapies.

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DOI: 10.1016/j.rehab.2016.07.014

PMID: 27676935 [PubMed - as supplied by publisher]

Perceived quality of physiotherapy services among informal caregivers of children with cerebral palsy in Ibadan, Nigeria.

Olaleye OA, Hamzat TK, Oloso MO.

J Pediatr Rehabil Med. 2015;8(3):227-34. doi: 10.3233/PRM-150339.

OBJECTIVE: Effective physiotherapy intervention for children with cerebral palsy (CP) requires that expectations of their caregivers be incorporated into treatment plans and strategies. This study explored the perceived Quality of Physiotherapy (QoP) for children with CP in Ibadan, Nigeria **METHODS:** This cross-sectional survey explored the perceived QoP using the SERVQUAL instrument among informal caregivers of children with CP from two different healthcare facilities. Data was analysed using Mann Whiney U and Wilcoxon Signed Rank tests at $p \leq 0.05$.

RESULTS: Fifty-three informal caregivers (50 females, 3 males) of children with CP (32 males, 21 females) were surveyed. Fourth-fifths (81.13%) of the caregivers perceived the QoP service for their children as poor. The highest negative and positive ranks were in the tangible and responsiveness dimensions of the SERVQUAL respectively.

CONCLUSIONS: The study demonstrated that caregivers of children with CP perceived the quality of physiotherapy provided for their children as poor. This poor perception is related more to the tangible dimension of care. Strategies to improve care environment for children with CP and their informal caregivers should be implemented to engender satisfaction with care.

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Stress and resolution in mothers of children with cerebral palsy.

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Res Dev Disabil. 2015 Dec;47:135-43. doi: 10.1016/j.ridd.2015.09.009. Epub 2015 Sep 27.
Erratum in Res Dev Disabil. 2016 Apr-May;51-52:188.

Parental resolution of diagnosis represents coming to terms with and accepting the diagnosis of a serious condition in their child. As risk factors for achieving resolution, we investigated: a child's functional status, cumulative stress, and maternal depression. The current study tested the hypothesis that mothers who are unresolved to their child's diagnosis would have considerably higher levels of risk factors, compared to resolved mothers. We also examined whether the observed risk factors could predict the resolution status. Maternal resolution was assessed by means of the Reaction to Diagnosis Interview. The sample consisted of 100 mothers of children aged 2-7, diagnosed with cerebral palsy. The results showed that unresolved mothers had children with poorer functional status, experienced more stressful life events, and were more depressed compared to resolved ones. The functional status of a child and maternal depression were shown to be significant resolution predictors. Importantly, they were more successful in predicting the resolved than the unresolved status. Further research is needed in order to investigate more extensively the unresolved parental status.

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The family needs of parents of preschool children with cerebral palsy: the impact of child's gross motor and communications functions.

Bertule D, Vetra A

Medicina (Kaunas). 2014;50(6):323-8. doi: 10.1016/j.medici.2014.11.005. Epub 2014 Nov 27.

BACKGROUND AND OBJECTIVE: An understanding of the needs of families of preschool children with cerebral palsy (CP) is of essential importance if efficient and cost-effective services are to be provided to them. The aims of this study were to identify the most frequently expressed needs of families with preschool children with CP; differences in the amount and types of family needs based on the child's gross motor function and communication function level; and the impact of the child's gross motor function and communication function level on the type and amount of family needs.

MATERIALS AND METHODS: A total of 227 parents of preschool children with CP completed a modified version of the Family Needs Survey and a demographic questionnaire. Children's gross motor function level and communication function level was classified using the Gross Motor Function Classification System (GMFCS) and the Communication Function Classification System (CFCS), respectively.

RESULTS: The total number of family needs differed based on GMFCS and CFCS levels. Children's GMFCS and CFCS level were not significant predictors of overall family needs (adjusted $R(2)=0.163$). In this model the GMFCS level of children did not account for the total number of family needs, while the CFCS level did.

CONCLUSIONS: Child's limitations in terms of communication and gross motor functions must be taken into consideration when planning services for families with preschool children with CP.

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Why placement in an institution is proposed to children with motor disability in 2016?

Hamonet-Torny J

Ann Phys Rehabil Med. 2016 Sep;59S:e175. doi: 10.1016/j.rehab.2016.07.381.

OPINION/FEEDBACK: INTRODUCTION: Despite of the politique for social inclusion leaded since the last decade, many specialized institutions for disabled children remained in France. This institutional field is varied and heterogenous, so difficult to understand from the exterior, particularly from the healthcare sector. The aim of this study was to evaluate the needs of the children accompanied within the Motor Education Institute of Couzeix in order to identify more precise indications to the placement.

METHOD: Retrospective study on the candidate files of the 34 children new admitted in the MEI, between September 2013 and January 2016.

RESULTS: These children presented an important motor disability (47% of tetraplegia, 23.5% of paraplegia, 26.5% of hemiplegia), caused by severe pathologies (44.1% of cerebral palsy, 17.6% of myopathy, 14.7% of tumoral pathology, 14.7% of rare diseases, 5.9% of head injury). Mean age at admission was 14.5 years old. The admissions mostly succeeded an anterior specialized accompanying (41.1% of children came from home care services and 29.4% from another MEI) or relayed a hospitalization (8.8%). But in 20.6% of cases, the children received only private duty cares before their admission. The analysis of the candidate motives shows the imbrication of various problematic: needs in rehabilitation cares (97%, of which 14.7% in a postoperative context), school difficulties (82.3%), socio-familial troubles (55.9%), psycho-affective troubles (50%), problems of course or career choice (29.4%), need of preparation in view of an adult life (11.7%).

CONCLUSION: The specific needs leading to the placement in the MEI of Couzeix are not only important needs in rehabilitation and daily cares, related to the disability severity, but also the necessity of a global and specialized psycho-social support. The admission reasons for schooling or course choice reveal the limits of the actual school inclusion. The direct admissions from the private duty sector without specific accompanying question the healthcare pathway of these children.

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Domotique - Technology

Gaze-based assistive technology used in daily life by children with severe physical impairments - parents' experiences.

Borgestig M, Rytterström P, Hemmingsson H

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OBJECTIVE: To describe and explore parents' experiences when their children with severe physical impairments receive gaze-based assistive technology (gaze-based assistive technology (AT)) for use in daily life.

METHODS: Semi-structured interviews were conducted twice, with one year in between, with parents of eight children with cerebral palsy that used gaze-based AT in their daily activities. To understand the parents' experiences, hermeneutical interpretations were used during data analysis.

RESULTS: The findings demonstrate that for parents, children's gaze-based AT usage meant that children demonstrated agency, provided them with opportunities to show personality and competencies, and gave children possibilities to develop. Overall, children's gaze-based AT provides hope for a better future for their children with severe physical impairments; a future in which the children can develop and gain influence in life.

CONCLUSION: Gaze-based AT provides children with new opportunities to perform activities and take initiatives to communicate, giving parents hope about the children's future.

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