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Interventions and Management

1. **Cochrane Database Syst Rev. 2012 Dec 12;12:CD005495. doi: 10.1002/14651858.CD005495.pub3.**

Early developmental intervention programmes post-hospital discharge to prevent motor and cognitive impairments in preterm infants.

Spittle A, Orton J, Anderson P, Boyd R, Doyle LW.

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BACKGROUND: Infants born preterm are at increased risk of developing cognitive and motor impairments compared with infants born at term. Early developmental interventions have been used in the clinical setting with the aim of improving the overall functional outcome for these infants. However, the long-term benefit of these programmes remains unclear. **OBJECTIVES:** To review the effectiveness of early developmental intervention post-discharge from hospital for preterm (< 37 weeks) infants on motor or cognitive development. **SEARCH METHODS:** The Cochrane Neonatal Review group search strategy was used to identify randomised and quasi-randomised controlled trials of early developmental interventions post hospital discharge. Two review authors independently searched the Cochrane Central Register of Controlled Trials (CENTRAL, The Cochrane Library), MEDLINE Advanced, CINAHL, PsycINFO and EMBASE (1966 through to October 2012). **SELECTION CRITERIA:** Studies included had to be randomised or quasi-randomised controlled trials of early developmental intervention programmes that began within the first 12 months of life for infants born at < 37 weeks with no major congenital abnormalities. Intervention could commence as an inpatient; however, a post-discharge component was necessary to be included in this review. The outcome measures were not pre-specified other than that they had to assess cognitive ability, motor ability or both. The rates of cerebral palsy were also documented. **DATA COLLECTION AND ANALYSIS:** Data were extracted and entered by two independent review authors. Cognitive and motor outcomes were pooled in four age groups - infancy (zero to < three years), pre-school age (three to < five years), school age (five to 17 years) and adulthood (\geq 18 years). Meta-analysis was carried out using RevMan 5.1 to determine the effects of early developmental intervention at each age range. Subgroup analysis was carried out in relation to gestational age, birthweight, brain injury, commencement of intervention and focus of intervention. **MAIN RESULTS:** Twenty-one studies met the inclusion criteria (3133 randomised patients). Only 10 of these studies were RCTs with appropriate allocation concealment. There was variability with regard to the focus and intensity of the intervention, subject characteristics and in length of follow-up. Meta-analysis concluded that intervention improved cognitive outcomes at infant age (developmental quotient (DQ): standardised mean difference (SMD) 0.31 standard deviations (SD); 95% confidence interval (CI) 0.13 to 0.50; $P < 0.001$; 13 studies; 2147 patients), and pre-school age (intelligence quotient (IQ); SMD 0.45 SD; 95% CI 0.34 to 0.57; $P < 0.001$; six studies; 1276 patients). However, this effect was not sustained at school age (IQ: SMD 0.25 SD; 95% CI -0.10 to

0.61; $P = 0.16$; five studies; 1242 patients). There was significant heterogeneity between studies for cognitive outcomes at infant and school ages. In regards to motor outcomes, meta-analysis of 10 studies showed a significant effect in favour of early developmental interventions; however, the effect was small (motor scale developmental quotient (DQ): SMD 0.10 SD; 95% CI 0.00 to 0.19; $P = 0.04$; 10 studies; 1745 patients). There was no effect on the rate of cerebral palsy in survivors; risk ratio (RR) 0.89; 95% CI 0.55 to 1.44; five studies; 737 patients). There was little evidence for a positive effect on motor outcomes in the long term, with only five of the included studies reporting outcomes at pre-school or school age. **AUTHORS' CONCLUSIONS:** Early intervention programmes for preterm infants have a positive influence on cognitive and motor outcomes during infancy, with the cognitive benefits persisting into pre-school age. There is a great deal of heterogeneity between studies due to the variety of early developmental intervention programmes trialled and gestational ages of the preterm infants included, which limits the comparisons of intervention programmes. Further research is needed to determine which early developmental interventions are the most effective at improving cognitive and motor outcomes, and on the longer-term effects of these programmes.

[PMID: 23235624](#) [PubMed - in process]

2. Dev Med Child Neurol. 2012 Dec 6. doi: 10.1111/dmcn.12049. [Epub ahead of print]

Does the Bayley-III Motor Scale at 2 years predict motor outcome at 4 years in very preterm children?

