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## Interventions and Management

### 1. *Physiother Theory Pract.* 2012 Apr 16. [Epub ahead of print]

#### **Critical approaches in physical therapy research: Investigating the symbolic value of walking.**

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Research using a critical social science perspective is uncommon in physiotherapy (PT) despite its potential advantages for investigating questions other approaches cannot address. Critical approaches can be used to expose ideas and concepts that are dominant, given, or taken-for-granted in practice in order to reflect on how "things could be otherwise." The purpose of this paper is to use an example of research examining the symbolic value of walking to outline the key features of critical research and its application to PT. The study drew from Pierre Bourdieu's sociology of practice to illuminate how socially ingrained notions of normality and disability are reflected in rehabilitation practices and affect parents and children with cerebral palsy. Dominant social assumptions about the value of walking are shown to shape individual choices and contribute to parental feelings of angst and doubt, and negative self-identities for children. The example reveals how critical approaches to research can be used to reveal the socio-political dimension of rehabilitation practice and address important research questions that have been largely neglected.

[PMID: 22507195](#) [PubMed - as supplied by publisher]

### 2. *Res Dev Disabil.* 2012 Jul;33(4):1235-41. Epub 2012 Mar 22.

#### **Fundamental movement skills and physical activity among children with and without cerebral palsy.**

Capio CM, Sit CH, Abernethy B, Masters RS.

Institute of Human Performance, The University of Hong Kong, Pokfulam Road, Hong Kong SAR, China; Faculty of Kinesiology and Rehabilitation Sciences, Katholieke Universiteit Leuven, Tervursevest 101, Heverlee 3001, Belgium.

Fundamental movement skills (FMS) proficiency is believed to influence children's physical activity (PA), with those more proficient tending to be more active. Children with cerebral palsy (CP), who represent the largest diagnostic group treated in pediatric rehabilitation, have been found to be less active than typically developing

children. This study examined the association of FMS proficiency with PA in a group of children with CP, and compared the data with a group of typically developing children. Five FMS (run, jump, kick, throw, catch) were tested using process- and product-oriented measures, and accelerometers were used to monitor PA over a 7-day period. The results showed that children with CP spent less time in moderate to vigorous physical activity (MVPA), but more time in sedentary behavior than typically developing children. FMS proficiency was negatively associated with sedentary time and positively associated with time spent in MVPA in both groups of children. Process-oriented FMS measures (movement patterns) were found to have a stronger influence on PA in children with CP than in typically developing children. The findings provide evidence that FMS proficiency facilitates activity accrual among children with CP, suggesting that rehabilitation and physical education programs that support FMS development may contribute to PA-related health benefits.

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### **3. Res Dev Disabil. 2012 Jul;33(4):1176-82. Epub 2012 Mar 22.**

#### **Relationships between respiratory muscle strength and daily living function in children with cerebral palsy.**

Wang HY, Chen CC, Hsiao SF.

Department of Physical Therapy, Kaohsiung Medical University, No. 100, Shih-Chuan 1st Rd., Kaohsiung, Taiwan; Department of Rehabilitation, Kaohsiung Medical University, Chung-Ho Memorial Hospital, No. 100, Shih-Chuan 1st Rd., Kaohsiung, Taiwan.

Cerebral palsy (CP) is a common childhood disorder characterized by motor disability. Children with CP are at risk of developing significant respiratory problems associated with insufficient respiratory muscle strength. It is crucial to identify important factors which are associated with the limitations in daily living function in such children. Hence, the aim of this study was to investigate the relationship between respiratory muscle strength and daily living function in children with CP. The participants were 30 children with CP ( $M \pm SD$  age,  $8.7 \pm 2.1$  years) and 30 children with typical development ( $M \pm SD$  age,  $8.3 \pm 0.9$  years). Respiratory muscle strength was measured by maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) for the both groups of children. Children with CP were also assessed on daily living function with the subscales of Pediatric Evaluation of Disability Inventory (PEDI), the Functional Skills Scales (PEDI-FSS) and the Caregiver Assistance Scale (PEDI-CAS). Results show that, compared to the children with typical development, the MIP and MEP in the CP group were significantly lower ( $p = .003$  and  $p = .001$ , respectively). In the CP group, MIP and MEP were correlated to two of the three PEDI-FSS domain scores ( $r = .43-.53$ ,  $p < .05$ ) but not with the three PEDI-CAS domain scores. MET explained 19% of the variance in the self-care domain score of PEDI-FSS. MEP also explained 15% of the variance in the social domain score of PEDI-FSS. The results of this study demonstrate that respiratory muscle strength in children with CP is correlated positively to their capability levels of daily living self-care and social function, and we suggest this should be taken into account when planning intervention to improving ability of daily living function for children with CP.

