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Interventions and Management

1. *Occup Ther Int.* 2014 Oct 29. doi: 10.1002/oti.1383. [Epub ahead of print]

Hand Use at Home and in Clinical Settings by Children with Cerebral Palsy: A Qualitative Study.

Brandão M1, Ocarino JM, Bueno KM, Mancini MC.

The purpose of this study was to understand the physical, attitudinal, and assistive characteristics of the home and the therapeutic settings that enable and/or hinder hand use by children with spastic hemiparesis CP. A qualitative study with 7 children with CP, their caregivers, and therapists was conducted. Children were observed at home and in their therapeutic settings to understand the supports and barriers from these environments regarding their use of the affected hand. Semi-structured interviews were conducted with caregivers and therapists. The transcribed interviews and field diaries were used for content analysis. The following thematic categories were drawn from the data analyses: (1) use when needed: from consistent to nonuse of the affected extremity; (2) making decisions: choosing to use or not use the affected extremity; and (3) responsibilities with activities: from complete dependence to independent performance. Discrepancies between caregivers and therapists' attitudes and actions towards children's hands use highlight the specific features from each context that facilitated or hindered children with CP's engagement in functional activities. Recommendations for future studies include investigating the relationship between the identified facilitators and improvements in children's effective hand use in home and clinical settings. Copyright © 2014 John Wiley & Sons, Ltd.

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2. *Childs Nerv Syst.* 2014 Oct 29. [Epub ahead of print]

Compartmental pressure after percutaneous tenotomy of the Achilles tendon in children with infantile cerebral palsy.

Carbonell PG.

PURPOSE: Our objective was to study the pressure of the posterior superficial compartment of legs of children with spastic cerebral palsy and equinus deformity before and after a percutaneous tenotomy of the Achilles tendon. **METHODS:** We studied compartmental pressure in 28 percutaneous tenotomies of the Achilles tendon (18 patients). All patients suffered cerebral palsy: 19 were tetraplegics (67.9 %) (Ashworth Grade 4, Gross Motor

Function Classification System (GMFCS) Level IV), and 9 were hemiplegics (32.1 %) (Ashworth Grade 3, GMFCS Level III). Exclusions were previous surgery and those who had previously been treated with botulinum toxin. An auto-calibration monitor (measurement error ± 1 mmHg) was used to calculate the pressure of the posterior superficial compartment of the leg. The ankle equinus was measured using a goniometer (measurement error $\pm 2^\circ$). The systolic and diastolic arterial pressures and the weight were measured simultaneously. STATISTICS: Descriptives, Wilcoxon test, and Kruskal-Wallis test were performed. RESULTS: The mean total age was 9.1 years, the mean total weight was 27.7 kg, and the mean systolic and diastolic pressures were 96.4 and 43.6 mmHg, respectively. The compartmental pressure was 11.3 mmHg pre-tenotomy and decreased by 30.1 % post-tenotomy to 7.9 mmHg. Compartmental pressure pre-tenotomy was 10.2 mmHg in hemiplegics and 11.8 mmHg in tetraplegics and was reduced to 2.3 and 10.5 mmHg post-tenotomy in hemiplegics and tetraplegics, respectively. The pressure was significantly reduced in post-tenotomy hemiplegics ($p = 0.001$). Compartmental pressure was independent of weight, systolic/diastolic pressure, both pre- and post-tenotomy. CONCLUSIONS: Compartmental pressure decreased significantly in spastic boys after percutaneous tenotomy of the Achilles tendon. Compartmental pressure was higher in tetraplegic than in hemiplegic boys.

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3. Dev Med Child Neurol. 2014 Oct 30. doi: 10.1111/dmcn.12610. [Epub ahead of print]

Functional performance in self-care and mobility after selective dorsal rhizotomy: a 10-year practice-based follow-up study.

Josenby AL1, Wagner P, Jarnlo GB, Westbom L, Nordmark E.