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AIM: To assess the predictive validity of the Bayley Scales of Infant and Toddler Development - Third Edition (Bayley-III) for later motor outcome. **METHOD:** Ninety-six infants (49 males, 47 females) born at less than 30 weeks' gestation admitted to two tertiary hospitals in Melbourne, Australia, were assessed with the Bayley-III Motor Scale at 2 years' corrected age and were classified as suspect or definite motor impairment if they scored less than -1 or -2 standard deviations respectively, relative to the test mean. At 4 years' corrected age, children completed Movement Assessment Battery for Children - Second Edition (MABC-2); for the total motor score, cut-offs of not more than the 15th were used to classify motor development and cut-offs of not more than the 15th centile were classified as having a significant movement difficulty. **RESULTS:** Of the 96 children assessed at both ages, at 2 years 9% had suspect and 4% had definite motor impairment; however, by 4 years, rates had increased to 22% and 19% respectively. The specificity of the Bayley-III for motor impairments for later motor outcome was excellent (ranging from 94 to 100% for cerebral palsy [CP] and 97 to 100% for motor impairment), although the sensitivity was low (ranging from 67 to 83% for CP and 18 to 37% for motor impairment); many children with later impairment were not identified by the Bayley-III. **INTERPRETATION:** The Bayley-III Motor Scale at 2 years underestimates later rates of motor impairment, particularly in the absence of CP at 4 years on the MABC-2 total motor score in children born at less than 30 weeks' gestational age.

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3. Brain Dev. 2012 Dec 10. pii: S0387-7604(12)00277-X. doi: 10.1016/j.braindev.2012.11.001. [Epub ahead of print]

Efficacy of modified constraint induced movement therapy in improving upper limb function in children with hemiplegic cerebral palsy: A randomized controlled trial.

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Purpose: The objective of this randomized single blind (outcome assessor) controlled trial was to evaluate the efficacy of 4 weeks of modified constraint induced movement therapy (mCIMT) in improving upper limb function in 3-8 years old children with hemiplegic cerebral palsy. **Methods:** Thirty-one children were randomly assigned to receive

the mCIMT (N=16) with conventional therapy or conventional therapy alone (N=15). Children were evaluated three times (at enrollment, follow up at 4weeks and 12weeks). The primary outcome measure was difference in "change in mean total QUEST scores" at 4weeks of intervention between the intervention and the control arm. Results: After 4weeks of intervention, mCIMT group showed significant change in the affected upper limb in QUEST scores (10.7 ± 5.2 vs 1.4 ± 1.7 , $p<0.001$) and time (s) to complete nine-hole-pegboard test compared with control group [$60(0-130)$ vs $5(-12$ to $30)$, $p<0.001$]. The improvement observed in upper limb function after 4weeks of intervention persisted 8weeks after discontinuation of intervention in mCIMT group. Conclusion: The modified constraint induced movement therapy appears to be effective in improving upper limb function in 3-8years old hemiplegic cerebral palsy children.

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4. NeuroRehabilitation. 2012 Jan 1;31(4):357-65. doi: 10.3233/NRE-2012-00804.

Effects of modified constraint-induced movement therapy in virtual environment on upper-limb function in children with spastic hemiparetic cerebral palsy: A randomised controlled trial.

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Objective: To determine effects of implementing a practice period of modified constraint-induced movement therapy in a virtual environment on upper limb function in children with spastic hemiparetic cerebral palsy. Methods: In a single-blinded, randomised, controlled trial, 32 participants (18 female, 14 male) received 18 hours training in 3 different groups (virtual reality, modified constraint-induced movement therapy, and a combination group). The fourth group was a control group. Training sessions occurred every other day, 3 times per week for 4-week. Each session lasted for 1.5 hours. Assessment sessions were conducted before, after, and 3-month after treatment period using pediatric motor activity log and the speed and dexterity subtest of the bruininks-oseretsky test of motor proficiency. Data analysis was conducted by ANOVA with repeated measures using SPSS 16.0 with alpha levels set at $P<0.05$. Results: Significantly higher gains were observed in the combination therapy group for the amount of limb use (mean change, 2.72), quality of movement (mean change, 2.79), and speed and dexterity (mean change, 1.74) at post-test. These gains were maintained at the 3-month follow-up assessment. Conclusions: Modified constraint-induced movement therapy in a virtual environment could be a promising rehabilitation procedure to enhance the benefits of both virtual reality and constraint-induced therapy techniques.

[PMID: 23232158](#) [PubMed - in process]

5. Dev Med Child Neurol. 2012 Dec 12. doi: 10.1111/dmcn.12054. [Epub ahead of print]

Intensive therapy following upper limb botulinum toxin A injection in young children with unilateral cerebral palsy: a randomized trial.

