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Interventions and Management

1. Arch Phys Med Rehabil. 2012 May 3. [Epub ahead of print]

Active Video Game Play in Children With Cerebral Palsy: Potential for Physical Activity Promotion and Rehabilitation Therapies.

Howcroft J, Klejman S, Fehlings D, Wright V, Zabjek K, Andrysek J, Biddiss E.

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OBJECTIVE: To evaluate the potential of active video game (AVG) play for physical activity promotion and rehabilitation therapies in children with cerebral palsy (CP) through a quantitative exploration of energy expenditure, muscle activation, and quality of movement. **DESIGN:** Single-group, experimental study. **SETTING:** Human movement laboratory in an urban rehabilitation hospital. **PARTICIPANTS:** Children (N=17; mean age \pm SD, 9.43 \pm 1.51y) with CP. **INTERVENTION:** Participants played 4 AVGs (bowling, tennis, boxing, and a dance game). **MAIN OUTCOME MEASURES:** Energy expenditure via a portable cardiopulmonary testing unit; upper limb muscle activations via single differential surface electrodes; upper limb kinematics via an optical motion capture system; and self-reported enjoyment via the Physical Activity Enjoyment Scale (PACES). **RESULTS:** Moderate levels of physical activity were achieved during the dance (metabolic equivalent for task [MET]=3.20 \pm 1.04) and boxing (MET=3.36 \pm 1.50) games. Muscle activations did not exceed maximum voluntary exertions and were greatest for the boxing AVG and for the wrist extensor bundle. Angular velocities and accelerations were significantly larger in the dominant arm than in the hemiplegic arm during bilateral play. A high level of enjoyment was reported on the PACES (4.5 \pm 0.3 out of 5). **CONCLUSIONS:** AVG play via a low-cost, commercially available system can offer an enjoyable opportunity for light to moderate physical activity in children with CP. While all games may encourage motor learning to some extent, AVGs can be strategically selected to address specific therapeutic goals (eg, targeted joints, bilateral limb use). Future research is needed to address the challenge of individual variability in movement patterns/play styles. Likewise, further study exploring home use of AVGs for physical activity promotion and rehabilitation therapies, and its functional outcomes, is warranted.

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[PMID: 22571917](https://pubmed.ncbi.nlm.nih.gov/22571917/) [PubMed - as supplied by publisher]

2. Gait Posture. 2012 May 4. [Epub ahead of print]**A comparison of hip joint centre localisation techniques with 3-DUS for clinical gait analysis in children with cerebral palsy.**

Peters A, Baker R, Morris ME, Sangeux M.

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Functional calibration techniques have been proposed as an alternative to regression equations for estimating the position of the hip within the pelvic co-ordinate system for clinical gait analysis. So far validation of such techniques has focussed on healthy adults. This study evaluated a range of techniques based on regression equations or functional calibration procedures techniques in 46 children representative of those attending a major clinical gait analysis service against previously validated 3-D ultrasound techniques for determining the hip joint centre. Best agreement with ultrasound for the position of the hip within the pelvic coordinate system was found for the Harrington equations (mean 14mm, sd 8mm). Sphere fitting (mean≈22mm, sd 11mm) performed better than transformational techniques applied locally (mean≈33mm, sd 12mm) or globally (mean=30mm, sd 14mm). The participants with cerebral palsy showed reduced range of movement compared with healthy adults. Differences between these results and studies modelling the effects of simulated noise on functional techniques can probably be attributed to differences between that noise and the soft tissue displacements that are actually occurring.

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3. Clin Biomech (Bristol, Avon). 2012 May 2. [Epub ahead of print]**The role of the scapulo-thoracic and gleno-humeral joints in upper-limb motion in children with hemiplegic cerebral palsy.**

Brochard S, Lempereur M, Mao L, Rémy-Néris O.

