

Monday 14 February 2011

This free weekly bulletin lists the latest research on cerebral palsy (CP), as indexed in the NCBI, PubMed (Medline) and Entrez (GenBank) databases. These articles were identified by a search using the key term "cerebral palsy".

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Interventions

1. *Pediatr Neurol.* 2011 Mar;**44(3):207-13.**

Sequence learning in cerebral palsy.

Gagliardi C, Tavano A, Turconi AC, Pozzoli U, Borgatti R.

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We investigated sequence-learning skills in 64 children with cerebral palsy (aged 4.01-14.7 years; 49 with bilateral, two with dystonic, and 13 with unilateral cerebral palsy), compared with a matched control group of typically developing children. Participants' motor and handling abilities were classified according to the Gross Motor Function Classification System and the Manual Ability Classification System. General cognitive, visuoperceptual, and constructive abilities were assessed. Participants performed an experimental computerized version of Corsi Span, followed by a normalized Supraspan sequence. Controls outperformed cerebral palsy participants in visual memory and accuracy. Participants with cerebral palsy were likelier to fail the test (cerebral palsy, 37.5%; control subjects, 5%) and obtain overall lower scores. Sequence learning skills were not related to motor and handling impairments. Failure to learn sequences resulted in an overall lower functioning profile regarding visuoperceptual, verbal, and performance abilities. The ability to fix sequences seemed to split the cerebral palsy group into an overall high-functioning group (successful in sequence learning) and low-functioning (failing) group. Results are discussed in light of a specific implicit memory impairment and the abnormal development of white matter frontostriatal and parietal connections.

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PMID: 21310337 [PubMed - in process]

2. *Pediatr Phys Ther.* 2011 Spring;**23(1):2-14.**

The Utrecht approach to exercise in chronic childhood conditions: the decade in review.

van Brussel M, van der Net J, Hulzebos E, Helders PJ, Takken T.

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PURPOSE: To summarize and discuss current evidence and understanding of clinical pediatric exercise physiology focusing on the work the research group at Utrecht and others have performed in the last decade in a variety of chronic childhood conditions as a continuation of the legacy of Dr Bar-Or. **KEY POINTS:** The report discusses current research findings on the cardiopulmonary exercise performance of children (and adolescents) with juvenile

idiopathic arthritis, osteogenesis imperfecta, achondroplasia, hemophilia, cerebral palsy, spina bifida, cystic fibrosis, and childhood cancer. Exercise recommendations and contraindications are provided for each condition. Implications for clinical practice and future research in this area are discussed for each of the chronic conditions presented. **CLINICAL IMPLICATIONS:** The authors provide a basic framework for developing an individual and/or disease-specific training program, introduce the physical activity pyramid, and recommend a core set of clinical measures to be used in clinical research.

PMID: 21304338 [PubMed - in process]

3. *Dev Med Child Neurol.* 2011 Feb 11. doi: 10.1111/j.1469-8749.2010.03899.x. [Epub ahead of print]

Identification of a core set of exercise tests for children and adolescents with cerebral palsy: a Delphi survey of researchers and clinicians.

Verschuren O, Ketelaar M, Keefer D, Wright V, Butler J, Ada L, Maher C, Reid S, Wright M, Dalziel B, Wiat L, Fowler E, Unnithan V, Maltais DB, VAN DEN Berg-Emons R, Takken T.

Centre of Excellence, Rehabilitation Centre "De Hoogstraat", Utrecht, the Netherlands; Partner of NetChild, Network for Childhood Disability Research, Utrecht, the Netherlands; Department of Rehabilitation, Nursing Science and Sports, University Medical Center, Rudolf Magnus Institute of Neuroscience, Utrecht, the Netherlands; Department of Wellness and Sport Sciences, Millersville University, Millersville, PA, USA; Holland Bloorview Kids Rehabilitation Hospital, Child Development Program, Toronto, ON, Canada; Department of Physical Therapy, University of Toronto, Toronto, ON, Canada; Faculty of Health Sciences, The University of Sydney, Sydney, NSW, Australia; Health and Use of Time Research Group, School of Health Sciences, University of South Australia, Adelaide, SA, Australia; School of Sport Science, Exercise and Health, University of Western Australia, Perth, WA, Australia; McMaster University, Hamilton, ON, Canada; Clinical Outcomes, Glenrose Rehabilitation Hospital, Edmonton, AB, Canada; Department of Physical Therapy, Faculty of Rehabilitation Medicine, University of Alberta, Edmonton, AB, Canada; Department of Orthopaedic Surgery, UCLA/Orthopaedic Hospital Centre for Cerebral Palsy, University of California, Los Angeles, CA, USA; Centre for Sport, Health and Exercise Research, Staffordshire University, Stoke-on-Trent, Staffordshire, UK; Department of Rehabilitation, Laval University, Quebec City, QC, Canada; Department of Rehabilitation Medicine and Physical Therapy, Erasmus Medical Center, Rotterdam, the Netherlands; Child Development and Exercise Center, Wilhelmina Children's Hospital, UMC Utrecht, Utrecht, the Netherlands.