AIM: To explore changes in performance in daily activities (self-care and mobility) 10 years after selective dorsal rhizotomy (SDR). METHOD: Twenty-four children with bilateral spastic cerebral palsy were followed; the median age at SDR was 4 years 1 month (range 2y 5mo-6y 4mo) and at 10-year follow-up was 14 years 6 months (range 12y 3mo-16y 9mo). The preoperative Gross Motor Function Classification System (GMFCS) levels were: I (n=1), II (n=7), III (n=4), IV (n=11), and V (n=1). The Pediatric Evaluation of Disability Inventory (PEDI) was used to assess performance in functional skills, caregiver assistance, and frequency of modifications and adaptive equipment (MAE) in self-care and mobility domains. Changes were analysed in relation to preoperative GMFCS levels, PEDI scores, and age at operation. RESULTS: All scores improved significantly ($p < 0.01$) during the first 5 years in patients assigned to GMFCS levels I-III and IV-V. Between 5 years and 10 years, changes were seen in patients grouped in GMFCS levels I-III in the functional skills, mobility ($p = 0.04$), caregiver assistance self-care ($p = 0.03$), and caregiver assistance mobility ($p = 0.03$) domains. Those grouped in GMFCS levels IV-V showed small changes between 5 years and 10 years after surgery. Changes were dependent on the preoperative GMFCS levels in all domains; caregiver assistance, self-care and mobility changes were dependent on preoperative values. The use of MAE increased in participants in GMFCS levels IV-V. INTERPRETATION: Children who underwent SDR and physiotherapy improved in functional performance in self-care and mobility and were more independent 10 years postoperatively.

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4. Plast Reconstr Surg. 2014 Nov;134(5):707e-16e. doi: 10.1097/PRS.0000000000000699.

Classification and surgical correction of asymmetric calves in Asians.

Suh IS1, Jung MS, Lee BH, Kim JH, Tak KS, Ahn DK.

BACKGROUND: In Asia, one of the most important factors in being physically attractive is to have aesthetically pleasing legs, which has made calf contouring surgery an issue nowadays. When one leg is abnormally changed because of various factors (e.g., iatrogenic causes, poliomyelitis, cerebral palsy, trauma, and tumor resection), the tissue atrophies. Such asymmetric calves can be corrected by various surgical methods. METHODS: Calf asymmetry is defined as a difference in the maximal circumference greater than 2.0 cm between both calves. From 2005 to 2012, the authors carried out calf contouring operations on 68 patients. For patients with mild or moderate asymmetry, selective neurectomy with or without liposuction was performed on the hypertrophic calf according to

shape and severity. For patients with severe asymmetry, selective neurectomy with liposuction was performed for the hypertrophic calf, whereas the hypotrophic calf was treated with fat injection or silicone implantation. RESULTS: At a minimum of 3 months' follow-up, the mild group patients had a size difference less than 0.5 cm. The moderate and severe asymmetry groups showed size differences less than 1.2 and 2.3 cm, respectively. No functional problems or major complications were shown. Minor complications included five cases of wound dehiscence, three cases of hematoma, and six cases of hypertrophic scar at the incision site. CONCLUSION: Classifying patients into three groups according to the maximal circumferential difference between both legs and treating them separately using different surgical methods could significantly provide satisfying outcomes in both functional and aesthetic aspects.

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

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5. BMC Surg. 2014 Oct 27;14(1):85. [Epub ahead of print]

Can hyperbaric oxygen be used to prevent deep infections in neuro-muscular scoliosis surgery?

Inanmaz ME, Kose KC, Isik C, Atmaca H, Basar H.