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AIM: Botulinum toxin A (BoNT-A) combined with occupational therapy is effective in improving upper limb outcomes in children with unilateral cerebral palsy (CP). It is now essential to identify the most effective therapies following BoNT-A. Given the added burden for children and families, the aim of this study was to explore whether modified constraint-induced movement therapy (mCIMT) leads to sufficiently superior gains compared with bimanual occupational therapy (BOT) in young children with unilateral CP following BoNT-A injections. METHOD: In this randomized, controlled, evaluator-blinded trial, 34 children (20 males, 14 females; mean age 3y, SD 1y 4mo, range 18mo-6y) with unilateral CP were randomized using concealed allocation to one of two 8-week interventions. The experimental group (n=17) received BoNT-A and mCIMT. The comparison group (n=17) received BoNT-A and

BOT. Participants were recruited from a physical rehabilitation clinic and randomized between August 2003 and May 2009. Primary outcome was measured using the Assisting Hand Assessment at 3 months. Secondary outcomes were measured at 3 months and 6 months using the Quality of Upper Extremity Skills Test, the Pediatric Evaluation of Disability Inventory, Canadian Occupational Performance Measure, and the Goal Attainment Scale. RESULTS: There were no clinically important differences between groups at baseline. Immediately following intervention, there was no evidence of a superior effect for BoNT-A + mCIMT as determined by the Assisting Hand Assessment (estimated mean difference [EMD] 0.81, upper 95% confidence limit 3.6; $p=0.32$) or secondary outcomes. However, both groups showed improvement over time (BoNT-A + mCIMT: EMD 2.7, 95% confidence interval [CI] 0.7-5.2; BONT-A + BOT: EMD 4.7, 95% CI 2.1-8.6). Follow-up at 6 months also demonstrated no superior effect for BoNT-A + mCIMT. INTERPRETATION: Following upper limb injection of BoNT-A, there was no evidence that mCIMT, despite the significantly increased intensity of the home programme, produced a superior effect across a range of outcomes compared with a structured programme of BOT in young children with unilateral CP.

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6. *Pediatr Phys Ther.* 2012 Fall;24(3):300. doi: 10.1097/PEP.0b013e31825f7e45.

Effects of constraint-induced movement therapy (CIMT) on gross motor outcomes.

Gillick B.

Comment on

Effects of constraint-induced movement therapy on gait, balance, and functional locomotor mobility. [*Pediatr Phys Ther.* 2012]

[PMID: 22735485](#) [PubMed - indexed for MEDLINE]

7. *Gait Posture.* 2012 Dec 3. pii: S0966-6362(12)00405-5. doi: 10.1016/j.gaitpost.2012.11.005. [Epub ahead of print]

Motion capture of the upper extremity during activities of daily living in patients with spastic hemiplegic cerebral palsy.

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Investigations using motion capture to analyze limitations in range of motion (ROM) of the upper extremity in adults with cerebral palsy (CP) are scarce. To evaluate the influence of those limitations on activities of daily living (ADL) and to determine potential mechanisms of compensation, we investigated 15 adults with hemiplegic CP using motion capture while they performed 10 defined ADLs. Data from the nonaffected body side and those from an age-matched able-bodied group were also collected and compared with our subjects. We measured motion of the elbow, shoulder, and trunk and found significant differences in ROM at these sites. The most pronounced reduction in ROM was observed distally in supination and pronation of the elbow. Here, the affected body side of the adults showed a reduction in supination of 45° compared to the able-bodied group. Furthermore we found a correlation between the Manual Ability Classification System (MACS) and the limitations in ROM. In summary, adults with spastic, hemiplegic CP show limitations in ROM accentuated distally during ADLs. The MACS gives conclusive information about those limitations.

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8. J Electromyogr Kinesiol. 2012 Dec 3. pii: S1050-6411(12)00196-4. doi: 10.1016/j.jelekin.2012.10.013. [Epub ahead of print]

Biceps brachii can add to performance of tasks requiring supination in cerebral palsy patients.

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The aim of this study was to assess whether cerebral palsy patients can use biceps brachii for supination during movement tasks requiring supination and pronation. 3D upper extremity kinematic and EMG-data of 12 patients (mean age 13y 8mo±36mo) were compared to 10 healthy age-matched controls. Significant difference in biceps brachii activation between maximal isolated pronation and supination in both groups showed that it is possible for CP patients to use biceps brachii for supination. Performance of reach-to-grasp with either pronation or supination showed similar activation patterns as during isolated tasks in both groups, although increased biceps brachii activation likely also hampered performance of reach-to-grasp in the patient group by causing increased, and possibly unwanted elbow flexion. However, the functional effect of this flexion for supination purposes cannot be ruled out. Therefore, one should be cautious with simply weakening biceps brachii when the purpose is to improve functional reach. Ideally treatment might focus more on changing the flexion moment/supination moment ratio of biceps toward a stronger supination function.