Aim: Evidence-based recommendations regarding which exercise tests to use in children and adolescents with cerebral palsy (CP) are lacking. This makes it very difficult for therapists and researchers to choose the appropriate exercise-related outcome measures for this group. This study aimed to identify a core set of exercise tests for children and adolescents with CP. **Method:** Fifteen experts (10 physical therapists/researchers and five exercise physiologists; three from the Netherlands, two from the USA, one from the UK, five from Canada, and four from Australia) participated in a Delphi survey which took four stages to achieve a consensus. Based on the information that was collected during the survey, a core set of measures was identified for levels I to IV of the Gross Motor Function Classification System (GMFCS). **Results:** For children with CP classified at GMFCS levels I and II, tests were identified for two motor skills (walking and cycling). For the subgroup of children with CP classified at GMFCS level III, the tests that were identified related to walking, cycling, and arm cranking. For children with CP classified at GMFCS level IV, the tests included in the core set were related to cycling and arm cranking. **Interpretation:** The core set will help physical therapists, exercise physiologists, and other health professionals who work with children and adolescents with CP to decide which test(s) to use in clinical practice or research. This will facilitate comparability of results across studies and clinical programmes.

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PMID: 21309764 [PubMed - as supplied by publisher]

4. Dev Med Child Neurol. 2011 Feb 11. doi: 10.1111/j.1469-8749.2010.03893.x. [Epub ahead of print]**Reliability of a shuttle run test for children with cerebral palsy who are classified at Gross Motor Function Classification System level III.**

Verschuren O, Bosma L, Takken T.

Rudolf Magnus Institute of Neuroscience and Center of Excellence for Rehabilitation Medicine, University Medical Center Utrecht and Rehabilitation Center De Hoogstraat, Utrecht, the Netherlands; Heliomare Rehabilitation Centre, Wijk aan Zee, the Netherlands; Child Development & Exercise Center, Wilhelmina Children's Hospital, UMC Utrecht, Utrecht, the Netherlands.

For children and adolescents with cerebral palsy (CP) classified as Gross Motor Function Classification System (GMFCS) level III there is no running-based field test available to assess their cardiorespiratory fitness. The current study investigated whether a shuttle run test can be reliably (test-retest) performed in a group of children with spastic diplegia (eight male, five female) classified as GMFCS level III. Thirteen children (mean age 12y, SD 3y) had to walk/run in squares of 7.5m delimited by cones. The auditory signals from the GMFCS II compact disc (as used in a previous reliability and validation study) were used during the test, resulting in a starting speed of 1.5km/hour with a graded increase in speed of 0.19km/hour per minute (shuttle). Intraclass correlation coefficients (two-way mixed) for achieved shuttles were 0.98. The standard error of measurement was 0.48 levels and the smallest detectable change was 1.32 shuttles. The results are the first indication that the shuttle run test protocol could be reliably performed in this population.

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PMID: 21309762 [PubMed - as supplied by publisher]

5. J Child Neurol. 2011 Feb 7. [Epub ahead of print]**Anthropometric and Fitness Variables Associated With Bone Mineral Density and Broadband Ultrasound Attenuation in Ambulatory Children With Cerebral Palsy.**

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We investigated anthropometric and fitness variables associated with areal bone mineral densities and broadband ultrasound attenuation in ambulatory children with cerebral palsy. Thirty-four children with cerebral palsy, aged 4-12 years, and 33 normal development children were collected. There were significant differences in femoral bone densities and calcaneus broadband ultrasound attenuation, but not in lumbar bone densities, between cerebral palsy and normal groups. Regression analysis revealed that different anthropometric and fitness variables were linked to bone densities of different skeletal regions in children with cerebral palsy (adjusted $r^2 = .41-.67$). Growth variables were mainly related to femoral and lumbar bone densities, while muscular endurance was mainly related to femoral and calcaneus bone densities. These findings suggest multiple complex variables can contribute to bone density variations among different skeleton areas in these children. These data can allow clinicians to identifying early these children at risk for low bone density.

PMID: 21303764 [PubMed - as supplied by publisher]

6. J Pediatr Orthop. 2011 Mar;31(2):205-10.**Subtalar fusion in cerebral palsy patients: results of a new technique using corticocancellous allograft.**

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Toronto, Canada.