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### **4. Ann Rehabil Med. 2012 Feb;36(1):39-46. Epub 2012 Feb 29.**

#### **The Effect of Comprehensive Hand Repetitive Intensive Strength Training (CHRIST) Using Motion Analysis in Children with Cerebral Palsy.**

Kim DA, Lee JA, Hwang PW, Lee MJ, Kim HK, Park JJ, You JH, Lee DR, Lee NG.

Department of Rehabilitation Medicine, National Rehabilitation Hospital, Seoul 142-884, Korea.

**OBJECTIVE:** To investigate the effect of Comprehensive Hand Repetitive Intensive Strength Training (CHRIST) on upper limb function in children with cerebral palsy using motion analysis. **METHOD:** The subjects in this study included 19 children (10 males, 9 females, mean age=8.8 years) with cerebral palsy. The experimental group

(n=10) received CHRIST and general rehabilitation therapy. The control group (n=9) received a home program as well as general rehabilitation therapy. Both groups received 30 sessions of CHRIST or home program training for 60 minutes per session 3 times a week during the 10-week period. The reaching movements were captured by a motion analysis system. Kinematic variables including movement time (MT), mean velocity (MV), normalized jerk score (NJS), mean angular velocity (MAV) and normalized jerk score of the shoulder, elbow and wrist joint with comfortable and fast speed were analyzed between groups and the pre-post training group. RESULTS: After pre- and post-training experimental group, MT, MV, NJS, MAV of shoulder, elbow, wrist and NJS of elbow and wrist improved significantly in reaching movement of both comfortable and fast speed ( $p<0.05$ ). However, After pre- and post-training control group, MV improved significantly in reaching movement of only comfortable speed ( $p<0.05$ ). Between two groups, MT and MAV of the elbow at comfortable speed and NJS of the elbow at fast speed were statistically significant ( $p<0.05$ ). CONCLUSION: CHRIST proved to be an effective intervention for improving upper limb extremity function of reaching movement in children with cerebral palsy.

[PMID: 22506234](#) [PubMed - in process] PMID: PMC3309323

##### **5. Res Dev Disabil. 2012 Jul;33(4):1227-34. Epub 2012 Mar 22.**

###### **Twenty weeks of computer-training improves sense of agency in children with spastic cerebral palsy.**

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Department of Exercise and Sport Sciences, Panum Institute, University of Copenhagen, Blegdamsvej 3, DK-2200 Copenhagen, Denmark; Department of Neuroscience and Pharmacology, Panum Institute, University of Copenhagen, Blegdamsvej 3, DK-2200 Copenhagen, Denmark; Helene Elsass Center, Holmegårdsvej 28, DK-2920 Charlottenlund, Denmark.

Children with cerebral palsy (CP) show alteration of perceptual and cognitive abilities in addition to motor and sensory deficits, which may include altered sense of agency. The aim of this study was to evaluate whether 20 weeks of internet-based motor, perceptual and cognitive training enhances the ability of CP children to determine whether they or a computer are responsible for the movement of a visually observed object. 40 CP children (8-16 years) were divided into a training (n:20) and control group (n:20). The training group trained 30min each day for 20 weeks. The ability of the children to judge whether they themselves or a computer were responsible for moving an object on a computer screen was tested before and after the 20-week period. Furthermore, we included a healthy age-matched group to determine a normal functional level of performance. Our results showed a significantly larger increase in the number of correct subjective reporting for the training group ( $p<0.001$ ). In accordance with this, the training group was also less fooled by computer-induced movements given by a decreased curvature which indicated a compensatory motor strategy when drawing the line to hit the target following the training than the control group ( $p=0.018$ ). These findings suggest that sense of agency may be altered, and that training of sense of agency may help to increase the outcome of training programmes in children with CP.

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##### **6. Ann Rehabil Med. 2012 Feb;36(1):33-8. Epub 2012 Feb 29.**

###### **Reliability of hip migration index in children with cerebral palsy: the classic and modified methods.**

Kim SM, Sim EG, Lim SG, Park ES.

Department and Research Institute of Rehabilitation Medicine, Yonsei University College of Medicine, Seoul 120-752, Korea.

