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Interventions and Management

1. J Electromyogr Kinesiol. 2013 Jan 30. pii: S1050-6411(13)00017-5. doi: 10.1016/j.jelekin.2012.12.005. [Epub ahead of print]

Fatigue and muscle activation during submaximal elbow flexion in children with cerebral palsy.

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The purpose of this study was to investigate whether children with cerebral palsy (CP), like typically developing peers, would compensate for muscle fatigue by recruiting additional motor units during a sustained low force contraction until task failure. Twelve children with CP and 17 typically developing peers performed one submaximal isometric elbow flexion contraction until the task could no longer be sustained at on average 25% (range 10-35%) of their maximal voluntary torque. Meanwhile surface electromyography (EMG) was measured from the biceps brachii and triceps brachii, and acceleration variations of the forearm were detected by an accelerometer. Slopes of the change in EMG amplitude and median frequency and accelerometer variation during time normalised to their initial values were calculated. Strength and time to task failure were similar in both groups. Children with CP exhibited a lower increase in EMG amplitude of the biceps brachii and triceps brachii during the course of the sustained elbow flexion task, while there were no significant group differences in median frequency decrease or acceleration variation increase. This indicates that children with CP do not compensate muscle fatigue with recruitment of additional motor units during sustained low force contractions.

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2. Res Dev Disabil. 2013 Jan 29;34(4):1152-1159. doi: 10.1016/j.ridd.2012.12.019. [Epub ahead of print]

The effect of lower body stabilization and different writing tools on writing biomechanics in children with cerebral palsy.

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A high percentage of children with cerebral palsy (CP) have difficulty keeping up with the handwriting demands at school. Previous studies have addressed the effects of proper sitting and writing tool on writing performance, but less on body biomechanics. The aim of this study was to investigate the influence of lower body stabilization and pencil design on body biomechanics in children with CP. Fourteen children (12.31 ± 4.13 years old) with CP were recruited for this study. A crossover repeated measures design was employed, with two independent variables: lower body stabilization (with/without) and pencil (regular/assigned grip height/biaxial). The writing task was to trace the Archimedean spiral mazes. Electromyography (EMG) of the upper extremity, the wrist flexion/extension movements, and the whole body photography were recorded to quantify the changes in posture and upper extremity biomechanics. Two-way repeated measures ANOVA was used for statistical analysis. No significant main effects were revealed in the EMG and wrist kinematics. The lower body stabilization significantly decreased the trunk lateral and forward deviations, and the visual focus-vertical angle. The biaxial pencil and the assigned grip height design significantly decreased the head, shoulder, trunk, and pelvic deviations compared with the regular design. The results indicated that the lower body positioning was effective in improving the trunk posture. A pencil with an assigned grip height or with a biaxial design could improve head, shoulder, trunk and pelvic alignment, but did not influence the muscle exertion of the upper extremity. This study could provide guidelines for parents, teachers and clinicians regarding the selection of writing tools and the knowledge of proper positioning for the children with handwriting difficulties. Further analyses can focus on the design, modification and clinical application of assistive sitting and writing devices for the use in children with handwriting difficulties.

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3. Res Dev Disabil. 2013 Jan 29;34(4):1134-1143. doi: 10.1016/j.ridd.2012.12.014. [Epub ahead of print]

Motor control of the lower extremity musculature in children with cerebral palsy.

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The aim of this investigation was to quantify the differences in torque steadiness and variability of the muscular control in children with cerebral palsy (CP) and typically developing (TD) children. Fifteen children with CP (age= 14.2 ± 0.7 years) that had a Gross Motor Function Classification System (GMFCS) score of I-III and 15 age and gender matched TD children (age= 14.1 ± 0.7 years) participated in this investigation. The participants performed submaximal steady-state isometric contractions with the ankle, knee, and hip while surface electromyography (sEMG) was recorded. An isokinetic dynamometer was used to measure the steady-state isometric torques while the participants matched a target torque of 20% of the subject's maximum voluntary torque value. The coefficient of variation was used to assess the amount of variability in the steady-state torque, while approximate entropy was used to assess the regularity of the steady-state torque over time. Lastly, the distribution of the power spectrum of the respective sEMG was evaluated. The results of this investigation were: 1) children with CP had a greater amount of variability in their torque steadiness at the ankle than TD children, 2) children with CP had a greater amount of variability at the ankle joint than at the knee and hip joint, 3) the children with CP had a more regular steady-state torque pattern than TD children for all the joints, 4) the ankle sEMG of children with CP was composed of higher harmonics than that of the TD children.