BACKGROUND: Valgus deformity of the hindfoot in cerebral palsy (CP) patients is common and causes functional deterioration and shoe fitting problems together with skin ulcerations. Our aims in this study are, to present an intra-articular technique of subtalar fusion using allograft and internal fixation to achieve stabilization and second to report the results and clinical outcome of a series of intra-articular subtalar arthrodesis performed in CP children.

METHODS: We performed a retrospective review of radiographs and medical records of 145 children with CP who underwent intra-articular subtalar fusion from January 1994 to December 2004. The subtalar joint was fixed through the anterior facet with a cannulated screw whereas the anterior aspect of the calcaneus was parallel to the anterior aspect of the head of the talus. Tricortical iliac crest allograft was placed into the sinus tarsi and the denuded posterior facet area. Results are grouped as good, satisfactory, and poor according to the radiographic and clinical outcomes. **RESULTS:** The mean age at the time of surgery was 12.7 years (range: 5 to 20 y) and the average follow-up was 4.8 years (range: 2 to 11 y). Good results were obtained in 242 feet (96%). Satisfactory results were obtained in 6 feet (2%) which were painless pseudoarthrosis of subtalar joint in 2 feet and screw removal was required in 4 feet because of pain. Nonunion of the subtalar joint together with recurrence of deformity was observed in 5 feet (2%) which is accepted as poor result and required revision surgery. No deep infections, implant failure, allograft failure were observed in a mean of 4.8 years. **CONCLUSIONS:** Our described technique of intra-articular subtalar joint fusion is safe and reliable in CP children with high rate of satisfactory results.

LEVEL OF EVIDENCE: Therapeutic studies-Level IV.

PMID: 21307716 [PubMed - in process]

7. *Pediatr Neurol.* 2011 Mar;44(3):202-6.

Use of trihexyphenidyl in children with cerebral palsy.

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A paucity of information exists regarding medications to treat dystonia in children with cerebral palsy. This study sought to review the benefits and tolerability of trihexyphenidyl in children with cerebral palsy, treated for dystonia or sialorrhea or both in a pediatric tertiary care hospital, through a retrospective chart review. In total, 101 patients (61 boys and 40 girls) were evaluated. The mean age at drug initiation was 7 years and 10 months (range, 1-18 years). The mean initial dose was 0.095 mg/kg/day. The dose was increased by 10-20% no sooner than every 2 weeks. The mean maximum dose reached was 0.55 mg/kg/day. Ninety-three patients (91%) tolerated the medication well, with a mean duration of treatment of 3 years and 7 months. Side effects occurred in 69% of subjects, the majority in patients aged ≥ 7 years, and soon after treatment initiation. Sixty-four percent continued the treatment at study end. Ninety-seven patients reported benefits, including reduction of dystonia in upper (59.4%) and lower (37.6%) extremities, sialorrhea (60.4%), and speech issues (24.7%). The majority of patients tolerated trihexyphenidyl well on a schedule of gradual dose increases, and almost all demonstrated improvements in dystonia or sialorrhea or both.

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8. *Paediatr Anaesth.* 2011 Feb 8. doi: 10.1111/j.1460-9592.2011.03530.x. [Epub ahead of print]

Effect of caudal block on sevoflurane requirement for lower limb surgery in children with cerebral palsy.

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Pain Research Institute, Yonsei University College of Medicine, Seoul, Korea.

Background: Caudal block is a widely used technique for providing perioperative pain management in children. In this randomized double-blinded study, we evaluated the effects of preoperative caudal block on sevoflurane requirements in children with cerebral palsy (CP) undergoing lower limb surgery while bispectral index (BIS) values were maintained between 45 and 55. **Methods:** 52 children undergoing Achilles-tendon lengthening were randomized to receive combined general-caudal anesthesia (caudal group, n = 27) or general anesthesia alone (control group, n = 25). Caudal block was performed with a single dose of 0.7 ml·kg⁻¹ of 1.0% lidocaine containing epinephrine at 5 µg·ml⁻¹. The control group received no preoperative caudal block. The endtidal sevoflurane concentrations (ET(sev)) were adjusted every minute to maintain the BIS values between 45 and 55. **Results:** The ET(sev) required to maintain the BIS values were not significantly different between the control and caudal groups after induction of anesthesia [2.1 (0.2) vs 2.2 (0.4); P = 0.773]. However, significantly higher ET(sev) was observed in the control group before surgical incision [2.0 (0.2) vs 1.8 (0.3); P = 0.013] and during the first 20 min after surgical incision [2.2 (0.3) vs 1.4 (0.3); P < 0.001]. There was no significant difference in BIS values between the control and caudal groups throughout the study period (P > 0.05). In the caudal group, the caudal block was successful in 25 of 27 (92.6%) patients. **Conclusions:** Caudal block effectively reduced sevoflurane requirements by 36% compared to general anesthesia alone in children with CP undergoing lower limb surgery while BIS values were maintained between 45 and 55.