BACKGROUND: The prevalence of postoperative wound infection in patients with neuromuscular scoliosis surgery is significantly higher than that in patients with other spinal surgery. Hyperbaric oxygen has been used as a supplement to treat postsurgical infections. Our aim was to determine beneficiary effects of hyperbaric oxygen treatment in terms of prevention of postoperative deep infection in this specific group of patients in a retrospective study. METHODS: Forty two neuromuscular scoliosis cases, operated between 2006-2011 were retrospectively reviewed. Patients who had presence of scoliosis and/or kyphosis in addition to cerebral palsy or myelomeningocele, postoperative follow-up >1 year and posterior only surgery were the subjects of this study. Eighteen patients formed the Hyperbaric oxygen prophylaxis (P-HBO) group and 24, the control group. The P-HBO group received 30 sessions of HBO and standard antibiotic prophylaxis postoperative, and the control group (received standard antibiotic prophylaxis). RESULTS: In the P-HBO group of 18 patients, the etiology was cerebral palsy in 13 and myelomeningocele in 5 cases with a mean age of 16.7 (11-27 yrs). The average follow-up was 20.4 months (12-36mo). The etiology of patients in the control group was cerebral palsy in 17, and myelomeningocele in 7 cases. The average age was 15.3 years (8-32 yrs). The average follow-up was 38.7 months (18-66mo). The overall incidence of infection in the whole study group was 11.9% (5/42). The infection rate in the P-HBO and the control group were 5.5% (1/18), and 16.6% (4/24) respectively. The use of HBO was found to significantly decrease the incidence of postoperative infections in neuromuscular scoliosis patients. CONCLUSION: In this study we found that hyperbaric oxygen has a possibility to reduce the rate of post-surgical deep infections in complex spine deformity in high risk neuromuscular patients.

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6. Clin Rehabil. 2014 Oct 28. pii: 0269215514555136. [Epub ahead of print]

A lifestyle intervention improves fatigue, mental health and social support among adolescents and young adults with cerebral palsy: Focus on mediating effects.

Slaman J1, van den Berg-Emons HJ2, van Meeteren J2, Twisk J3, van Markus F4, Stam HJ2, van der Slot WM5, Roebroek ME2.

OBJECTIVE: To evaluate the effect of a lifestyle intervention on fatigue, participation, quality of life, gross motor functioning, motivation, self-efficacy and social support, and to explore mediating effects of physical behavior and physical fitness. DESIGN: A randomized controlled trial with intention to treat analysis. SETTING: Rehabilitation centers in university hospitals in the Netherlands. SUBJECTS: Adolescents and young adults with spastic cerebral palsy. INTERVENTIONS: A six-month lifestyle intervention that consisted of physical fitness training combined with counseling sessions focused on physical behavior and sports participation. MAIN MEASURES: Fatigue, social participation, quality of life and gross motor functioning. RESULTS: The lifestyle intervention was effective in decreasing fatigue severity during the intervention (difference = -6.72, p = 0.02) and in increasing health-related quality of life with respect to bodily pain (difference = 15.14, p = 0.01) and mental health (difference = 8.80, p = 0.03)

during follow-up. Furthermore, the domain participation and involvement of the social support increased during both the intervention (difference = 5.38, $p = 0.04$) and follow-up (difference = 4.52, $p = 0.03$) period. Physical behavior or physical fitness explained the observed effects for 22.6%, 9.7% and 28.1% of improvements on fatigue, bodily pain and mental health, but had little effect on social support (2.6%). INTERPRETATION: Fatigue, bodily pain, mental health and social support can be improved using a lifestyle intervention among adolescents and young adults with cerebral palsy. Furthermore, substantial mediating effects were found for physical behavior and physical fitness on fatigue, bodily pain and mental health.

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7. Disabil Rehabil. 2014 Oct 27:1-9. [Epub ahead of print]

Barriers and facilitators of sports in children with physical disabilities: a mixed-method study.

Jaarsma EA1, Dijkstra PU, de Blécourt AC, Geertzen JH, Dekker R.

Purpose: This study explored barriers and facilitators of sports participation of children with physical disabilities from the perspective of the children, their parents and their health professionals. **Method:** Thirty children and 38 parents completed a questionnaire, and 17 professionals were interviewed in a semi-structured way. Data from the three groups were combined in a mixed-method design, after which the results were triangulated. **Results:** Mean age (SD) of the children was 14.1 (2.9) years old, 58% were boys. Sixty-seven percent of the children had cerebral palsy and 77% participated in sports after school. Most commonly practiced sports were swimming, cycling and football. Children specifically experienced dependency on others as a barrier, parents did not have enough information about sports facilities, and professionals observed that the family's attitude had influence on the child's sports participation. Facilitators were health benefits, fun and social contacts. **Conclusion:** Sports participation of children with physical disabilities is a complex phenomenon because children, their parents and professionals reported different barriers. Sports participation is more physically challenging for children with severe physical disabilities, as their daily activities already require much energy. However, the psychosocial benefits of sports are applicable to all children with physical disabilities. **Implication for Rehabilitation** Perceived barriers seemed to differ for children, parents and health professionals, suggesting that sports participation is a complex phenomenon. Sports might be more physically challenging for children with severe physical disabilities, as their daily activities already take much energy. The psychosocial benefits of sports should be emphasized by rehabilitation professionals when advising children with physical disabilities about sports.