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9. Gait Posture. 2012 Dec 3. pii: S0966-6362(12)00403-1. doi: 10.1016/j.gaitpost.2012.11.003. [Epub ahead of print]

A clinical measurement to quantify spasticity in children with cerebral palsy by integration of multidimensional signals.

Bar-On L, Aertbeliën E, Wambacq H, Severijns D, Lambrecht K, Dan B, Huenaerts C, Bruyninckx H, Janssens L, Van Gestel L, Jaspers E, Molenaers G, Desloovere K.

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Most clinical tools for measuring spasticity, such as the Modified Ashworth Scale (MAS) and the Modified Tardieu Scale (MTS), are not sufficiently accurate or reliable. This study investigated the clinimetric properties of an instrumented spasticity assessment. Twenty-eight children with spastic cerebral palsy (CP) and 10 typically developing (TD) children were included. Six of the children with CP were retested to evaluate reliability. To quantify spasticity in the gastrocnemius (GAS) and medial hamstrings (MEH), three synchronized signals were collected and integrated: surface electromyography (sEMG); joint-angle characteristics; and torque. Muscles were manually stretched at low velocity (LV) and high velocity (HV). Spasticity parameters were extracted from the change in sEMG and in torque between LV and HV. Reliability was determined with intraclass-correlation coefficients and the standard error of measurement; validity by assessing group differences and correlating spasticity parameters with the MAS and MTS. Reliability was moderately high for both muscles. Spasticity parameters in both muscles were higher in children with CP than in TD children, showed moderate correlation with the MAS for both muscles and good correlation to the MTS for the MEH. Spasticity assessment based on multidimensional signals therefore provides reliable and clinically relevant measures of spasticity. Moreover, the moderate correlations of the MAS and MTS with the objective parameters further stress the added value of the instrumented measurements to detect and investigate spasticity, especially for the GAS.

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10. Med Biol Eng Comput. 2012 Dec 9. [Epub ahead of print]**Gait analysis in children with cerebral palsy via inertial and magnetic sensors.**

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3D kinematic measurements in children with cerebral palsy (CP) to assess gait deviations can only be performed in gait laboratories using optoelectronic systems. Alternatively, an inertial and magnetic measurement system (IMMS) can be applied for ambulatory motion-tracking. A protocol named Outwalk has recently been developed to measure the 3D kinematics during gait with IMMS. This study preliminarily validated the application of IMMS, based on the Outwalk protocol, in gait analysis of six children with CP and one typically developing child. Reference joint kinematics were simultaneously obtained from a laboratory-based system and protocol. On average, the root mean square error (RMSE) of Outwalk/IMMS, compared to the reference, was less than 17° in the transversal plane, and less than 10° in the sagittal and frontal planes. The greatest differences were found in offsets in the knee and ankle rotation, and in the hip flexion. These offset differences were mainly caused by a different anatomical calibration in the protocols. When removing the offsets, RMSE was always less than 4°. Therefore, IMMS is suitable for gait analysis of major joint angles in a laboratory-free setting. Further studies should focus on improvement of anatomical calibrations of IMMS that can be performed in children with CP.

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11. Gait Posture. 2012 Dec 7. pii: S0966-6362(12)00414-6. doi: 10.1016/j.gaitpost.2012.11.013. [Epub ahead of print]**The effects of muscle-tendon surgery on dynamic electromyographic patterns and muscle tone in children with cerebral palsy.**

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During multilevel surgery, muscle-tendon lengthening (MTL) is commonly carried out in children with cerebral palsy. However, it is unclear if MTL also modifies increased muscle tone and if pathologic activation patterns are changed as an indirect effect of the biomechanical changes. Since investigations addressing this issue are limited, this study aimed at evaluating the effects of MTL on muscle tone and activation pattern. Forty-two children with spastic diplegia who were treated by MTL underwent standardized muscle tone testing (modified Ashworth and Tardieu test), dynamic EMG and three-dimensional gait analysis before, one and three years after MTL. For the evaluation of muscle activation patterns the norm-distance of dynamic EMG data was analyzed. Range of motion and joint alignment in clinical examination were found to be significantly improved one year after MTL. However, deterioration of these parameters was noted after three years. Muscle tone was significantly reduced one year postoperatively but showed an increase after three years. Joint kinematics were found significantly closer to reference data of age matched controls initially after surgery, but deteriorated until three years postoperatively. However, the EMG patterns of the muscles which were surgically addressed were found to be unchanged in either follow-up. These findings suggest that despite the influence of MTS on biomechanics and physiology (muscle tone reduction and improvements of joint mobility and gait pattern) MTS does not change abnormal patterns of muscle activation. Recurrence of increased muscle tone and deterioration of kinematic parameters three years after surgery may be attributed to these persistent pathologic activation patterns.