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9. *Pediatr Neurol.* 2011 Mar;**44(3):177-82.**

Somatosensory evoked potentials in children with bilateral spastic cerebral palsy.

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Alterations were monitored of somatosensory evoked potentials in children with bilateral spastic cerebral palsy and these findings correlated with relevant clinical and laboratory parameters. Fifty-one children with bilateral spastic cerebral palsy (31 boys, 20 girls; age range 24-168 months) participated in the study. Abnormal somatosensory evoked potentials latencies were recorded in 23 of 34 (67.6%) cortical recordings of the median nerve and in 38 of 51 (74.5%) cortical recordings of the tibial nerve. Abnormal tibial nerve somatosensory evoked potentials were strongly correlated with abnormal electroencephalogram (P = 0.014), while impaired median nerve recordings were correlated with abnormal visual evoked potentials (P = 0.02) and a history of perinatal or neonatal infection (P = 0.016). Furthermore, perinatal/neonatal infection adversely effected the recordings in both tibial and medial nerves in quadriplegic patients (P = 0.023). Sensory impairment is strongly related with abnormal visual evoked potentials, abnormal electroencephalogram, and a history of perinatal or neonatal infection.

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10. *Spine (Phila Pa 1976).* 2011 Feb 9. [Epub ahead of print]

Value of Pre-operative Pulmonary Function Test in Surgery for Flaccid Neuromuscular Scoliosis Surgery.

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Study Design. Retrospective study. **Objectives.** To evaluate the prognostic value of preoperative pulmonary function test for postoperative pulmonary complications and to identify the operability associated with severely decreased forced vital capacity (< 30% FVC) status in flaccid neuromuscular scoliosis. **Summary of Background Data.** The pre-operative pulmonary function test, especially > 30% FVC, is known as a critical factor for the operability of flaccid

neuromuscular scoliosis. But only one study reported that patients with preexisting respiratory failure on nocturnal noninvasive ventilation can undergo an operation for deformity correction without mortality and severe complications. Methods. Seventy four patients (45 males, 29 females) presented with flaccid neuromuscular scoliosis. For every patients, preoperative pulmonary function tests were evaluated and subdivided into three groups (< 30% FVC, 30-50% FVC, and > 50% FVC). Then postoperative pulmonary complications, pneumothorax, pneumonia, atelectasis, prolonged ventilator care in the intensive care unit (more than 72 hours), and postoperative tracheostomy were evaluated. Results. Among these patients, 59 had muscular dystrophy; 5, spinal muscular atrophy; 2, cerebral palsy; and 8, others. The mean age at surgery was 16.8 years (range, 5-32 years). The mean preoperative Cobb's angle was 54.6° (16°-135°). The overall postoperative pulmonary complication rate was 31% (23 complications in 74 patients). The < 30% FVC group had 6 complications among 18 patients; the 30-50% FVC group had 7 complications among 18 patients; and the > 50% FVC group had 10 complications among 38 patients. There were no deaths during the perioperative period. There is no statistical difference between the three groups ($P = 0.6195$). Conclusions. Patients with flaccid neuromuscular scoliosis can undergo an operation for deformity correction regardless of the severely decreased pulmonary function.

PMID: 21311396 [PubMed - as supplied by publisher]

11. Dev Med Child Neurol. 2011 Feb 11. doi: 10.1111/j.1469-8749.2010.03905.x. [Epub ahead of print]

Visual assessment in children with cerebral palsy: implementation of a functional questionnaire.

Ferziger NB, Nemet P, Brezner A, Feldman R, Galili G, Zivotofsky AZ.