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8. Front Integr Neurosci. 2014 Oct 9;8:78. doi: 10.3389/fnint.2014.00078. eCollection 2014.

Implications of CI therapy for visual deficit training.

Taub E, Mark VW, Uswatte G.

We address here the question of whether the techniques of Constraint Induced (CI) therapy, a family of treatments that has been employed in the rehabilitation of movement and language after brain damage might apply to the rehabilitation of such visual deficits as unilateral spatial neglect and visual field deficits. CI therapy has been used successfully for the upper and lower extremities after chronic stroke, cerebral palsy (CP), multiple sclerosis (MS), other central nervous system (CNS) degenerative conditions, resection of motor areas of the brain, focal hand dystonia, and aphasia. Treatments making use of similar methods have proven efficacious for amblyopia. The CI therapy approach consists of four major components: intensive training, training by shaping, a "transfer package" to facilitate the transfer of gains from the treatment setting to everyday activities, and strong discouragement of compensatory strategies. CI therapy is said to be effective because it overcomes learned nonuse, a learned inhibition of movement that follows injury to the CNS. In addition, CI therapy produces substantial increases in the gray matter of motor areas on both sides of the brain. We propose here that these mechanisms are examples of more general processes: learned nonuse being considered parallel to sensory nonuse following damage to sensory areas of the brain, with both having in common diminished neural connections (DNCs) in the nervous system as an underlying mechanism. CI therapy would achieve its therapeutic effect by strengthening the DNCs. Use-dependent

cortical reorganization is considered to be an example of the more general neuroplastic mechanism of brain structure repurposing. If the mechanisms involved in these broader categories are involved in each of the deficits being considered, then it may be the principles underlying efficacious treatment in each case may be similar. The lessons learned during CI therapy research might then prove useful for the treatment of visual deficits.

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9. Int J Clin Pediatr Dent. 2014 May;7(2):109-18. doi: 10.5005/jp-journals-10005-1247. Epub 2014 Aug 29.

Cerebral palsy: a dental update.

Sehrawat N1, Marwaha M2, Bansal K3, Chopra R4.

Special and medically compromised patients present a unique population that challenges the dentist's skill and knowledge. Providing oral care to people with cerebral palsy (CP) requires adaptation of the skills we use everyday. In fact, most people with mild or moderate forms of CP can be treated successfully in the general practice setting. This article is to review various dental considerations and management of a CP patient.

[PMID: 25356010](#) [PubMed] PMID: PMC4212167

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

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

Du RY1, McGrath CP, Yiu CK, King NM.

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

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11. OTJR (Thorofare N J). 2014 Fall;34(4):193-201. doi: 10.3928/15394492-20141006-04.

The Social Context of Occupations: Analysis of a Father Feeding his Daughter Diagnosed with Cerebral Palsy.

Bonsall A.

The purpose of this article is to examine a father feeding his daughter who is diagnosed with cerebral palsy in order to identify the contexts that make this occupation significant. The analysis of direct observation and interviews demonstrates significant moments where two individuals make intersubjective connections. Themes that are presented are the Intensity of Mealtime, Connections Between Participants, and Adapted Forms of Communication. Both the difficulties and rewards of mealtime are illustrated within these themes. This analysis reveals the structure and importance of doing together in influencing and determining occupations. From a clinical perspective, the meaningfulness of fathering occupations highlights the importance of including fathers in family-centered care.