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4. J Pediatr Orthop. 2013 Mar;33(2):182-9. doi: 10.1097/BPO.0b013e318274541a.

Proximal femoral geometry before and after varus rotational osteotomy in children with cerebral palsy and neuromuscular hip dysplasia.

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BACKGROUND: Surgical management of hip dysplasia in children with cerebral palsy (CP) usually includes varus rotational osteotomy (VRO) of the proximal femur. Several techniques of VRO (end-to-end, EE; end-to-side, ES) have been designed to maximize correction and minimize associated deformities. The goals of the current study were to establish the prevalence and contribution of caput valgum to coxa valga deformity in children with CP, compare the geometry of the proximal femur after EE and ES techniques of VRO, and document the response of the proximal femur to subsequent growth after VRO. **METHODS:** The records of 75 children with CP (Gross Motor Function Classification System, levels IV and V) with 137 surgically treated hips were retrospectively reviewed. Outcomes were limited to the technical domain (eg, radiographic measurements and surgical complications). Measurements made for each hip (preoperative, operative, and follow-up) included the neck-shaft angle (NSA), head-shaft angle (HSA), and the medialization index. **RESULTS:** The mean age at the time of surgery was 7 years. The mean follow-up was 5 years and 6 months. Caput valgum was present in all hips, increasing the actual geometric valgus by a mean of 10%. The ES technique was more effective at medializing the femoral shaft; however, this benefit was lost with growth ($P=0.891$). The ES technique was more effective at achieving and maintaining correction of the NSA ($P=0.026$). Maintenance of correction of the HSA was comparable for both ES and EE surgical techniques ($P=0.099$). Subsequent growth of the proximal femur resulted in loss of correction of the NSA (mean 29%) and HSA (mean 21%). **DISCUSSION:** Caput valgum is usually present in children with CP who are undergoing surgical hip reconstruction. The ES technique is a reasonable alternative for the correction of neuromuscular hip dysplasia associated with extreme coxa valga and long femoral necks. Recurrence of coronal plane deformity with growth after VRO is common, and further study is required to determine how best to control this phenomena.

LEVEL OF EVIDENCE: Level IV-therapeutic.

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5. Orthopedics. 2013 Feb 1;36(2):e139-46. doi: 10.3928/01477447-20130122-13.

Subtrochanteric valgus osteotomy with monolateral external fixator in hips for patients with severe cerebral palsy.

Agashe M, Song SH, Tong XB, Hong JH, Song HR.

Subtrochanteric valgus osteotomy has been used for painful hip joint dislocation in patients with severe cerebral palsy. The goal of this study was to evaluate 11 patients (17 hips) with severe cerebral palsy who had chronically dislocated and painful hips treated with subtrochanteric valgus osteotomy using a monolateral external fixator. A retrospective review was performed of 11 patients (average age, 17.8 years) with severe quadriplegic cerebral palsy with flexion-adduction contractures due to chronically dislocated and painful hips. A subtrochanteric valgus osteotomy with a monolateral fixator was performed in all patients. Patients were analyzed clinicoradiologically, and caregivers were asked about ease of handling, transfers, and perineal care. At an average follow-up of 37 months (range, 14-72 months), all caregivers were satisfied with the surgery and felt that their child was more comfortable and could sit with support for a longer time period and that perineal care, wheelchair mobilization, and transfers were much easier. A total of 11 complications in 7 patients were observed, including pin-tract infections, delayed consolidation, abduction deformity, and hypostatic pneumonia. The complication rate of subtrochanteric valgus osteotomy was comparable with other methods, and this method had the advantage of shorter surgical time, ease of application, no internal implant with lesser chance of infection or heterotopic calcification, and less intraoperative blood loss with less morbidity.

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6. J Pediatr Orthop. 2013 Mar;33(2):175-81. doi: 10.1097/BPO.0b013e31827d0b73.