OBJECTIVE: To determine reliability and clinical use of two methods of migration index (MI) in CP patients with or without hip dysplasia. METHOD: The materials included radiographs of 200 hips of children with cerebral palsy. Conventional anteroposterior radiographs of the pelvis were taken with the child in the supine position with standardized methods. Two rehabilitation doctors measured the migration index using two methods. In the classic method, the lateral margin of the acetabular roof was used as a landmark and in the modified method the lateral

margin of the sourcil was used as a landmark. Each rater measured the migration index at three separate times with a time interval of at least one week. Intraclass correlation (ICC) was used to test the inter- and intra-rater reliability. RESULTS: MI shows excellent intra-rater reliability in both the classic and modified methods, but the inter-rater reliability was higher in the classic method than in the modified method. When categorized according to the sourcil classification, inter-rater reliability was higher in the normal sourcil type and lower in the dysplastic sourcil types. CONCLUSION: Generally, the classic method showed higher reliability than the modified method, even though the reliability of the MI measurement was relatively high with both methods.

[PMID: 22506233](#) [PubMed - in process] PMID: PMC3309325

## 7. J Pediatr Orthop B. 2012 Apr 13. [Epub ahead of print]

### **Double osteotomy of the pelvis for treatment of an anterior hip subluxation in a 9-year-old child with cerebral palsy: a variation of the Salter osteotomy.**

Schmid RB, Brunner R, Camathias C, Rutz E.

Pediatric Orthopaedic Department, University Children's Hospital Basle, UKBB, Basel, Switzerland.

Treatment with an unconventional double osteotomy of the pelvis in a 9-year-old girl with recurrent anterior hip subluxation after hip reconstruction in cerebral palsy is presented. Classical Pemberton or Salter osteotomy is effective for superolateral acetabular dysplasia, but corrections in the anterior or posterior direction are limited. In this case, double osteotomy of the pubic and iliac bone allowed better coverage in the anterior part of the acetabulum. The bone provided sufficient elasticity to achieve the desired correction without an ischial cut, therefore providing more stability of the pelvis.

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## 8. Res Dev Disabil. 2012 Jul;33(4):1087-94. Epub 2012 Feb 28.

### **Muscle strength enhancement following home-based virtual cycling training in ambulatory children with cerebral palsy.**

Chen CL, Hong WH, Cheng HY, Liaw MY, Chung CY, Chen CY.

Department of Physical Medicine and Rehabilitation, Chang Gung Memorial Hospital, Linkou, 5 Fu-Hsing St., Kwei-Shan, Tao-Yuan 333, Taiwan; Graduate Institute of Early Intervention, Chang Gung University, 259 Wen-Hwa 1st Rd, Kwei-Shan, Tao-Yuan 333, Taiwan.

This study is the first well-designed randomized controlled trial to assess the effects of a novel home-based virtual cycling training (hVCT) program for improving muscle strength in children with spastic cerebral palsy (CP). Twenty-eight ambulatory children with spastic CP aged 6-12 years were randomly assigned to an hVCT group (n=13) or a control group (n=15). Outcome measures, including gross motor function of the Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) and muscle strength (isokinetic torque of knee extensor and flexor muscle), were administered before and immediately after the 12-week intervention. Analysis of covariance (ANCOVA) at post-treatment showed that, compared to the control group, the hVCT group had significantly higher isokinetic torque in the knee extensor and flexor muscles at 60°/s and 120°/s angular velocities ( $p < 0.05$ ). At post-treatment, the hVCT group also showed greater isokinetic strength improvement in the knee flexor than in the knee extensor at 60°/s (knee flexor: 41%; knee extensor: 19%) and at 120°/s (knee flexor: 36%; knee extensor: 30%). However, the BOTMP scores at post-treatment did not differ between the two groups. Although the proposed 12-week hVCT protocol does not improve gross motor function, it enhances knee muscle strength in children with CP. The protocol obtains larger gains in the knee flexor than in the knee extensor at different angular velocities. The study findings will help clinicians to provide more effective and efficient strategies for muscle strength training in children with CP.

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**9. Ann Rehabil Med. 2011 Jun;35(3):354-60. Epub 2011 Jun 30.****Reliability of visual classification of sagittal gait patterns in patients with bilateral spastic cerebral palsy.**

Kim DJ, Park ES, Sim EG, Kim KJ, Kim YU, Rha DW.

Department of Rehabilitation Medicine and Research Institute, Yonsei University College of Medicine, Seoul 120-752, Korea.