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Aim: The aim of this study was to evaluate an interdisciplinary visual assessment for multiply challenged children diagnosed with cerebral palsy (CP). Method: A comprehensive ophthalmological assessment together with a visual classification scale (VCS) and a questionnaire evaluating daily visual function were completed regarding 77 children (41 females, 36 males; age range 3-20y; mean age 8y 3mo [SD 4y 3mo]; Gross Motor Function Classification System [GMFCS] level V; Manual Ability Classification System level V) who were diagnosed with CP (79.2% spastic quadriplegia, 6.5% athetoid quadriplegia, 10.4% mixed type, 3.9% hemiplegia). All participants had severe to profound motor and intellectual disability and an inability to communicate consistently through either verbal or assisted communication. The interrater and test-retest reliability of the questionnaire and its validity in comparison with the VCS were examined. In addition, the contribution of ophthalmological testing in predicting daily visual function was assessed. Results: The ophthalmological examination revealed three diagnostic subgroups: a group with cerebral visual impairment (CVI), a group with optic atrophy, and a group without visual impairment. The questionnaire was found to have high values of interrater reliability (interclass correlation coefficient [ICC]=0.873; 95% confidence interval [CI] 0.762-0.935) and test-retest reliability (ICC=0.988; 95% CI 0.964-0.996). Validity was established for the questionnaire factors: task-orientated visual function ($r=0.802$; 95% CI 0.669-0.885) and basic visual skills ($r=0.691$; 95% CI 0.504-0.816). The questionnaire provided information about daily visual performance not available from one-time ophthalmological testing, particularly for participants diagnosed with CVI. The visual performance scale significantly predicted daily visual function for all groups. Interpretation: This study highlights the benefits of implementing a diagnostic performance scale as well as a reliable functional questionnaire to achieve a precise visual assessment of children with severe neurological impairment.

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12. Expert Opin Biol Ther. 2011 Feb 8. [Epub ahead of print]

Update on stem cell therapy for cerebral palsy.

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Introduction: Due to the publicity about stem cell transplantation for the treatment of cerebral palsy, many families seek information on treatment, and many travel overseas for cell transplantation. Even so, there is little scientific confirmation of benefit, and therefore existing knowledge in the field must be summarized. Areas covered: This paper addresses the clinical protocols examining the problem, types of stem cells available for transplant, experimental models used to test the benefit of the cells, possible mechanisms of action, potential complications of cell treatment and what is needed in the field to help accelerate cell-based therapies. Expert opinion: While stem cells may be beneficial in acute injuries of the CNS the biology of stem cells is not well enough understood in chronic injuries or disorders such as cerebral palsy. More work is required at the basic level of stem cell biology, in the development of animal models, and finally in well-conceived clinical trials.

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13. J Rehabil Med. 2011 Feb 8. doi: 10.2340/16501977-0672. [Epub ahead of print]

Effects of botulinum toxin A in ambulant adults with spastic cerebral palsy: A randomized double-blind placebo controlled-trial.

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Objective: This study aimed to assess short-term effects of botulinum toxin A in ambulant adults with spastic cerebral palsy. Design: A single-centre double-blind, placebo-controlled, randomized clinical trial. Subjects: Patients were recruited through advertisements. Inclusion criteria were: spastic cerebral palsy, age 18-65 years, decreased walking, walking without aids for minimum 20 m, and no cognitive impairments. Methods: A total of 66 participants, mean age 37 (standard deviation 11.4) years, were enrolled and received injections of either botulinum toxin A (n = 33) or placebo (n = 33). Primary outcomes were: sagittal kinematics of ankle, knee and hip, and health-related quality of life (Short Form 36). Secondary outcomes were: visual analogue scale for muscle-stiffness/spasticity, Timed Up and Go, 6-minute walk test, and Global Scale of perceived effect. Results: No significant differences were found between the groups in the primary outcomes. In the secondary outcomes the botulinum toxin A group rated improvement in visual analogue scale muscle-stiffness/spasticity and the Global Scale of perceived effect. No serious adverse events occurred. Conclusion: Botulinum toxin A injections alone gave no benefit over placebo in lower limb sagittal kinematics and Short Form 36 in ambulatory adults with cerebral palsy. However, self-reported rating of muscle-stiffness/spasticity and global effects indicated positive effects of botulinum toxin A. Further studies with specific post-injection rehabilitation and longer study period are warranted.

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14. Res Dev Disabil. 2011 Feb 7. [Epub ahead of print]

Visual feedback of the non-moving limb improves active joint-position sense of the impaired limb in Spastic Hemiparetic Cerebral Palsy.

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This study examined the active joint-position sense in children with Spastic Hemiparetic Cerebral Palsy (SHCP) and the effect of static visual feedback and static mirror visual feedback, of the non-moving limb, on the joint-position sense. Participants were asked to match the position of one upper limb with that of the contralateral limb. The task was performed in three visual conditions: without visual feedback (no vision); with visual feedback of the non-moving limb (screen); and with visual feedback of the non-moving limb and its mirror reflection (mirror). In addition to the proprioceptive measure, a functional test [Quality of Upper Extremity Skills Test (QUEST)] was performed and the amount of spasticity was determined in order to examine their relation with proprioceptive ability. The accuracy of matching was significantly influenced by the distance that had to be covered by the matching limb; a larger

distance resulted in a lower matching accuracy. Moreover it was demonstrated that static (mirror) visual feedback improved the matching accuracy. A clear relation between functionality, as measured by the QUEST, and active joint-position sense was not found. This might be explained by the availability of visual information during the performance of the QUEST. It is concluded that static visual feedback improves matching accuracy in children with SHCP and that the initial distance between the limbs is an influential factor which has to be taken into account when measuring joint-position sense.