Unilateral hip reconstruction in children with cerebral palsy: predictors for failure.

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BACKGROUND: Unilateral hip reconstruction in patients with cerebral palsy can be complicated by contralateral subluxation and ipsilateral failure. We sought to identify predictors for failure after unilateral reconstruction in patients with GMFCS IV-V CP with unilateral hip involvement. **METHODS:** We performed an IRB-approved retrospective study on GMFCS IV-V CP patients with unilateral hip reconstruction at a minimum 2-year follow-up. Radiologic data included acetabular index, femoral migration index (FMI), lateral center edge angle (LCE), and pelvic obliquity. The effects of age, sex, pelvic obliquity, scoliosis surgery, and contralateral hip soft-tissue release at the index surgery were analyzed for ipsilateral hip failure and contralateral hip subluxation. Statistical analysis was performed using the χ^2 and t tests. **RESULTS:** There were 35 patients (M:F, 23:12) with mean age of 110 months (range, 45 to 215 mo) with mean follow-up of 60.5 months (range, 24 to 129 mo). The mean preoperative ipsilateral hip FMI was 60% (range, 40% to 100%) and the mean LCE was -16.7 degrees (range, -85 to 17.2 degrees). Contralateral soft-tissue release was performed in 13/35 patients. Ipsilateral hip failure or contralateral hip subluxation was observed in 51% (18/35) patients. Contralateral hip subluxation developed in 28% (10/35) of patients. Ipsilateral hip failure was observed in 34% (12/35) patients. Four had both ipsilateral failure and contralateral subluxation. Lack of contralateral hip soft-tissue release, reversal of pelvic obliquity angle, and high initial contralateral hip FMI (>25%) significantly predicted the risk of contralateral hip subluxation ($P=0.03$). Similarly, persistence or worsening of preoperative pelvic obliquity significantly predicted ipsilateral hip failure ($P<0.04$). There was a strong trend toward contralateral hip subluxation in patients below 8 years of age ($P=0.1$) and ipsilateral hip failure in those who had spinal fusion surgery for scoliosis ($P=0.06$). **CONCLUSIONS:** Predictors of contralateral hip subluxation included lack of contralateral soft-tissue release, reversal of pelvic obliquity angle, and larger initial contralateral hip FMI (>25%). The only predictor of ipsilateral failure was persistence or worsening of preoperative pelvic obliquity.

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7. Arq Neuropsiquiatr. 2013 Feb;71(2):71.

Cerebral palsy: how can we improve the use of mobility devices?

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[PMID: 23392321](#) [PubMed - in process]

8. BMC Pediatr. 2013 Feb 1;13(1):17. [Epub ahead of print]

Optimising Ankle Foot Orthoses for children with Cerebral Palsy walking with excessive knee flexion to improve their mobility and participation; protocol of the AFO-CP study.

Kerkum YL, Harlaar J, Buizer AI, Noort JC, Becher JG, Brehm MA.

BACKGROUND: Ankle-Foot-Orthoses with a ventral shell, also known as Floor Reaction Orthoses (FROs), are often used to reduce gait-related problems in children with spastic cerebral palsy (SCP), walking with excessive knee flexion. However, current evidence for the effectiveness (e.g. in terms of walking energy cost) of FROs is both limited and inconclusive. Much of this ambiguity may be due to a mismatch between the FRO ankle stiffness and the patient's gait deviations. The primary aim of this study is to evaluate the effect of FROs optimised for ankle

stiffness on the walking energy cost in children with SCP, compared to walking with shoes alone. In addition, effects on various secondary outcome measures will be evaluated in order to identify possible working mechanisms and potential predictors of FRO treatment success. **Method/Design:** A pre-post experimental study design will include 32 children with SCP, walking with excessive knee flexion in midstance, recruited from our university hospital and affiliated rehabilitation centres. All participants will receive a newly designed FRO, allowing ankle stiffness to be varied into three configurations by means of a hinge. Gait biomechanics will be assessed for each FRO configuration. The FRO that results in the greatest reduction in knee flexion during the single stance phase will be selected as the subject's optimal FRO. Subsequently, the effects of wearing this optimal FRO will be evaluated after 12--20 weeks. The primary study parameter will be walking energy cost, with the most important secondary outcomes being intensity of participation, daily activity, walking speed and gait biomechanics. **DISCUSSION:** The AFO-CP trial will be the first experimental study to evaluate the effect of individually optimised FROs on mobility and participation. The evaluation will include outcome measures at all levels of the International Classification of Functioning, Disability and Health, providing a unique set of data with which to assess relationships between outcome measures. This will provide insights into working mechanisms of FROs and will help to identify predictors of treatment success, both of which will contribute to improving FRO treatment in SCP in term. **Trial registration:** This study is registered in the Dutch Trial Register as NTR3418.