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BACKGROUND: The pathophysiology of abnormal shoulder motion in children with hemiplegic cerebral palsy is not yet well understood. The aim of this study was to compare the motion of the two principle shoulder joints in children with hemiplegic cerebral palsy and typically developing children. **METHODS:** 10 children in each group carried out 6 tasks recorded by an optoelectronic system. The analysis protocol was based on an acromion marker cluster, a functional method to determine the gleno-humeral rotation center and different Euler sequences thus providing three dimensional thoraco-humeral, scapulo-thoracic and gleno-humeral kinematics during upper-limb motion. **FINDINGS:** In the children with hemiplegic cerebral palsy, the scapulo-thoracic joint was more protracted ($P<0.05$) and tended to be more laterally rotated depending on the tasks and the degree of humeral elevation. The gleno-humeral joint was limited in elevation ($P<0.09$), internal rotation ($P<0.05$) and plane of elevation ($P<0.05$) depending on the task. At rest, the orientation of the arm was more related to the scapular posture than to the gleno-humeral orientation, the latter which appeared to compensate the initial internal arm rotation at the beginning of the motion. **INTERPRETATION:** The scapulo-thoracic joint plays a key role in arm posture at rest and during motion but does not seem to limit arm motion. The gleno-humeral joint compensates the scapula orientation at small degrees of humeral elevation but has a reduced total range of motion. Clinical management should focus on both joints taking into account their respective roles in upper-limb motion in this population.

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4. Explore (NY). 2012 May;8(3):199-205.**Effects of myofascial release and other advanced myofascial therapies on children with cerebral palsy: six case reports.**

Whisler SL, Lang DM, Armstrong M, Vickers J, Qualls C, Feldman JS.

Department of Pediatrics, University of New Mexico School of Medicine, Albuquerque, NM.

[PMID: 22560759](#) [PubMed - in process]

5. Res Dev Disabil. 2012 May 5;33(5):1670-1676. [Epub ahead of print]**Factors related to impaired visual orienting behavior in children with intellectual disabilities.**

Boot FH, Pel JJ, Evenhuis HM, van der Steen J.

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It is generally assumed that children with intellectual disabilities (ID) have an increased risk of impaired visual information processing due to brain damage or brain development disorder. So far little evidence has been presented to support this assumption. Abnormal visual orienting behavior is a sensitive tool to evaluate impaired visual information processing. Therefore, the main objective of this study was to investigate possible correlations between the children's characteristics (age, gender, level of ID, mobility, gestational age, cerebral palsy, Down syndrome, visual acuity, strabismus, nystagmus, and epilepsy), and abnormal visual orienting behavior. We quantified data on visual orienting behavior, in terms of visual processing time and ocular motor fixations, in 88 children with ID aged 4-14 years. These visual parameters were combined with data collected from the children's medical records (predictors) and were put in a Pearson bivariate correlation analysis. A predictor was included for multiple regression analysis if the Pearson's correlation coefficient had a level of significance of $p < 0.05$. As shown by multiple regression analysis, age, level of ID, and Down syndrome significantly affected visual processing time. Mobility, strabismus, and nystagmus significantly affected fixation quality. Using a systematic approach, we confirmed the hypothesis that children with ID have an increased risk of impaired visual information processing which is related to a low IQ.

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6. J Craniofac Surg. 2012 May 4. [Epub ahead of print]**Quadruple Salivary Duct Diversion for Drooling in Cerebral Palsy.**

Celet Ozden B, Aydin A, Kuvat SV, Yazar M, Ozmen M, Tatli B.

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Drooling complicates many neurologic disorders including cerebral palsy. It is socially debilitating for the patient and very tedious for the caregiver. Surgical treatment consists mainly of ablative (excision/ligation) or physiological (diversion) methods; combined techniques have also been proposed. We have applied bilateral diversion of both submandibular and parotid ducts in 12 cerebral palsy patients (age range, 7-15 years). Preoperative drooling severity was grade 4/5 in 10 cases and grade 5/5 in 2 of the cases. All patients underwent physiotherapy for a minimum of 6 months and were consulted with a dentist, otolaryngologist, and a speech therapist before surgery. No bleeding, hematoma, or infection has been observed in any of the patients. Two patients had early postoperative tongue edema that regressed with conservative treatment. All patients except one regressed to grade

2/5 drooling by the first postoperative month. In 1 patient who had previously been classified as grade 5/5, surgery provided limited improvement with only 1 grade of step-down. Satisfactory results for the patients and their families could be achieved and sustained for a median 18 months (7-20 months) of follow-up. In conclusion, the quadruple duct diversion method is an effective physiological surgical method in the control of drooling in cerebral palsy.