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12. Gait Posture. 2012 Dec 6. pii: S0966-6362(12)00438-9. doi: 10.1016/j.gaitpost.2012.11.018. [Epub ahead of print]

Outcomes of lower extremity orthopedic surgery in ambulatory children with cerebral palsy with and without gait analysis: Results of a randomized controlled trial.

Wren TA, Otsuka NY, Bowen RE, Scaduto AA, Chan LS, Dennis SW, Rethlefsen SA, Healy BS, Hara R, Sheng M, Kay RM.

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This study examined the impact of gait analysis on surgical outcomes in ambulatory children with cerebral palsy (CP) through a randomized controlled trial. 156 children with CP (94 male; age 10.2±3.7 years) underwent gait analysis and were randomized to two groups: Gait Report group (N=83), where the referring surgeon received the patient's gait analysis report, and Control group (N=73), where the surgeon did not receive the gait report. Outcomes were assessed pre- and 1.3±0.5 years post-operatively. An intent-to-treat analysis compared outcomes between the two groups. Outcome measures included the Gillette Functional Activity Questionnaire (FAQ), Gait Deviation Index (GDI), oxygen cost, gross motor function measure, Child Health Questionnaire (CHQ), Pediatric Outcomes Data Collection Instrument (PODCI), and Pediatric Evaluation and Disability Inventory. The outcomes that differed significantly between groups were change in health from the CHQ, which was rated as much better for 56% (46/82) of children in the Gait Report group compared with 38% (28/73) in the Control group (p=0.04), and upper extremity physical function from the PODCI. Gait outcomes (FAQ and GDI) improved more when over half of the recommendations for a patient were followed or the recommended extent of surgery (none, single, or multi-level) was done (p≤0.04). On average, however, only 42% of the recommendations were followed in the Gait Report group, compared with 35% in the Control group (p=0.23). This is much less than the >85% reported in previous studies and may account for the lack of differences between groups for some of the outcome measures.

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13. J Neurosurg Pediatr. 2012 Oct;10(4):315-9. doi: 10.3171/2012.6.PEDS11456. Epub 2012 Aug 3.

Intraventricular baclofen as an alternative to intrathecal baclofen for intractable spasticity or dystonia: outcomes and technical considerations.

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OBJECT: The aim of this study was to identify the benefits of intraventricular baclofen (IVB) therapy for the treatment of intractable spasticity or dystonia in a subset of patients who had experienced multiple revisions while receiving intrathecal baclofen (ITB) therapy. **METHODS:** The authors reviewed the charts of 22 consecutive patients with intractable spasticity or dystonia who initially underwent ITB therapy, subsequently suffered multiple revisions during ITB therapy, and ultimately received IVB therapy, all during a 12-year period from November 1998 to October 2010. The intraventricular catheters were positioned in the lateral ventricle, aided by stereonavigation. **RESULTS:** The surgical revision rate (the average number of surgical revisions per average number of follow-up years) during ITB therapy was 0.84, and was 0.50 during IVB therapy. The most frequent complication requiring surgical revision during ITB therapy was catheter occlusion, followed by pump malfunction/pump pocket issues, and infection. The most frequent complication requiring surgical revision during IVB therapy was infection, followed by catheter misplacement/migration. Four patients suffered infection that required removal of their intraventricular catheter, and currently have no baclofen system. **CONCLUSIONS:** Some of these patients had a history of increasing revisions with increasing frequency during ITB therapy. Such a history puts them at risk for spinal arachnoiditis, a condition that complicates further ITB therapy. For such patients, the authors believe that IVB therapy may be a beneficial therapeutic option, given that the surgical revision rate was lower for IVB than for ITB. Intraventricular baclofen may be a cost-effective option for patients with mounting revisions during ITB therapy.

[PMID: 22861196](#) [PubMed - indexed for MEDLINE]

14. Am J Phys Med Rehabil. 2012 Dec 6. [Epub ahead of print]

Test-Retest Reliability of the 20-sec Wingate Test to Assess Anaerobic Power in Children with Cerebral Palsy.