**OBJECTIVE:** To investigate the reliability of inspection-based classification of sagittal gait patterns in children with bilateral spastic cerebral palsy (CP). **METHOD:** Video clip recordings of gait patterns and sagittal kinematic data obtained by a computerized motion analysis system from 91 patients with bilateral spastic CP were reviewed. The abnormal gait patterns were classified into 4 groups using the method described by Rodda et al. Visual observation-based classification (visual classification) was compared with classification by 3D analysis-based methods (3D classification). The reliabilities of visual classifications made by an experienced physician and a trainee physician were analyzed. **RESULTS:** The consistency of inspection-based gait classification using kinematic data analysis was demonstrated by an experienced physician (Kappa coefficient ( $k$ )=0.67,  $p<0.001$ ). However, the consistency was low for the trainee physician ( $k=0.37$ ,  $p<0.001$ ). Group III (apparent equinus) was commonly confused with group IV (crouch gait) by the trainee physician, resulting in lower agreement for those two evaluation groups than for other patterns. Video observation showed low reliability in comparisons made between the experienced and the trainee physician ( $k=0.37$ ,  $p<0.001$ ). **CONCLUSION:** There was substantial agreement of gait classification between video observation and kinematic data analysis by the experienced physician, but not by the trainee physician. Low reliability was also demonstrated for inspection-based gait classification.

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**10. Ann Rehabil Med. 2011 Jun;35(3):344-53. Epub 2011 Jun 30.****The effect and complication of botulinum toxin type a injection with serial casting for the treatment of spastic equinus foot.**

Lee SJ, Sung IY, Jang DH, Yi JH, Lee JH, Ryu JS.

Department of Rehabilitation Medicine, Asan Medical Center, University of Ulsan College of Medicine, Seoul 138-736, Korea.

**OBJECTIVE:** To identify the effect of serial casting combined with Botulinum toxin type A (BTX-A) injection on spastic equinus foot. **METHOD:** Twenty-nine children with cerebral palsy who had equinus foot were recruited from the outpatient clinic of Rehabilitation Medicine. The children were divided into 2 groups, one of which received serial casting after BTX-A injection, and the other which only received BTX-A injection. Serial casting started 3 weeks after the BTX-A injection, and was changed weekly for 3 times. Spasticity of the ankle joint was evaluated using the modified Ashworth scale (MAS), and the modified Tardieu scale (MTS). Gait pattern was measured using the physician's rating scale (PRS). **RESULTS:** The degree of ankle dorsiflexion and the MAS improved significantly until 12 weeks following the BTX-A injection in the serial casting group ( $p<0.001$ ), while the BTX-A injection-only group improved until 6 weeks following injection ( $p<0.05$ ). The combined group showed a significantly greater increase in the degree of dorsiflexion compared to the BTX-A injection-only group at post-injection weeks 6 and 12 ( $p<0.05$ ). Three children (11.5%) suffered from foot ulcers as a complication caused by the serial casting. **CONCLUSION:** Our study demonstrated that the effect of BTX-A injection with serial casting was superior and lasted longer than the effect of BTX-A injection only in patients with spastic equinus foot. We therefore recommend BTX-A injection with serial casting for the treatment of equinus foot. However, physicians must also consider the possible complications associated with serial casting.

[PMID: 22506143](#) [PubMed - in process] PMID: PMC3309222

**11. Ann Rehabil Med. 2011 Oct;35(5):742-6. Epub 2011 Oct 31.****Combined therapy of orthopedic surgery after deep brain stimulation in cerebral palsy mixed type - a case report.**

Park HS, Park ES, Chang JW, Lee KS, Suh YJ, Cho SR.

Department & Research Institute of Rehabilitation Medicine, Yonsei University College of Medicine, Seoul 120-752, Korea.

Dystonia is a symptom defined by involuntary and irregular contractions of the muscles, which cause movement disorders and postural problems. Deep brain stimulation (DBS) in globus pallidus interna (GPi) is a good option for controlling dystonia. DBS has already been shown to have significant effects on primary dystonia as well as Parkinson's disease. Dystonia is very difficult to manage, as seen in cerebral palsy (CP) mixed with spasticity. As CP patients grow, their musculoskeletal problems may require orthopedic surgery. However, the outcome of orthopedic surgery is not usually suitable due to dystonia. Therefore, we attempted to control dystonia through DBS initially and perform orthopedic surgery to correct musculoskeletal deformities after treatment of dystonia. Herein, we report a case that showed remarkable improvement in terms of the dystonia rating scale and gait pattern after combined therapy of DBS and orthopedic surgery.