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7. BMC Res Notes. 2012 May 4;5(1):218. [Epub ahead of print]

Weight-based nutritional diagnosis of Mexican children and adolescents with neuromotor disabilities.

Vega-Sanchez R, Gomez-Aguilar MD, Haua K, Rozada G.

BACKGROUND: Nutrition related problems are increasing worldwide but they have scarcely been evaluated in people with neuromotor disabilities, particularly in developing countries. In this study our aim was to describe the weight-based nutritional diagnoses of children and adolescents with neuromotor disabilities who attended a private rehabilitation center in Mexico City. **METHODS:** Data from the first visit's clinical records of 410 patients who attended the Nutrition department at the Teleton Center for Children Rehabilitation, between 1999 and 2008, were analyzed. Sex, age, weight and height, length or segmental length data were collected and used to obtain the nutritional diagnosis based on international growth charts, as well as disability-specific charts. Weight for height was considered the main indicator. **RESULTS:** Cerebral palsy was the most frequent diagnosis, followed by spina bifida, muscular dystrophy, and Down's syndrome. Children with cerebral palsy showed a higher risk of presenting low weight/undernutrition (LW/UN) than children with other disabilities, which was three times higher in females. In contrast, children with spina bifida, particularly males, were more likely to be overweight/obese (OW/OB), especially after the age of 6 and even more after 11. Patients with muscular dystrophy showed a significantly lower risk of LW/UN than patients with other disabilities. In patients with Down's syndrome neither LW/UN nor OW/OB were different between age and sex. **CONCLUSIONS:** This is the first study that provides evidence of the nutritional situation of children and adolescents with neuromotor disabilities in Mexico, based on their weight status. Low weight and obesity affect a large number of these patients due to their disability, age and sex. Early nutritional diagnosis must be considered an essential component in the treatment of these patients to prevent obesity and malnutrition, and improve their quality of life.

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Prevention and Cure

8. N Engl J Med. 2012 May 10;366(19):1803-13. Epub 2012 May 5.

Reproductive technologies and the risk of birth defects.

Davies MJ, Moore VM, Willson KJ, Van Essen P, Priest K, Scott H, Haan EA, Chan A.

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BACKGROUND: The extent to which birth defects after infertility treatment may be explained by underlying parental factors is uncertain. **METHODS:** We linked a census of treatment with assisted reproductive technology in South Australia to a registry of births and terminations with a gestation period of at least 20 weeks or a birth weight of at least 400 g and registries of birth defects (including cerebral palsy and terminations for defects at any gestational period). We compared risks of birth defects (diagnosed before a child's fifth birthday) among pregnancies in women who received treatment with assisted reproductive technology, spontaneous pregnancies (i.e., without assisted conception) in women who had a previous birth with assisted conception, pregnancies in women with a record of infertility but no treatment with assisted reproductive technology, and pregnancies in women with no record of infertility. **RESULTS:** Of the 308,974 births, 6163 resulted from assisted conception. The unadjusted odds ratio for any birth defect in pregnancies involving assisted conception (513 defects, 8.3%) as compared with pregnancies not involving assisted conception (17,546 defects, 5.8%) was 1.47 (95% confidence interval [CI], 1.33 to 1.62); the

multivariate-adjusted odds ratio was 1.28 (95% CI, 1.16 to 1.41). The corresponding odds ratios with in vitro fertilization (IVF) (165 birth defects, 7.2%) were 1.26 (95% CI, 1.07 to 1.48) and 1.07 (95% CI, 0.90 to 1.26), and the odds ratios with intracytoplasmic sperm injection (ICSI) (139 defects, 9.9%) were 1.77 (95% CI, 1.47 to 2.12) and 1.57 (95% CI, 1.30 to 1.90). A history of infertility, either with or without assisted conception, was also significantly associated with birth defects.

CONCLUSIONS: The increased risk of birth defects associated with IVF was no longer significant after adjustment for parental factors. The risk of birth defects associated with ICSI remained increased after multivariate adjustment, although the possibility of residual confounding cannot be excluded. (Funded by the National Health and Medical Research Council and the Australian Research Council.).

[PMID: 22559061](#) [PubMed - in process]

9. *Drugs*. 2012 May 7;72(7):907-16. doi: 10.2165/11632870-000000000-00000.