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12. Dev Med Child Neurol. 2014 Oct 28. doi: 10.1111/dmcn.12619. [Epub ahead of print]

Comprehension of spoken language in non-speaking children with severe cerebral palsy: an explorative study on associations with motor type and disabilities.

Geytenbeek JJ1, Vermeulen RJ, Becher JG, Oostrom KJ.

AIM: To assess spoken language comprehension in non-speaking children with severe cerebral palsy (CP) and to explore possible associations with motor type and disability. **METHOD:** Eighty-seven non-speaking children (44 males, 43 females, mean age 6y 8mo, SD 2y 1mo) with spastic (54%) or dyskinetic (46%) CP (Gross Motor Function Classification System [GMFCS] levels IV [39%] and V [61%]) underwent spoken language comprehension assessment with the computer-based instrument for low motor language testing (C-BiLLT), a new and validated diagnostic instrument. A multiple linear regression model was used to investigate which variables explained the variation in C-BiLLT scores. Associations between spoken language comprehension abilities (expressed in z-score or age-equivalent score) and motor type of CP, GMFCS and Manual Ability Classification System (MACS) levels, gestational age, and epilepsy were analysed with Fisher's exact test. A p-value <0.05 was considered statistically significant. **RESULTS:** Chronological age, motor type, and GMFCS classification explained 33% ($R=0.577$, $R^2=0.33$) of the variance in spoken language comprehension. Of the children aged younger than 6 years 6 months, 52.4% of the children with dyskinetic CP attained comprehension scores within the average range (z-score ≥ -1.6) as opposed to none of the children with spastic CP. Of the children aged older than 6 years 6 months, 32% of the children with dyskinetic CP reached the highest achievable age-equivalent score compared to 4% of the children with spastic CP. No significant difference in disability was found between CP-related variables (MACS levels, gestational age, epilepsy), with the exception of GMFCS which showed a significant difference in children aged younger than 6 years 6 months ($p=0.043$). **INTERPRETATION:** Despite communication disabilities in children with severe CP, particularly in dyskinetic CP, spoken language comprehension may show no or only moderate delay. These findings emphasize the importance of introducing alternative and/or augmentative communication devices from early childhood.

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13. Dev Med Child Neurol. 2014 Oct 28. doi: 10.1111/dmcn.12615. [Epub ahead of print]

Innovative assessment reveals speech production and language comprehension are dissociable skills in severe cerebral palsy.

Morgan AT.

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14. Rev Neurol. 2014 Nov 16;59(10):443-8.

Cognitive stimulation in children with cerebral palsy [Article in Spanish]

Muriel V1, Garcia-Molina A, Aparicio-Lopez C, Ensenat A, Roig-Rovira T.

INTRODUCTION. Cerebral palsy is often accompanied by cognitive impairment affecting attention, visuoperception, executive functions and working memory. **AIMS.** To analyse the effect of cognitive stimulation treatment on the cognitive capabilities in children with cerebral palsy. **PATIENTS AND METHODS.** Our sample consisted of 15 children with cerebral palsy, with a mean age of 8.80 ± 2.51 years, who were classified with the aid of the Gross Motor Function Classification System (GMFCS) on level I ($n = 6$), level II ($n = 4$), level III ($n = 2$) and level V ($n = 3$). Cognitive impairment was evaluated by means of the Wechsler Intelligence Scale for Children (WISC-IV) and the Continuous Performance Test (CPT-II). Both the questionnaires for parents and teachers from

the Behavior Rating Inventory of Executive Function (BRIEF) and the Conners rating scales (CPRS-48 and CTRS-28) were administered. A cognitive stimulation programme was carried out at a rate of two hours a week for a total of eight weeks. RESULTS. Statistically significant differences were observed after applying the cognitive stimulation treatment in the perceptive reasoning index of the WISC-IV. No differences were obtained on the Conners' and the BRIEF scores before and after the treatment. Neither were any differences found in the results on the WISC-IV according to sex or on the GMFCS. CONCLUSIONS. The cognitive performance of children with cerebral palsy improves after applying a cognitive rehabilitation programme.