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9. J Neuroeng Rehabil. 2013 Feb 7;10(1):15. [Epub ahead of print]

The effects of virtual reality game training on trunk to pelvis coupling in a child with cerebral palsy.

Barton GJ, Hawken MB, Foster RJ, Holmes G, Butler PB.

BACKGROUND: Good control of trunk and pelvic movements is necessary for well controlled leg movements required to perform activities of daily living. The nature of movement coupling between the trunk and pelvis varies and depends on the type of activity. Children with cerebral palsy often have reduced ability to modulate coupling between the trunk and pelvis but movement patterns of the pelvis can be improved by training. The aim of this study was to examine how pelvis to trunk coupling changed while playing a computer game driven by pelvic rotations. **METHODS:** One boy with cerebral palsy diplegia played the Goblin Post Office game on the CAREN virtual rehabilitation system for six weeks. He navigated a flying dragon in a virtual cave towards randomly appearing targets by rotating the pelvis around a vertical axis. Motion of the pelvis and trunk was captured in real-time by a Vicon 612 optoelectronic system tracking two clusters of three markers attached to the sacrum and thoracic spine. **RESULTS:** Convex hull areas calculated from angle-angle plots of pelvic and trunk rotations showed that coupling increased over game training ($F_{1,11} = 7.482$, $p = 0.019$). Reaching to targets far from the midline required tighter coupling than reaching near targets ($F_{1,12} = 10.619$, $p = 0.007$). **CONCLUSIONS:** Increasing coupling appears to be an initial compensation mechanism using the better controlled trunk to drive rotation of the pelvis. Co-contractions causing increased coupling are expected to reduce over longer exposure to training. The control scheme of the training game can be set to facilitate de-coupling of pelvic movements from the trunk. Using large ranges of pelvic rotation required more coupling suggesting that training of selective pelvic movements is likely to be more effective close to a neutral pelvic posture.

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10. Acta Anaesthesiol Taiwan. 2012 Dec;50(4):183-4. doi: 10.1016/j.aat.2012.08.010. Epub 2013 Jan 5.

Hypersensitivity reaction probably induced by sugammadex.

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We report here an intellectually compromised 7-year-old boy with cerebral palsy who developed a hypersensitivity reaction several minutes after the administration of sugammadex for subsequent extubation. He developed signs of upper airway stenosis and decreased oxygen saturation, as well as wheals on his neck, chest, and both upper extremities. He was successfully treated with immediate administration of adrenaline and hydrocortisone. A

hypersensitivity reaction to sugammadex was suspected on the basis of the patient's clinical course.

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11. Pediatrics. 2013 Feb 4. [Epub ahead of print]

Serious Air Leak Syndrome Complicating High-Flow Nasal Cannula Therapy: A Report of 3 Cases.

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Despite the absence of clinical safety data, heated, humidified high-flow nasal cannula (HHFNC) therapy is increasingly being used as an alternative to positive-pressure ventilation in pediatrics. This use of HHFNC is "off label" because the US Food and Drug Administration's approval for these devices was only for air humidification and not as a modality to provide positive distending pressure. For the first time we describe 3 cases who developed serious air leaks related to HHFNC therapy. The first child was a previously healthy 2-month-old male infant with respiratory syncytial virus bronchiolitis who developed a right pneumothorax on day 5 of his illness at 8 liters per minute (lpm). He subsequently required intubation and ventilation for 14 days. The second case involved an otherwise healthy 16-year-old boy with cerebral palsy who developed pneumomediastinum and died of its complications. He was receiving 20 lpm HHFNC therapy when he developed pneumomediastinum. The third case involved a 22-month-old, previously healthy boy who developed subdural hematoma secondary to abuse. He developed a right pneumothorax while receiving HHFNC at a flow of 6 lpm, requiring chest tube placement. These cases emphasize the need for extreme caution while using HHFNC for the off-label indication of providing positive distending pressure in children, especially at flows higher than the patient's minute ventilation. A more detailed study to specifically look at the serious adverse events related to HHFNC is urgently needed.