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15. J Biomech. 2011 Feb 2. [Epub ahead of print]

Level of subject-specific detail in musculoskeletal models affects hip moment arm length calculation during gait in pediatric subjects with increased femoral anteversion.

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Biomechanical parameters of gait such as muscle's moment arm length (MAL) and muscle-tendon length are known to be sensitive to anatomical variability. Nevertheless, most studies rely on rescaled generic models (RGMo) constructed from averaged data of cadaveric measurements in a healthy adult population. As an alternative, deformable generic models (DGMo) have been proposed. These models integrate a higher level of subject-specific detail by applying characteristic deformations to the musculoskeletal geometry. In contrast, musculoskeletal models based on magnetic resonance (MR) images (MRMo) reflect the involved subject's characteristics in every level of the model. This study investigated the effect of the varying levels of subject-specific detail in these three model types on the calculated hip MAL during gait in a pediatric population of seven cerebral palsy subjects presenting aberrant femoral geometry. Our results show large percentage differences in calculated MAL between RGMo and MRMo. Furthermore, the use of DGMo did not uniformly reduce inter-model differences in calculated MAL. The magnitude of these percentage differences stresses the need to take these effects into account when selecting the level of subject-specific detail one wants to integrate in musculoskeletal. Furthermore, the variability of these differences between subjects and between muscles makes it very difficult to a priori estimate their importance for a biomechanical analysis of a certain muscle in a given subject.

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Epidemiology / Aetiology / Diagnosis & Early Treatment

16. *J Perinat Med.* 2011 Feb 7. [Epub ahead of print]

The impact of clinical maternal chorioamnionitis on neurological and psychological sequelae in very-low-birth weight infants: a case-control study.

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Aims: To assess the relationship between clinically maternal chorioamnionitis and outcome in preterm very-low-birth weight (VLBW) infants. **Methods:** An observational case-control study was conducted in the neonatology departments of 12 acute care teaching hospitals in Spain. Between January 2004 and December 2006, all consecutive VLBW (≤ 1500 g) infants who were born to a mother with clinical chorioamnionitis were enrolled. The controls included infants who were born to mothers without chorioamnionitis, matched by gestational age, and immediately born after each index case. At a corrected age of 24 months, a neurological examination and a psychological assessment of the surviving children were performed. **Results:** Sixty-six of the newborn infants died; therefore, 262 infants from the original sample were available for the study. Follow-up data were obtained at a corrected age of 24 months from a total of 209 children (106 cases and 103 controls, 80% of the original sample size). Seventy children (33.5%) were diagnosed with some type of sequelae. The following conditions were all more prevalent in infants born to mothers with chorioamnionitis in comparison to controls: low development quotient (98.3 ± 12.15 vs. 95.9 ± 15.64 ; $P=0.497$), cerebral palsy (4.9% vs. 10.4%; $P=0.138$), seizures (1.0% vs. 3.8%; $P=0.369$), and other neurological or sensorial sequelae (32.0% vs. 34.9%; $P=0.611$). **Conclusions:** After controlling for gestational age, the study population demonstrated that the neurological outcomes in infants at a corrected age of 24 months was not worsened by chorioamnionitis.

PMID: 21299358 [PubMed - as supplied by publisher]

17. *Dev Med Child Neurol.* 2011 Feb 11. doi: 10.1111/j.1469-8749.2010.03878.x. [Epub ahead of print]

Unilateral cerebral palsy: a population-based study of gait and motor function.

Dobson F, Morris ME, Baker R, Graham HK.

Murdoch Childrens Research Institute/Hugh Williamson Gait Laboratory, Royal Children's Hospital, Victoria, Australia; Melbourne School Health Sciences, The University of Melbourne, Victoria, Australia; Department of Clinical Gait Analysis, University of Salford, Manchester, UK; Department of Orthopaedics, Murdoch Childrens Research Institute, Royal Children's Hospital, Victoria, Australia; Department of Paediatrics, University of Melbourne, Victoria, Australia.