[PMID: 22506201](#) [PubMed - in process] PMCID: PMC3309255

**12. Ann Rehabil Med. 2011 Oct;35(5):636-40. Epub 2011 Oct 31.****Effect of botulinum toxin type a on morphology of salivary glands in patients with cerebral palsy.**

Lee ZI, Cho DH, Choi WD, Park DH, Byun SD.

Department of Rehabilitation Medicine, Dae-gu Fatima Hospital, Deagu 701-600, Korea.

**OBJECTIVE:** To investigate the effect of botulinum toxin type A (BTXA) on drooling and the morphologic change of the salivary gland in patients with cerebral palsy. **METHOD:** Eight cerebral palsy patients suffering from severe drooling participated in this study. BTXA was injected into both submandibular and parotid glands under intravenous sedation and with ultrasound guidance (1 unit/gland/kg: maximum 100 units) in an outpatient or inpatient procedure. The severity of drooling was measured before injection and 3 weeks after injection using the Teacher Drooling Scale, the Drooling Score-severity, frequency and the Visual Analog Scale. To investigate the morphologic change of the salivary glands, the size of salivary glands were measured before injection and 3 weeks after injection using computed tomography of the neck. The measurement values were analyzed by Wilcoxon signed rank test. **RESULTS:** Statistically significant improvements were shown in all three parameters for assessing the severity of drooling after BTXA injections ( $p < 0.05$ ). Size of the salivary glands were significantly decreased at 3 weeks after BTXA injection ( $p < 0.05$ ). **CONCLUSION:** Salivary gland injection with BTXA could be a useful treatment method to reduce drooling in patients with cerebral palsy and decreased size of salivary glands may partially explain the mechanism.

[PMID: 22506185](#) [PubMed - in process] PMCID: PMC3309260

**13. Ann Rehabil Med. 2011 Dec;35(6):867-72. Epub 2011 Dec 30.****Neurodevelopmental disorders of children screened by the infantile health promotion system.**

Kim SW, Han ZA, Jeon HR, Choi JY, Chung HJ, Kim YK, Yoon YH.

Department of Physical Medicine and Rehabilitation, National Health Insurance Corporation Ilsan Hospital, Goyang 410-719, Korea.

**OBJECTIVE:** To perform an in depth evaluation of children, and thus provide a systematic method of managing children, who after infantile health screening, were categorized as suspected developmental delay. **METHOD:** 78 children referred to the Developmental Delay Clinic of Ilsan Hospital after suspected development delay on infantile

health examinations were enrolled. A team comprised of a physiatrist, pediatrician and pediatric psychiatrist examined the patients. Neurological examination, speech and cognitive evaluation were done. Hearing tests and chromosome studies were performed when needed clinically. All referred children completed K-ASQ questionnaires. Final diagnoses were categorized into specific language impairment (SLI), global developmental delay (GDD), intellectual disability (ID), cerebral palsy (CP), motor developmental delay (MD) or autism spectrum disorder (ASD). RESULTS: 72 of the 78 patients were abnormal in the final diagnosis, with a positive predictive value of 92.3%. Thirty (38.4%) of the 78 subjects were diagnosed as GDD, 28 (35.8%) as SLI, 5 (6.4%) as ASD, 9 (12.5%) as MD, and 6 (7.6%) as normal. Forty five of the 78 patients had risk factors related to development, and 18 had a positive family history for developmental delay and/or autistic disorders. The mean number of abnormal domains on the K-ASQ questionnaires were 3.6 for ASD, 2.7 for GDD, 1.8 for SLI and 0.6 for MD. Differences between these numbers were statistically significant ( $p < 0.05$ ). CONCLUSION: Because of the high predictive value of the K-ASQ, a detailed evaluation is necessary for children suspected of developmental delay in an infantile health promotion system.

[PMID: 22506216](#) [PubMed - in process] PMCID: PMC3309373

#### **14. Disabil Rehabil. 2012 Apr 17. [Epub ahead of print]**

##### **Looking to the future: adolescents with cerebral palsy talk about their aspirations - a narrative study.**

Cussen A, Howie L, Imms C.

Department of Occupational Therapy, La Trobe University, Melbourne, Victoria, Australia.