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OBJECTIVE: The aim of this study was to determine the test-retest reliability of the 20-sec Wingate anaerobic test in children with cerebral palsy. **DESIGN:** Participants were 22 ambulant children with cerebral palsy, with Gross Motor Function Classification System levels I (limitations in advanced motor skills, n = 11), II (limitations in walking, n = 7), and III (walking with walking aids, n = 4), aged 7-13 yrs. All children performed two 20-sec full-out sprint tests on a bicycle ergometer within 1-3 wks. Mean power and peak power (W/kg) were calculated as an estimate of anaerobic power. Test-retest reliability was determined by calculating the intraclass correlation coefficient (ICC) and standard error of measurement (SEM). Values were shown for the total group and Gross Motor Function Classification System I and II/III separately. **RESULTS:** The test-retest reliability of mean power output was excellent for children with Gross Motor Function Classification System level I (ICC, 0.96; SEM, 5.4%) and II/III (ICC, 0.99; SEM, 6.1%). Peak power output showed a lower reliability in both Gross Motor Function Classification System I (ICC, 0.87; SEM, 9.4%) and II/III (ICC, 0.96; SEM, 11.7%). **CONCLUSIONS:** Anaerobic testing using a 20-sec Wingate bicycle test is reliable in ambulant school-aged children with cerebral palsy.

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15. *Pediatr Phys Ther.* 2012 Fall;**24(3):252-7.** doi: 10.1097/PEP.0b013e31825c1a7d.

Physiological demands of therapeutic horseback riding in children with moderate to severe motor impairments: an exploratory study.

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PURPOSE: To examine energy expenditure at rest and during a single therapeutic horseback riding (THR) session in children with moderate to severe motor impairments. **METHODS:** Heart rate (HR), oxygen uptake (.VO₂), and minute ventilation (.VE) were measured continuously during a 10-minute rest period and during a typical THR session. **RESULTS:** Seven children (4 males, mean age 12.3 ± 3.5 years) completed the protocol. Significant increases from rest were seen for mean HR, .VO₂, .VE, and energy expenditure. Based on .VO₂, 43.3 ± 24.3% of the THR session consisted of sedentary, 44.4 ± 13.4% of light, and 12.3 ± 21.8% of moderate to vigorous activity intensity, with large interindividual differences. **CONCLUSIONS:** The physiological demands of THR in children with moderate to severe motor impairments are moderate. However, considering the short duration of maintaining moderate to vigorous exercise activity during THR in combination with the low training frequency, group data indicate that it is unlikely that THR will improve cardiopulmonary fitness in these children.

Comment in

Commentary on "Physiological demands of therapeutic horseback riding in children with moderate to severe motor impairments: an exploratory study". [*Pediatr Phys Ther.* 2012]

[PMID: 22735475](#) [PubMed - indexed for MEDLINE]

16. *Pediatr Phys Ther.* 2012 Fall;24(3):258. doi: 10.1097/PEP.0b013e31825cc9ee.

Commentary on "Physiological demands of therapeutic horseback riding in children with moderate to severe motor impairments: an exploratory study".

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Comment on

Physiological demands of therapeutic horseback riding in children with moderate to severe motor impairments: an exploratory study. [*Pediatr Phys Ther.* 2012]

[PMID: 22735476](#) [PubMed - indexed for MEDLINE]

17. *J Gastroenterol Hepatol.* 2012 Dec 6. doi: 10.1111/jgh.12071. [Epub ahead of print]

Characteristics of Inflammatory Bowel Disease with an Onset before Eight Years of Age: A Multicenter Epidemiological Survey in Japan.

Maisawa SI, Sasaki M, Ida S, Uchida K, Kagimoto S, Shimizu T, Yoden A.

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BACKGROUND AND AIM: Pediatric inflammatory bowel disease (IBD) has not been rare in Japan since the 1990s. The present study attempted to define the epidemiological and clinical characteristics of early-childhood IBD in Japan, in comparison with results from Western countries. **METHODS:** Among children diagnosed as having IBD between January 1998 and December 2008, those showing onset before 8 years of age were investigated retrospectively. A questionnaire survey was carried out at 45 facilities throughout Japan, and 80 cases were reported from 27 facilities. On the basis of the final diagnosis, 24 patients with Crohn's disease (CD) and 47 patients with ulcerative colitis (UC) were analyzed. **RESULTS:** Among the patients with CD, the age at onset was less than one year in 62.5%. On the basis of the Montreal classification, 87.5% of CD cases involved the colon and 63.8% of UC cases were pancolitis. Co-existing conditions such as congenital diseases (5 cases) and cerebral palsy (4 cases) were present before the onset of IBD. Growth failure was more severe ($P < 0.05$) at diagnosis in CD patients than in UC patients. Familial occurrence within first-degree relatives was observed in 8 families among 45 patients with UC, compared with none among the CD patients ($P < 0.05$). **CONCLUSION:** Our results suggest that, in Japan, the pathogenesis of IBD in infants and children may differ from that in Western countries, and that the characteristics of early childhood-onset IBD are distinct from those of school age-onset IBD.

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A real-time fMRI-based spelling device immediately enabling robust motor-independent communication.