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12. Acta Inform Med. 2012 Dec;20(4):235-7. doi: 10.5455/aim.2012.20.235-237.

Percutaneous endoscopic gastrostomy (PEG): retrospective analysis of a 7-year clinical experience.

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AIMS: Since its description in 1980, percutaneous endoscopic gastrostomy has become the modality of choice for providing enteral access to patients who require long-term enteral nutrition. This study aimed to evaluate current indications and complications associated with PEG feeding. **METHODS:** We conducted a retrospective analysis of all patients who referred to our endoscopic unit of the Department of Gastroenterology and Hepatology of the Medical Center University of Sarajevo for PEG tube placement over a period of 7 years. Medical records of 359 patients dealing with PEG tube placement were reviewed to assess indications, technical success, complications and the need for repeat procedures. **RESULTS:** The indications for enteral feeding tube placement were malignancy in 44% (n=158), of which 61% (n=97) patients were suffering of head and neck cancer and 39% (n=61) of other malignancy. Central nervous disease was the indication in 48.7 % (n=175) of patients. Cerebrovascular accidents (CVA) accounted for 20% (n=73), head injury for 16% (n=59) and cerebral palsy for 11% (n=38). In 6.13% (n=22) of patients minor complications occur which included wound infection (0.8%), inadvertent PEG removal (2.5%) and tube blockage (1.1%). 11 patients experienced major complications including hemorrhage, tube migration and perforation. There were no deaths related to PEG procedure placement and the overall 30-day mortality rate due to primary disease was 15.8%. Oral feeding was resumed in 23% of the patients and the tube was removed subsequently after 6 -12 months. **CONCLUSIONS:** Percutaneous endoscopic gastrostomy is a safe and minimally invasive endoscopic procedure associated with a low morbidity (9.2%) rate, easy to follow-up and to replace when blockage occurs. Over a seven-year period we noticed an increase of 63% in PEG placement at our department.

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13. Dev Med Child Neurol. 2012 Dec;54(12):1127-32. doi: 10.1111/j.1469-8749.2012.04431.x. Epub 2012 Oct 25.

Experience of using electromyography of the genioglossus in the investigation of paediatric dysphagia.

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AIM: The aim of the study was to assess, retrospectively, the utility of genioglossus electromyography (gEMG) in evaluating children with suspected neurogenic feeding and swallowing difficulties. **METHOD:** Children who were evaluated using gEMG at a tertiary paediatric neurology dysphagia service were reviewed. Data were analysed by the presence/absence of neurogenic changes on gEMG and the method of feeding at their most recent follow-up. **RESULTS:** The study group comprised 59 individuals (36 males, 23 females; median age 20 mo; range 1 mo-15 y). The study cohort included individuals with heterogeneous neurological phenotypes (n=40), craniofacial syndrome (n=10), and congenital bulbar palsy (n=9). gEMG identified 35 out of 59 (60%) with neurogenic changes. At follow-up, 24 individuals were on oral feeds and 35 were on alternative methods of feeding (nasogastric /gastrostomy). Eight out of 24 children on oral feeds showed neurogenic changes compared with 27 out of 35 on alternative feeds. χ^2 analysis of feeding method at follow-up and the presence or absence of neurogenic change on EMG was highly significant ($p=0.002$). When confounding factors for alternative feeds were accounted for on univariate analysis, the neurogenic changes, severe gastro-oesophageal reflux disease, and respiratory comorbidities were statistically significant in predicting the alternative feeding, whereas growth failure and behavioural difficulties were not significant confounders. Moreover, multiple logistic regression analysis revealed that the neurogenic changes were independently predictive of an alternative method of feeding after adjusting for other confounders with an odds ratio of 29.6 (95% confidence interval 3.97-220; $p<0.007$). **CONCLUSION:** gEMG is a valuable complementary tool in the evaluation of children with neurogenic dysphagia as the degree of severity is independently correlated with long-term feeding outcomes.