Purpose: To explore the future hopes and aspirations of adolescents with cerebral palsy (CP) with a particular focus on their reflections on engagement in leisure activities. Method: This qualitative study used narrative inquiry methodology. Ten adolescents, aged 14-16 years with CP and Manual Ability Classification System levels ranging from I-IV, were purposively sampled from a longitudinal study of leisure participation. Data were gathered during two face-face interviews conducted approximately 1 month apart. Between interviews, photographs were taken by the adolescents to represent their visions of their future aspirations. In accordance with narrative inquiry methodology, the results were presented as individual stories constructed by the researcher. These narratives were subsequently analysed to produce themes representing the participants' reflections on their future. Results: Three themes were developed: (i) Keeping close relationships, (ii) Choosing a future life of one's own, (iii) Leisure in the years ahead. All the adolescents had aspirations for education, work, leisure and living situation. Conclusion: This study highlights the value of seeking information from adolescents with CP and suggests clinicians be aware of, and work to support their expectations for future study, employment and recreational engagement.

[PMID: 22510161](#) [PubMed - as supplied by publisher]

#### **15. Res Dev Disabil. 2012 Jul;33(4):1287-93. Epub 2012 Mar 22.**

##### **Psychiatric disorders among children with cerebral palsy at school starting age.**

Bjorgaas HM, Hysing M, Elgen I.

Department of Clinical Medicine, University of Bergen, Bergen, Norway; Department of Child Neurology, Stavanger University Hospital, Stavanger, Norway.

The aim of the present population study was to estimate the prevalence of psychiatric disorders in children with cerebral palsy (CP), as well as the impact of comorbid conditions. A cohort of children with CP born 2001-2003, and living in the Western Health Region of Norway were evaluated at school starting age. Parents were interviewed with the diagnostic instrument Kiddie-SADS, to find the prevalence of psychiatric disorders. Sixty-seven children participated, 43 boys, with mean age 88 months (SD 6,8 months). Most children had spastic CP, Gross Motor Function Classification System (GMFCS) levels I and II were found in 2/3 of the group. We found the diagnostic instrument appropriate for GMFCS levels I-IV. Child psychiatric disorders were found in 57% of the children, including 28 children meeting criteria for an attention deficit disorder, which was the most common. Communication problem was significantly associated with having a psychiatric disorder, whereas intellectual disability, type of CP and functional level did not account for significant differences. Subthreshold symptoms were found in 33 children,

and 42 children (75%) met criteria for either psychiatric disorder, or mental health symptoms. One in four (14 children) were considered well-functioning from a mental health point of view. We conclude with a recommendation for early psychiatric evaluation of all children with CP.

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## Prevention and Cure

### 16. Gait Posture. 2012 Apr 13. [Epub ahead of print]

#### **Kinematic assessment of stereotypy in spontaneous movements in infants.**

Karch D, Kang KS, Wochner K, Philippi H, Hadders-Algra M, Pietz J, Dickhaus H.

Institute of Medical Biometry and Informatics, University of Heidelberg, Germany.

Movement variation constitutes a crucial feature of infant motor development. Reduced variation of spontaneous infant movements, i.e. stereotyped movements, may indicate severe neurological deficit at an early stage. Hitherto evaluation of movement variation has been mainly restricted to subjective assessment based on observation. This article introduces a method for quantitative assessment yielding an objective definition of stereotyped movements which may be used for the prognosis of neurological deficits such as cerebral palsy (CP). Movements of 3-month-old infants were recorded with an electromagnetic tracking system facilitating the analysis of joint angles of the upper and lower limb. A stereotypy score based on dynamic time warping has been developed describing movements which are self-similar in multiple degrees of freedom. For clinical evaluation, this measure was calculated in a group of infants at risk for neurological disorders (n=54) and a control group of typically developing children (n=21) on the basis of spontaneous movements at the age of 3 months. The stereotypy score was related to outcome at the age of 24 months in terms of CP (n=10) or no-CP (n=53). Using the stereotypy score of upper limb movements CP cases could be identified with a sensitivity of 90% and a specificity of 96%. The corresponding score of the leg movements did not allow for valid discrimination of the groups. The presented stereotypy feature is a promising candidate for a marker that may be used as a simple and noninvasive quantitative measure in the prediction of CP. The method can be adopted for the assessment of infant movement variation in research and clinical applications.

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### 17. Aust N Z J Obstet Gynaecol. 2012 Apr 20. doi: 10.1111/j.1479-828X.2012.01434.x. [Epub ahead of print]

#### **Feasibility of implementing magnesium sulphate for neuroprotection in a tertiary obstetric unit.**

Ow LL, Kennedy A, McCarthy EA, Walker SP.