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Human communication entirely depends on the functional integrity of the neuromuscular system. This is devastatingly illustrated in clinical conditions such as the so-called locked-in syndrome (LIS), in which severely motor-disabled patients become incapable to communicate naturally--while being fully conscious and awake. For the last 20 years, research on motor-independent communication has focused on developing brain-computer interfaces (BCIs) implementing neuroelectric signals for communication (e.g., [2-7]), and BCIs based on electroencephalography (EEG) have already been applied successfully to concerned patients. However, not all

patients achieve proficiency in EEG-based BCI control. Thus, more recently, hemodynamic brain signals have also been explored for BCI purposes. Here, we introduce the first spelling device based on fMRI. By exploiting spatiotemporal characteristics of hemodynamic responses, evoked by performing differently timed mental imagery tasks, our novel letter encoding technique allows translating any freely chosen answer (letter-by-letter) into reliable and differentiable single-trial fMRI signals. Most importantly, automated letter decoding in real time enables back-and-forth communication within a single scanning session. Because the suggested spelling device requires only little effort and pretraining, it is immediately operational and possesses high potential for clinical applications, both in terms of diagnostics and establishing short-term communication with nonresponsive and severely motor-impaired patients.

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Low Contrast Acuity Measurement: Does it add value in the visual assessment of Down syndrome and Cerebral palsy populations?

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PURPOSE: Children with Down syndrome (DS) and cerebral palsy (CP) often have reduced visual acuity (VA). This study assessed VA and low contrast acuity (LCA) with Lea symbols in DS and CP populations to explore whether LCA measures provide useful additional information about visual performance. VA and LCA were also measured from a large group of typically developing children. **Methods:** High contrast VA and LCA performance was measured monocularly using crowded Lea symbols on 45 children with CP (mean age 11.8 \pm 4years), 44 with DS (mean age 10.5 \pm 3years) and 211 controls (mean age 11.4 \pm 3years). Refractive status was confirmed with cycloplegic retinoscopy. **RESULTS:** DS and CP groups had significantly lower acuities than controls at all contrasts ($p < 0.001$). Mean (\pm SD) high contrast VA: DS= $+0.39 \pm 0.2$ logMAR; CP= $+0.18 \pm 0.2$ logMAR; controls= -0.04 ± 0.1 logMAR. Mean 2.5% LCA: DS= $+0.73 \pm 0.2$ logMAR; CP= $+0.50 \pm 0.2$ logMAR; controls= $+0.37 \pm 0.1$ logMAR. For controls, the mean difference between VA and 2.5% LCA was 0.40 logMAR (95% limits of agreement ± 0.22 logMAR). Whilst there was a positive relation between VA and 2.5% LCA scores (linear regressions $p < 0.0001$), considerable variation existed, with VA explaining only 36% of the variance in LCA performance for control data. **Conclusion:** VA and LCA performance was significantly poorer in DS and CP groups than in controls, and high contrast VA did not reliably predict low contrast performance. Therefore both high and low contrast acuity assessment are valuable to fully describe an individual's visual function, and this may be particularly relevant in DS and CP where patients may be unable to articulate visual difficulties. Age-specific reference data from a large sample of typically developing children across a broad age range are presented for clinicians using high and low contrast Lea symbols.

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20. Ophthalmology. 2012 Dec 5. pii: S0161-6420(12)00896-2. doi: 10.1016/j.ophtha.2012.09.018. [Epub ahead of print]

Surgical Outcomes of Medial Rectus Recession in Esotropia with Cerebral Palsy.

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PURPOSE: To determine the outcome of a reduced amount of medial rectus (MR) muscle recession in esotropes with cerebral palsy (CP) and to compare the surgical response with that of normal controls. **DESIGN:** Retrospective

cohort study. **PARTICIPANTS:** Thirty esotropes with CP and 60 age-matched esotropes without CP who underwent a unilateral or bilateral MR muscle recession. **METHODS:** The surgical amount of MR muscle recession was reduced by 1 mm per muscle in patients with CP. **MAIN OUTCOME MEASURES:** Success rates, surgical response, cumulative probabilities of success, and factors affecting surgical responses evaluated by generalized linear mixed models. **RESULTS:** In patients with CP, the initial success rate was higher ($P = 0.037$) and the rate of undercorrection was lower ($P = 0.037$) compared with patients without CP. At the final visit, success rates were not significantly different between both groups. However, the rate of overcorrection was higher ($P = 0.003$) compared with patients without CP. The rate of overcorrection per person-year during follow-up was 11% in patients with CP and 2% in patients without CP. Patients with CP showed a greater surgical response than did those without CP, at about 1.3 prism diopters per millimeter of MR muscle recession ($P < 0.001$). **CONCLUSIONS:** Even with the reduced amount of recession, esotropes with CP showed a greater surgical response to MR muscle recession than did those without CP, and the incidence of late overcorrection was significantly higher compared with that of patients without CP. **FINANCIAL DISCLOSURE(S):** The author(s) have no proprietary or commercial interest in any materials discussed in this article.