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14. Cir Cir. 2012 Jul;80(4):320-6.

Visual neurorehabilitation of patients with cerebral damage using botulinum toxin [Article in Spanish]

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Background: The neurorehabilitation of the patient with cerebral damage implies the reestablishment of the visual functions. Botulinum toxin can be considered as a less invasive alternative for treatment. **Objective:** to demonstrate the answer to the treatment using botulinum toxin of the visual motor alterations in patients with cerebral damage. **Methods:** Descriptive study of patients with visual alterations associated to cerebral damage. The visual treatment included three areas: sensorial, refracting and motor under quimiodenervation with botulinum toxin, of May 2009 to May 2010. **Results:** 48 patients were studied, age 22,4 years \pm 23. The strabismus were: esotropia 52%, exotropia 39,5%, vertical 8%, nystagmus 4%. 50% of the patients had psychomotor delay. Some of the most important causes of cerebral damage were: Down syndrome, epilepsy, tumor, hydrocephalus, neuroinfection, infantile cerebral paralysis, multiple sclerosis, metabolic syndrome, cranial trauma, congenital cardiopathy, ventricular hemorrhage, cerebrovascular stroke. The dose of botulinum toxin was 8,1 UI \pm 3. We registered good results in 56.5%, regular 23,9% and bad 19,5%. The global percentage of rehabilitation was 69% of correction with a r of Pearson of 0,5. **Conclusion:** The botulinum toxin is an effective option for the visual rehabilitation in patients with cerebral damage and prevents the progression of more cerebral changes secondary to strabismus.

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Prevention and Cure

15. *Dev Med Child Neurol.* 2013 Feb 5. doi: 10.1111/dmcn.12086. [Epub ahead of print]

Apolipoprotein E polymorphisms and severity of cerebral palsy: a cross-sectional study in 255 children in Norway.

Lien E, Andersen GL, Bao Y, Gordish-Dressman H, Skranes JS, Vik T, Blackman JA.

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AIM: The aim of this study was to examine whether the presence of the apolipoprotein E (ApoE) allele APOEε4 is associated with less severe manifestations of cerebral palsy (CP), consistent with the suggested beneficial effect of this allele on neurodevelopment in children. **METHOD:** ApoE genotyping was performed on buccal epithelial cells from 255 children (141 males 114 females; mean age 12y, SD 2y 3mo, range 9-17y) recorded in the Cerebral Palsy Register of Norway. The main outcome measure of CP severity was the Gross Motor Function Classification System (GMFCS). Secondary outcome measures were fine motor function, epilepsy, and the need for gastrostomy tube feeding (GTF). **RESULTS:** There was no association between the APOEε4 genotype and GMFCS levels (odds ratio [OR] 1.15; 95% confidence interval [CI] 0.66-1.99). However, the APOEε4 genotype was more often present among children with epilepsy (OR 2.2; 95% CI 1.1-4.2) and/or receiving GTF (OR 2.7; 95% CI 1.1-6.6). Among children with unilateral CP, the presence of APOEε4 was associated with more severe fine motor impairment (OR 2.6; 95% CI 1.3-6.9). **INTERPRETATION:** Our main hypothesis that APOEε4 would have a protective effect on neurodevelopment was not supported. Instead, subgroup analyses suggested an adverse effect of the APOEε4 genotype on the developing brain after injury.

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16. *Dev Med Child Neurol.* 2013 Feb 5. doi: 10.1111/dmcn.12074. [Epub ahead of print]

Apolipoprotein E and the genetics of cerebral palsy - where to next?

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17. *Med Wieku Rozwoj.* 2012;16(3):222-231.

Intellectual and motor development of extremely low birth weight (=1000 g) children in the 7th year of life; a multicenter, cross-sectional study of children born in the Malopolska voivodship between 2002 and 2004. [Article in Polish]

Kwinta P, Klimek M, Grudzien A, Nitecka M, Profus K, Gasinska M, Pawlik D, Lauterbach R, Olechowski W, Pietrzyk JJ.