Mercy Hospital for Women.

**BACKGROUND:** It is important to establish whether research recommendations regarding magnesium sulphate for neuroprotection can be readily translated into clinical practice and achieve the dual objectives of good coverage of the target group, while minimising unnecessary or prolonged exposure to treatment. **METHODS:** This retrospective cohort study included all women admitted to a tertiary obstetric centre at 23-32 weeks gestation in the first 12 months following implementation of the guideline 'Magnesium sulphate for the prevention of cerebral palsy'. We determined the number triaged to receive magnesium sulphate, the proportion of infants who received magnesium sulphate prior to delivery and the total number of doses administered. **RESULTS:** A total of 330 women were admitted at a mean gestational age of 28.2 weeks, and 132/330 (40%) were prescribed magnesium sulphate, of

whom 123/132 (93%) delivered. 142/191 (74%) infants born at <32 weeks' gestation received magnesium sulphate prior to delivery, with no significant differences seen by plurality or gestational age. Of the 145 doses administered, only 13 women received more than one dose, and only nine of 145 (7%) doses proved to be unnecessary. The median treatment duration was 3 h 58 min. The infusion was discontinued as result of side effects in 2% of women. CONCLUSION: Research recommendations regarding administration of magnesium sulphate with neuroprotective intent can be successfully translated into clinical practice. Appropriate triaging of women at high risk of imminent preterm birth is feasible, enabling a high level of magnesium sulphate coverage for infants that deliver prior to 32 weeks gestation, with minimal toxicity and a low rate of unnecessary maternal exposure.

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### **18. Clin Obstet Gynecol. 2012 Jun;55(2):521-30.**

#### **Prevention of maternal and congenital cytomegalovirus infection.**

Johnson J, Anderson B, Pass RF.

\* Department of Obstetrics and Gynecology, Women and Infants Hospital/Alpert Medical School of Brown University, Providence, Rhode Island; † Department of Pediatrics, University of Alabama at Birmingham, Birmingham, Alabama.

Congenital cytomegalovirus (CMV) infection is an important cause of hearing impairment, mental retardation, and cerebral palsy. Principal sources of infection during pregnancy are young children and intimate contacts. Prevention of maternal and congenital CMV infection depends on counseling women regarding the sources of infection and hygienic measures that might prevent infection. There is currently insufficient evidence to support use of antiviral treatment or passive immunization for postexposure prophylaxis of pregnant women or as a maternal treatment aimed at preventing fetal infection. Vaccines for CMV are under development but it will be a number of years before one is licensed.

[PMID: 22510635](#) [PubMed - in process]

### **19. Clin Obstet Gynecol. 2012 Jun;55(2):510-20.**

#### **Preventing neonatal transmission of herpes simplex virus.**

Jaiyeoba O, Amaya MI, Soper DE, Kilby JM.

Departments of \* Obstetrics and Gynecology † Medicine, Division of Infectious Diseases; ‡ Pediatrics, Medical University of South Carolina, Charleston, South Carolina.

Herpes simplex virus (HSV) infections are highly prevalent and may have devastating consequences if transmitted to newborns. The highest risk of transmission is when the mother has primary HSV infection (rather than recurrence of chronic infection) late in pregnancy. Clinicians should obtain a careful history, performing serologic testing and counseling as appropriate. Delayed diagnosis of neonatal HSV is associated with high mortality. Even with adequate treatment, permanent sequelae, such as cerebral palsy and developmental delay, may occur. Clinicians should develop prudent strategies to avoid primary HSV acquisition during pregnancy, and provide prophylaxis or treatment when indicated.

[PMID: 22510634](#) [PubMed - in process]

**20. J Neurosci. 2012 Apr 18;32(16):5500-9.****Motor deficits are triggered by reperfusion-reoxygenation injury as diagnosed by MRI and by a mechanism involving oxidants.**

Drobyshevsky A, Luo K, Derrick M, Yu L, Du H, Prasad PV, Vasquez-Vivar J, Batinic-Haberle I, Tan S.

Department of Pediatrics, Center on Outcomes, Research and Education, and Radiology, NorthShore University Healthcare Research Institute, Evanston, Illinois 60201, Department of Biophysics, Medical College of Wisconsin, Milwaukee, Wisconsin 53226, and Department of Radiation Oncology, Duke University Medical Center, Durham, North Carolina 27710.