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Prevention and Cure

15. Arch Dis Child Fetal Neonatal Ed. 2014 Oct 30. pii: fetalneonatal-2013-305677. doi: 10.1136/archdischild-2013-305677. [Epub ahead of print]

Neurodevelopmental outcomes of preterm singletons, twins and higher-order gestations: a population-based cohort study.

Gnanendran L1, Bajuk B2, Oei J3, Lui K3, Abdel-Latif ME4; for the NICUS Network.

OBJECTIVE: To study the neurodevelopmental outcomes of multiple (twins, triplets, quads) compared with singleton extremely preterm infants <29 weeks gestation. DESIGN: Population-based retrospective cohort study. SETTING: A network of 10 neonatal intensive care units in a geographically defined area of New South Wales and the Australian Capital territory. PATIENTS: 1473 infants <29 weeks gestation born between 1 January 1998 and 31 December 2004. INTERVENTION: At 2-3 years of corrected age, a neurodevelopmental assessment was conducted using either the Griffiths Mental Developmental Scales or the Bayley Scales of Infant Development II. MAIN OUTCOME MEASURE: Moderate-severe functional disability was defined as developmental delay (Griffiths Mental Developmental Scales General Quotient or Bayley Scales of Infant Development-II Mental Development Index >2 SDs below the mean), moderate cerebral palsy (unable to walk without aids), sensorineural or conductive deafness (requiring amplification) or bilateral blindness (visual acuity <6/60 in the better eye). RESULTS: Of the 1081 singletons and 392 multiples followed-up, singletons demonstrated higher rates of systemic infections, steroid treatment for chronic lung disease and birth weight <10th percentile. Moderate-severe functional disability did not differ significantly between singletons and multiples (15.8% vs 17.6%, OR 1.14; 95% CI 0.84 to 1.54; p=0.464). Further subgroup analysis of twins, higher-order gestations, 1st-born multiples, 2nd or higher-born multiples, same and unlike gender multiples, did not demonstrate statistically higher rates of functional disability compared with singletons. CONCLUSIONS: Premature infants from multiple gestation pregnancies appear to have comparable neurodevelopmental outcomes to singletons.

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16. Dev Med Child Neurol. 2014 Oct 29. doi: 10.1111/dmcn.12603. [Epub ahead of print]

Follow-up of extreme neonatal hyperbilirubinaemia in 5- to 10-year-old children: a Danish population-based study.

Vandborg PK1, Hansen BM, Greisen G, Mathiasen R, Kasper F, Ebbesen F.

AIM: To investigate whether infants with neonatal hyperbilirubinaemia but without intermediate or advanced bilirubin encephalopathy develop long-term sequelae, with impairment of motor development, executive function, or hearing. METHOD: This nested double-cohort study included 167 exposed children (107 males, 60 females) born in Denmark 2000 to 2005 at gestational age ≥ 35 weeks with a total serum bilirubin ≥ 450 $\mu\text{mol/L}$ (26.3mg/dL) and 163

age-, sex-, and gestational age-matched unexposed children (103 males, 60 females). The children were examined at a mean age of 7.7 years (SD 1.7y) using the Movement Assessment Battery for Children-Second Edition (MABC-2), pure tone audiometry, and the Behavioural Regulation Inventory of Executive Function (BRIEF) questionnaire. RESULTS: The follow-up rate was 70% of the eligible infants in the exposed group and 45% in the unexposed group. Mean difference was -0.2 (95% confidence interval [CI] -1.1 to 0.8) in adjusted standard score for MABC-2 and 0.3 (95% CI -2.9 to 3.5) in adjusted BRIEF executive composite standard score. No children had significant hearing impairment or a diagnosis of cerebral palsy, attention-deficit-hyperactive disorder, or autism spectrum disorder recorded in national registries. INTERPRETATION: No evidence was found of an increased risk of deficits in motor development, executive function, or hearing in children with extreme hyperbilirubinaemia who did not have intermediate or advanced bilirubin encephalopathy.

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17. Front Neurol. 2014 Oct 9;5:200. doi: 10.3389/fneur.2014.00200. eCollection 2014.