Aim: To investigate the spectrum and relationships between gait patterns and motor function in a population-based cross study of children with unilateral cerebral palsy (CP). **Method:** Children identified with unilateral CP born in Victoria, Australia, from 1990 to 1992 were eligible to participate. Characteristics were reported using the Winters, Gage, and Hicks (WGH) classification for gait patterns, the Gross Motor Function Classification System (GMFCS) and Functional Mobility Scale (FMS) for gross motor function, and Manual Ability Classification System (MACS) and House classification for upper-limb function. **Results:** A recruitment rate of 71% was achieved (42 males, 27 females; mean age 11y 4mo, SD 2y 4mo). Children were classified in levels I and II of the GMFCS and levels I, II, and III of the MACS whereas there was a greater range of scores using the FMS and House classification. The association was moderate between categorizations of lower-limb and upper-limb involvement (Kendall's $\tau(b) = 0.46-0.47$, $p < 0.001$), accounting for around 21% of the explained variance. The proportions of gait-pattern groups in the current cohort were rather similar to the original WGH cohort ($\chi^2 = 7.07$, degrees of freedom [df]=3, $p=0.070$). **Interpretation:** Unilateral CP embraces a wide spectrum of clinical phenotypes. There were only moderate associations between categorizations of upper- and lower-limb function, supporting the need for separate classification systems of upper- and lower-limb functioning in this diverse group of children.

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18. Neurobiol Dis. 2011 Feb 7. [Epub ahead of print]

The bone morphogenetic protein antagonist noggin protects white matter after perinatal hypoxia-ischemia.

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Hypoxia-ischemia (HI) in the neonate leads to white matter injury and subsequently cerebral palsy. We find that expression of bone morphogenetic protein 4 (BMP4) increases in the neonatal mouse brain after unilateral common carotid artery ligation followed by hypoxia. Since signaling by the BMP family of factors is a potent inhibitor of oligodendroglial differentiation, we tested the hypothesis that antagonism of BMP signaling would prevent loss of oligodendroglia (OL) and white matter in a mouse model of perinatal HI. Perinatal HI was induced in transgenic mice in which the BMP antagonist noggin is overexpressed during oligodendrogenesis (pNSE-Noggin). Following perinatal HI, pNSE-Noggin mice had more oligodendroglial progenitor cells (OPCs) and more mature OL compared to wild type (WT) animals. The increase in OPC numbers did not result from proliferation but rather from increased differentiation from precursor cells. Immunofluorescence studies showed preservation of white matter in lesioned pNSE-Noggin mice compared to lesioned WT animals. Further, following perinatal HI, the pNSE-Noggin mice were protected from gait deficits. Together these findings indicate that the BMP-inhibitor noggin protects from HI-induced loss of oligodendroglial lineage cells and white matter as well as loss of motor function.

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19. Acta Obstet Gynecol Scand. 2011 Feb 5. doi: 10.1111/j.1600-0412.2011.01088.x. [Epub ahead of print]

Maternal and child outcome after in-vitro fertilization-a review of 25 years population based data from Sweden.

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Department of Pediatrics, University Hospital, Linköping, Tornblad Institute, University of Lund, Lund, Department of Statistics, Monitoring and Analyses, National Board of Health and Welfare, Stockholm, and IVF and Fertility Clinic, Sophiahemmet Hospital, Stockholm, Sweden.

Objective. To summarize data on deliveries after IVF performed in Sweden up to 2006. **Design.** Cohort study of women and children, conceived after IVF with comparisons of deliveries after IVF before and after April 1, 2001. **Setting.** Study based on Swedish health registers. **Population.** Births registered in the Swedish Medical Birth Register with information on IVF from all IVF clinics in Sweden. **Methods.** Results from the second study period are summarized and outcomes between the two periods are compared. Long term follow-up is based on data from both periods. **Main outcome measures.** Maternal and perinatal outcomes, long term sequels. **Results.** Some maternal pregnancy complications decreased in rate, notably preeclampsia and PROM. The rate of multiple births and preterm births decreased dramatically with a better neonatal outcome, including neonatal mortality. No difference in outcome existed between IVF and ICSI or between the use of fresh and cryopreserved embryos, but children born after blastocyst transfer had a slightly higher risk for preterm birth and congenital malformations than children born after cleavage stage transfer. An increased risk for cerebral palsy, possibly for attention deficit and hyperactivity disorder, for impaired visual acuity, and for childhood cancer was noted but these outcomes were rare also after IVF. An increased risk for asthma was demonstrated. No effect on maternal cancer risk was seen. **Conclusions.** A marked decrease in multiple births was the main reason for better pregnancy and neonatal outcome and may also have a beneficial effect on long-term results, notably cerebral palsy.