The early antecedents of cerebral palsy (CP) are unknown but are suspected to be due to hypoxia-ischemia (H-I). In our rabbit model of CP, the MRI biomarker, apparent diffusion coefficient (ADC) on diffusion-weighted imaging, predicted which fetuses will develop postnatal hypertonia. Surviving H-I fetuses experience reperfusion-reoxygenation but a subpopulation manifested a continued decline of ADC during early reperfusion-reoxygenation, which possibly represented greater brain injury (RepReOx). We hypothesized that oxidative stress in reperfusion-reoxygenation is a critical trigger for postnatal hypertonia. We investigated whether RepReOx predicted postnatal neurobehavior, indicated oxidative stress, and whether targeting antioxidants at RepReOx ameliorated motor deficits, which included testing of a new superoxide dismutase mimic (MnTnHex-2-PyP). Rabbit dams, 79% gestation (E25), were subjected to 40 min uterine ischemia. Fetal brain ADC was followed during H-I, immediate reperfusion-reoxygenation, and 4-72 h after H-I. Endpoints were postnatal neurological outcome at E32, ADC at end of H-I, ADC nadir during H-I and reperfusion-reoxygenation, and area under ADC curve during the first 20 min of reperfusion-reoxygenation. Antioxidants targeting RepReOx were administered before and/or after uterine ischemia. The new MRI-ADC biomarker for RepReOx improved prediction of postnatal hypertonia. Greater superoxide production, mitochondrial injury, and oligodendroglial loss occurred in fetal brains exhibiting RepReOx than in those without. The antioxidants, MnTnHex-2-PyP and Ascorbate and Trolox combination, significantly decreased postnatal motor deficits and extent of RepReOx. The etiological link between early injury and later motor deficits can thus be investigated by MRI, and allows us to distinguish between critical oxidative stress that causes motor deficits and noncritical oxidative stress that does not.

[PMID: 22514312](#) [PubMed - in process]

**21. Sci Transl Med. 2012 Apr 18;4(130):130ra46.****Dendrimer-based postnatal therapy for neuroinflammation and cerebral palsy in a rabbit model.**

Kannan S, Dai H, Navath RS, Balakrishnan B, Jyoti A, Janisse J, Romero R, Kannan RM.

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Cerebral palsy (CP) is a chronic childhood disorder with no effective cure. Neuroinflammation, caused by activated microglia and astrocytes, plays a key role in the pathogenesis of CP and disorders such as Alzheimer's disease and multiple sclerosis. Targeting neuroinflammation can be a potent therapeutic strategy. However, delivering drugs across the blood-brain barrier to the target cells for treating diffuse brain injury is a major challenge. We show that systemically administered polyamidoamine dendrimers localize in activated microglia and astrocytes in the brain of newborn rabbits with CP, but not healthy controls. We further demonstrate that dendrimer-based N-acetyl-L-cysteine (NAC) therapy for brain injury suppresses neuroinflammation and leads to a marked improvement in motor function in the CP kits. The well-known and safe clinical profile for NAC, when combined with dendrimer-based targeting, provides opportunities for clinical translation in the treatment of neuroinflammatory disorders in humans. The effectiveness of the dendrimer-NAC treatment, administered in the postnatal period for a prenatal insult, suggests a window of opportunity for treatment of CP in humans after birth.

[PMID: 22517883](#) [PubMed - in process]

**22. Sci Transl Med. 2012 Apr 18;4(130):130fs8.**

**A baby step for nano.**

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Nanomedicine treatment postnatally in an inflammatory model of cerebral palsy ameliorates motor deficits.

[PMID: 22517882](#) [PubMed - in process]

**23. Science. 2012 Apr 20;336(6079):286.**

**Biomedicine. Nanoparticle treatment reverses cerebral palsy in rabbits.**

Miller G.

[PMID: 22517832](#) [PubMed - in process]

**24. Rev Prat. 2012 Mar;62(3):371-6.**

**Neurological consequences of prematurity [Article in French]**

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Very preterm infants are at risk of neurodevelopmental impairment. Severe disabilities (cerebral palsy, mental retardation) occur in around 10% of cases. The most frequent impairments concern cognitive and neurobehavioral development which usually express at school age. These disorders involve behavior, executive function, attention and speech development. All of these deficiencies can compromise learning functions, social interactions and school integration. Near 40% of very preterm infants need special therapies: psychological therapy, physiotherapy, speech therapy... Environmental, educative and health conditions largely influence the neurodevelopmental outcome. These infants need a special medical and social follow-up.

[PMID: 22514995](#) [PubMed - in process]

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