Could cord blood cell therapy reduce preterm brain injury?

Li J1, McDonald CA1, Fahey MC2, Jenkin G3, Miller SL3.

Major advances in neonatal care have led to significant improvements in survival rates for preterm infants, but this occurs at a cost, with a strong causal link between preterm birth and neurological deficits, including cerebral palsy (CP). Indeed, in high-income countries, up to 50% of children with CP were born preterm. The pathways that link preterm birth and brain injury are complex and multifactorial, but it is clear that preterm birth is strongly associated with damage to the white matter of the developing brain. Nearly 90% of preterm infants who later develop spastic CP have evidence of periventricular white matter injury. There are currently no treatments targeted at protecting the immature preterm brain. Umbilical cord blood (UCB) contains a diverse mix of stem and progenitor cells, and is a particularly promising source of cells for clinical applications, due to ethical and practical advantages over other potential therapeutic cell types. Recent studies have documented the potential benefits of UCB cells in reducing brain injury, particularly in rodent models of term neonatal hypoxia-ischemia. These studies indicate that UCB cells act via anti-inflammatory and immuno-modulatory effects, and release neurotrophic growth factors to support the damaged and surrounding brain tissue. The etiology of brain injury in preterm-born infants is less well understood than in term infants, but likely results from episodes of hypoperfusion, hypoxia-ischemia, and/or inflammation over a developmental period of white matter vulnerability. This review will explore current knowledge about the neuroprotective actions of UCB cells and their potential to ameliorate preterm brain injury through neonatal cell administration. We will also discuss the characteristics of UCB-derived from preterm and term infants for use in clinical applications.

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18. J Matern Fetal Neonatal Med. 2014 Oct 29:1-18. [Epub ahead of print]

Neurodevelopmental Outcomes of Premature Infants with Severe Intraventricular Hemorrhagea.

Calisici E1, Eras Z, Oncel MY, Oguz SS, Gokce IK, Dilmen U.

Objective: Our objective was to determine the neurodevelopmental outcome at 18-24 months' of corrected age (CA) in preterm infants with severe intraventricular hemorrhage (IVH). Methods. This was a retrospective cohort study of all preterm infants who were <37 weeks' gestation, had Grade 3-4 IVH, were admitted between January 2009 and December 2010 and discharged. The cohort was divided into 3 groups. Group 1 was defined as infants born with a birth weight (BW) less than 1000 g, group 2 was defined as infants born with a BW between 1000-1500 g and group 3 was defined as infants born with a BW between 1501-2500 g. Severe IVH was defined as the presence of grade 3-4 IVH on cranial ultrasound. Cranial ultrasound was performed in the first week of life and subsequently at weekly intervals by a radiologist. A comprehensive assessment including hearing, vision, neurological and developmental evaluation with Bayley Scales of Infant Development, Second edition (BSID II) was performed by the experienced researchers at 18 to 24 months' CA. Neurodevelopmental impairment (NDI) was defined as at the presence of one or more of the following: cerebral palsy; MDI score lower than 70; PDI score lower than 70;

bilateral hearing impairment; or bilateral blindness. Results: From January 2009 to December 2010, a total of 138 were diagnosed as severe IVH (Grade 3-4). Of these, 74 (71.1%) infants (group 1=31, group 2=29 and group 3=14 infants) completed the follow-up visit and evaluated at 18-24 months' CA. Median Apgar score ($p<0.01$) and resuscitation at birth ($p<0.01$) were significantly different for group 1, group 2 and group 3. The use of catheterization, need for mechanical ventilation, need for phototherapy, retinopathy of premature and bronchopulmonary dysplasia were significantly higher in-group 1 compared to group 2 and 3 ($p<0.001$, $p<0.001$, $p<0.01$, $p<0.01$ and $p=0.014$ respectively). The duration of hospitalization and mortality rates consistent with the degree of prematurity and were significantly higher in-group 1 compared to group 2 and 3 ($p=0.03$ and $p=0.01$). Among the long-term outcomes; the rates of CP and NDI did not differ between the groups ($p=0.68$ and $p=0.068$). Conclusion: Our results demonstrated that long-term outcomes of preterm infants did not differ between the groups classified according to the birth weight at 2 years of age. This has led to the conclusion that severe IVH is alone represents a significant risk factor for poor neurodevelopmental outcome in this already high-risk population.