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20. Early Hum Dev. 2011 Feb 3. [Epub ahead of print]**Movements and postures of infants aged 3 to 5 months: To what extent is their optimality related to perinatal events and to the neurological outcome?**

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BACKGROUND: The quality of spontaneous general movements (GMs), assessed in the individual infant, has emerged as one of the most reliable and valid predictors especially of severe neurological impairments. **AIMS:** To implement a more detailed assessment of GMs and co-existing movements and postural patterns in a rehabilitation clinic, and to examine to what extent is the optimality of movements and postures of infants aged 3 to 5 months related to perinatal events and the neurological outcome. **STUDY DESIGN:** Prospective study of 41 infants (15 boys and 26 girls; 11 infants born preterm) admitted to the Department of Paediatric Neurology and Rehabilitation of the St. Joseph's Hospital in Kyoto (Japan). **OUTCOME MEASURES:** Clinical, neurological and psychological status at age 5. **RESULTS:** Motor optimality at age 3 to 5 months correlated positively with neonatal optimality ($r=0.48$, $p<0.01$), especially regarding factors associated with hypoxic events. A non-optimal motor performance (lowest possible scores) predicted cerebral palsy with 100% accuracy. Other adverse outcomes such as developmental delays, developmental coordination disorders, pervasive developmental disorder or attention deficit hyperactivity disorder turned out not to be associated with early motor performance. In 13% of cases absence of fidgety movements proved to be false positives, but their normal appearance along with a smooth concurrent motor performance was solely found in infants with a normal neurological development. **CONCLUSION:** Assessing the quality of motor performance at age 3 to 5 months considerably improves our ability to identify infants at risk for maldevelopment.

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21. Aust N Z J Obstet Gynaecol. 2011 Feb;51(1):17-21. doi: 10.1111/j.1479-828X.2010.01275.x.**Gathering the evidence: Cord gases and placental histology for births with low Apgar scores.**

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Background: Acute intrapartum hypoxia is an uncommon cause of cerebral palsy. The exclusion of acute intrapartum hypoxia utilizes two vital pieces of information that can be obtained at the time of birth: (i) cord blood gas to exclude a severe metabolic acidosis, and (ii) placental histology to suggest an alternative aetiology other than acute intrapartum hypoxia. Although recommendations exist to encourage this practice in high-risk deliveries, their compliance in an Australian setting is not known. **Aims:** To evaluate the frequency and utility of cord blood gases and placental histology following delivery with an Apgar score ≤ 6 at five minutes. **Methods:** A retrospective study of 12,887 consecutive deliveries at a tertiary obstetric centre, of which 100 live births had Apgar scores ≤ 6 at five minutes. Cord blood gases and placental histology were examined. There were also 132 stillbirths where placental histology was sought. **Results:** Cord gases were measured in 52 of 100 live births with a low Apgar score. Seven of these had severe metabolic acidaemia and 26 had normal cord gases. Placental histology was requested in 40 of these births and 30 showed abnormal histology, suggesting alternative aetiologies. Of the 132 stillbirths, placental histology was available in 50. Abnormal histology was present in 39 of these stillbirths. **Conclusions:** Cord gases and placental histology should be sought in all babies with low Apgar scores for the benefit of understanding causation, counselling of the parents, research and professional liability assessment. Heightened awareness for adverse perinatal outcomes is required by health care professionals when a neonate requires resuscitation.

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22. Neurological Disorders.

Silberberg D, Katabira E.

In: Jamison DT, Feachem RG, Makgoba MW, Bos ER, Baingana FK, Hofman KJ, Rogo KO, editors. Disease and Mortality in Sub-Saharan Africa.

2nd edition. Washington (DC): World Bank; 2006. Chapter 23.

Excerpt: Neurological disorders are increasingly prevalent in Sub-Saharan Africa. The factors that are producing this increased burden include malnutrition, adverse perinatal conditions, malaria, the human immunodeficiency virus and the acquired immune deficiency syndrome (HIV/AIDS) and other causes of encephalitis and meningitis, demographic transitions, increased vehicular traffic, and persistent regional conflicts. Leading neurological disorders include cerebral palsy, mental retardation and other developmental disorders, epilepsy, peripheral neuropathy, stroke, and, increasingly, the nervous system complications of HIV/AIDS, trauma, and alcohol abuse. The disabling rather than fatal nature of many neurological disorders, the stigma associated with brain disorders, and the enormous difficulty in gathering epidemiologic data have resulted in their being underreported and neglected in Sub-Saharan Africa. This neglect represents an unfortunate paradox, since neurological (and psychiatric) disorders make up at least 25 percent of the global burden of disease and are responsible for an even greater proportion of persons living with disability.

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