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Introduction: A better understanding of the developmental problems in extremely low birth weight (ELBW) preterm infants may enhance their chances of proper adaptation to their environment and make it possible to retrospectively

assess perinatal and neonatal methods of treatment. The aim of the study was to evaluate the cognitive and motor development of ELBW children born from 2002 to 2004 in the 7th year of life. Based on these results and perinatal mortality data, it was established what chance the children have to live free of severe complications. Material and methods: Two hundred and four alive newborns with birth weight ≥ 1000 g were born in the Malopolska voivodship between 1.09.2002 and 31.08.2004. One hundred and fifteen children (56%) died in early infancy. The study included 81 (91%) children out of the 89 surviving ones. Their mean gestational age at birth was 27.3 weeks. (SD: 2.1 weeks) and their mean birth weight was 840g (SD: 130g). Neurosensory disturbances were assessed in all the children and their cognitive development was evaluated with the use of the WISC-R (Wechsler Intelligence Scale for Children - Revised) scale. The children were divided into 3 groups: group I - normal development (full motor capacity and IQ >84 points and no vision or hearing impairment), group II - mild or moderate impairment (cerebral palsy level I, II or III according to the Gross Motor Function Classification System [GMCS], or IQ 40-84 points, or abnormal vision or hearing, or signs of the hyperactivity syndrome), group III - severe impairment (cerebral palsy level IV, and/or IQ <40 points, or deafness/blindness). Results: Forty-five (56%) children were included in group I, 25 (30%) in group II and 11 (14%) in group III. Moreover, other neurologic abnormalities, such as uneven development, problems with concentration, or abnormal grapho-motor ability were highly prevalent in the group of ELBW children. The incidence of cerebral palsy in the population studied was 16%, the incidence of deafness and severe hearing impairment was 11%, and blindness and severe vision impairment - 12%. In general, the chance of survival free of severe complications was merely 15% in children with birthweight ≤ 700 g, 28% in children with birth weight 701- 800 g, 45% in children with birth weight 801-900 g, and 62% in children with birth weight 901-1000 g. Conclusions: 1. The data gathered in a regional study may yield valuable information useful in assessing the prognosis of the general health status of ELBW newborns. 2. Most of the children present uneven development, problems with concentration, or abnormal grapho-motor ability, which may be a cause of learning problems and abnormal relationships with peers. 3. A follow-up study up to adulthood is required for this group of ELBW newborns.

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18. Paediatr Perinat Epidemiol. 2013 Mar;27(2):182-7. doi: 10.1111/ppe.12034.

Association between transient hypothyroxinaemia of prematurity and adult autism spectrum disorder in a low-birthweight cohort: an exploratory study.

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BACKGROUND: Transient hypothyroxinaemia of prematurity (THOP) is associated with increased risk of cerebral palsy and lower IQ in low-birthweight infants. This study explores whether THOP is also associated with increased risk of autism spectrum disorders (ASD). **METHODS:** This secondary analysis uses data from a birth cohort of newborns weighing 500-2000g ($n=1105$) who were followed to age 21 years, when they were assessed for ASD in the second of a two-stage process. Of the 187 assessed at age 21, 14 had ASD. Neonatal thyroxine results were available for 12/14 and 165/173 participants diagnosed with and without ASD, respectively. THOP was defined as thyroxine z-score <-2.6 . Unadjusted relative risks (RR) and confidence intervals (CI) were calculated. **RESULTS:** The mean neonatal thyroxine z-score in young adults diagnosed with ASD was 0.5 SD lower [95% CI -0.16, 1.06] than in those without ASD. Participants with THOP were at 2.5-fold greater risk of ASD (RR 2.5 [95% CI 0.7, 8.4]). While neither of these differences was statistically significant, in a secondary subgroup analysis of those whose mothers did not have hypertension during pregnancy, THOP significantly increased the RR for ASD (5.0 [95% CI 1.2, 20.5]). **CONCLUSION:** While the primary relation between THOP and ASD found here is not statistically significant, the magnitude of association and significant relationship observed in the subgroup whose mothers did not have hypertension during pregnancy suggest that it is worthy of further investigation.

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