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19. J Neurophysiol. 2014 Oct 29;jn.00144.2014. doi: 10.1152/jn.00144.2014. [Epub ahead of print]

Alteration in rectification of potassium channels in perinatal hypoxia ischemia brain damage.

Chen P1, Wang L2, Deng Q, Ruan H, Cai W.

Oligodendrocyte progenitor cells (OPCs) are susceptible to perinatal hypoxia ischemia brain damage (HIBD), which results in infant cerebral palsy due to the effects on myelination. The origin of OPC vulnerability in HIBD, however, remains controversial. In this study, we defined the HIBD punctate lesions by MRI diffuse excessive high signal intensity (DEHSI) in postnatal 7-day rats. The electrophysiological functional properties of OPCs in HIBD were recorded by patch clamp in acute cerebral cortex slices. The slices were intracellularly injected with Lucifer yellow and immunohistochemically labeled with NG2 antibody to identify local OPCs. Passive membrane properties and K^+ channel functions in OPCs were analyzed to estimate the onset of vulnerability in HIBD. The resting membrane potential (RMP), membrane resistance (R_{in}) and membrane capacitance (C_m) of OPCs were increased both in the grey and white matter of the cerebral cortex. OPCs in both the grey and white matter exhibited voltage-dependent K^+ currents, which consisted of the initiated rectified potassium currents (IA) and the sustained rectified currents (IK). The significant alternation in membrane resistance was influenced by the diversity of potassium channel kinetics. These findings suggest that the rectification of IA and IK channels may play a significant role in OPC vulnerability in HIBD.

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Outcome of infants with hypoxic ischemic encephalopathy treated with brain hypothermia.

Tokuhsa T1, Ibara S, Minakami H, Maede Y, Ishihara C, Matsui T.

AIM: The aim of this study was to determine perinatal factors associated with cerebral palsy (CP) in infants treated with brain hypothermia (BHT). MATERIAL AND METHODS: We carried out a retrospective review of 23 infants with hypoxic ischemic encephalopathy in whom BHT was applied within 6 h after birth. Outcome regarding the presence or absence of CP was assessed at the age of 18 months. Oxygen extraction fraction (OEF) was measured before, during and after BHT at the jugular sinus. RESULTS: Three infants died and 12 developed CP (poor outcome group). The remaining eight infants did not have CP at 18 months old (favorable outcome group). There were no differences in gestational age, birthweight, pH, base deficit, or lactate level between infants with favorable and poor outcomes. Infants with flat trace on electroencephalography on admission were less likely to have favorable outcome (0.0% [0/8] vs 53% [8/15], respectively, $P = 0.02$), while those with Apgar score at 10 min ≥ 5 (57% [8/14] vs 0.0% [0/9], $P = 0.007$) or ≥ 6 (70% [7/10] vs 7.7% [1/13], $P = 0.002$), OEF $\geq 13.3\%$ during BHT (64% [7/11] vs 8.3% [1/12], $P = 0.009$), and OEF $\geq 18.5\%$ after BHT (73% [8/11] vs 0.0% [0/12], $P = 0.002$) were more likely to have favorable outcome compared with those with counterpart characteristics. CONCLUSION: Infants with an Apgar score at 10 min ≥ 5 , activity on electroencephalography on admission, and higher OEF during

and after BHT were likely to have a favorable outcome.

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Foetal brain damage may follow gastric bypass surgery [Article in Danish]

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Bariatric surgery is performed on an increasing number of women of childbearing age. During pregnancy they have reduced risk of obesity-related complications but increased risk of bariatric surgery-related complications, including internal hernias. We present a case in which a pregnant woman required acute surgery for internal herniation and later gave birth to a child with cerebral palsy. Before performing bariatric surgery in women of childbearing age, thorough information about risks and benefits related to pregnancy should be given. Special medical attention during pregnancy is required.

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