Patent ductus arteriosus in premature neonates.

Mezu-Ndubuisi OJ, Agarwal G, Raghavan A, Pham JT, Ohler KH, Maheshwari A.

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Persistent patency of the ductus arteriosus is a major cause of morbidity and mortality in premature infants. In infants born prior to 28 weeks of gestation, a haemodynamically significant patent ductus arteriosus (PDA) can cause cardiovascular instability, exacerbate respiratory distress syndrome, prolong the need for assisted ventilation and increase the risk of bronchopulmonary dysplasia, intraventricular haemorrhage, renal dysfunction, cerebral palsy and mortality. We review the pathophysiology, clinical features and assessment of haemodynamic significance, and provide a rigorous appraisal of the quality of evidence to support current medical and surgical management of PDA of prematurity. Cyclo-oxygenase inhibitors such as indomethacin and ibuprofen remain the mainstay of medical therapy for PDA, and can be used both for prophylaxis as well as for rescue therapy to achieve PDA closure. Surgical ligation is also effective and is used in infants who do not respond to medical management. Although both medical and surgical treatment have proven efficacy in closing the ductus, both modalities are associated with significant adverse effects. Because the ductus does undergo spontaneous closure in some premature infants, improved and early identification of infants most likely to develop a symptomatic PDA could help in directing treatment to the at-risk infants and allow others to receive expectant management.

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10. *Curr Pharm Des*. 2012 Apr 18. [Epub ahead of print]

Vitamin A in Prevention of Bronchopulmonary Dysplasia.

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Bronchopulmonary dysplasia (BPD) remains one of the most serious challenges in the care of the very preterm infants, affecting approximately one-quarter of infants born <1500g birth weight and 30% <1000g. Oxygen toxicity may contribute to its pathogenesis. Vitamin A concentrations are lower in BPD infants which may result in a reduction of the antioxidant protection. It has been found to up regulate genes necessary for fetal lung growth and increase surfactant production in animal models and is also involved in the modulation of immunological and inflammatory responses by regulation of cytokine production. Retinoic acid plays a key role in lung development improving alveolar septation. Evidence exists that vitamin A supplementation for very low birth weight (VLBW) infants, beyond that routinely given in multivitamin preparations, is associated with a reduction in death or BPD. So, parenteral administration of vitamin A to the newborn is one of the current recommended preventive therapies for BPD (number needed to treat 12; 95% CI: 6-94; The information on long-term neurodevelopmental status suggests no evidence of either benefit or harm. Estimates for cerebral palsy range from a number needed to treat of 11 to a number needed to harm of 33. Nowadays, it seems that administration of antenatal vitamin A to the mother in late pregnancy associated with neonatal supplementation can better prevent the development of BPD in areas of

endemic vitamin A deficiency. The benefits, in terms of vitamin A status, safety and acceptability of delivering vitamin A in an intravenous emulsion compared with repeat intramuscular injections, the association of vitamin A prenatal and postnatal, as well as the effectiveness and safety of administered high dose vitamin A in ELBW infants waits evaluation and should be assessed in further trials.

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11. *Ginekol Pol.* 2012 Mar;**83(3):214-8.**

Therapeutic hypothermia for neonatal hypoxic-ischemic encephalopathy [Article in Polish]

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Hypoxia-ischemia in the perinatal period is a serious condition affecting infants, which can result in death and cerebral palsy and associated disabilities. There has been significant research progress in hypoxic-ischemic encephalopathy over the last 2 decades. Many new molecular mechanisms of asphyxia have been identified. Despite all these advances, therapeutic interventions in HIE remain to be limited. Recently it has been revealed that mild therapeutic hypothermia is the only modality shown to improve neurologic outcome. The authors present a summary of pathogenesis of HIE, animal studies of cooling for hypoxic and ischemic models, and first publications on human therapeutic hypothermia trials. The diagnosis of encephalopathy in full-term neonates and enrollment criteria for hypothermia are also discussed. The current data from randomized control trials of hypothermia as neuroprotection for full and near-term infants are presented along with the results of meta-analyses of these trials. Finally the status of ongoing neonatal hypothermia trials as well as status of therapeutic hypothermia in Poland is summarized.

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