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21. NeuroRehabilitation. 2012 Jan 1;31(4):349-55. doi: 10.3233/NRE-2012-00803.

A novel EEG-based brain mapping to determine cortical activation patterns in normal children and children with cerebral palsy during motor imagery tasks.

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Purpose: The purpose of this study was to compare EEG topographical maps in normal children and children with cerebral palsy (CP) during motor execution and motor imagery tasks. **Method:** Four normal children and four children with CP (mean age 11.6 years) were recruited from a community medical center. An EEG-based brain mapping system with 30 scalp sites (extended 10–20 system) was used to determine cortical reorganization in the regions of interest (ROIs) during four motor tasks: movement execution (ME), kinesthetic-motor imagery (KMI), observation of movement (OOM), and visual motor imagery (VMI). ROIs included the primary sensorimotor cortex (SMC), premotor cortex (PMC), and supplementary motor area (SMA). **Design:** Descriptive analysis. **Results:** Normal children showed increased SMC activation during the ME and KMI as well as SMC and visual cortex (VC) activation during KMI. Children with CP showed similar activation in the SMC and other motor network areas (PMC, SMA, and VC). During the OOM and VMI tasks, the VC or occipital area were primarily activated in normal children, whereas the VC, SMC, and bilateral auditory areas were activated in children with CP. **Discussion:** This is the first study demonstrating different neural substrates for motor imagery tasks in normal and children with CP.

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22. Adv Clin Exp Med. 2012 May-Jun;21(3):363-71.

The impact of rehabilitation carried out using the Masgutova Neurosensorimotor Reflex Integration method in children with cerebral palsy on the results of brain stem auditory potential examinations.

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BACKGROUND: Rehabilitation therapy in children with neuromotor development disorders can be carried out with the use of various methods. **OBJECTIVES:** The aim of this study was to determine the efficiency of rehabilitation carried out with the use of the new therapeutic method MNRI (Masgutova Neurosensorimotor Reflex Integration) in children with cerebral palsy (CP) by objective measurements with a Brainstem Auditory Evoked Potentials (BAEP) examination. **MATERIAL AND METHODS:** Besides the known parameters, Interpeak Latency I-V (IPL I-V) in

BAEP, an original parameter proposed by Pilecki was introduced, called a relative IPL I-V value. The study involved a group of 17 children (9 girls and 8 boys) aged from 1.3 to 5.9 years (mean = 3.8 years, SD = 1.3) with cerebral palsy. Due to difficulty in co-operation, analysis of only 15 children could be finished. RESULTS: Analysis of the absolute IPL I-V values showed that after rehabilitation the percentage of the results with slowed transmission, i.e. those in which the IPL I-V value was prolonged, decreased from more than 88% to 60%. The assessment of the relative IPL I-V values showed that the results obtained after rehabilitation are more advantageous. CONCLUSIONS: As a result of rehabilitation carried out by the MNRI method in children with CP, a significant improvement in the transmission in the brain stem section of the auditory pathway was observed based on the absolute and relative IPL I-V values. However, the change obtained in children was various.

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23. Med Pregl. 2012 Sep-Oct;65(9-10):373-7.

Coping with stress and adaptation in mothers of children with cerebral palsy.

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INTRODUCTION: Raising a child with cerebral palsy is stressful for the parent because it requires an intensive physical engagement as well as coping with emotional reactions to the child's condition. Parents have different modes of adapting to stress and demands caused by the disorder. The Resiliency Model of Family Stress, Adjustment and Adaptation postulates that the use of certain coping strategies facilitates successful family adaptation to the child's condition. MATERIAL AND METHODS: Our study included 60 mothers of two- to seven-year-old children with diagnosed cerebral palsy. The modified Family Crisis-oriented Personal Evaluation Scales, with its five sub-scales, was applied to assess the strategies used by families to cope with stress. RESULTS: The most frequently used strategy is reframing, whereas other strategies were used less frequently. The study has revealed some differences in adoption of certain strategies by mothers from urban and rural areas as well as of those strategies which depend on the severity of the child's condition. DISCUSSION: The fact that reframing is the most frequently used strategy is encouraging because it helps parents to make their grave situation more acceptable. Institutional support is also often used by mothers of children with severe form of disease because of their need for medical care. CONCLUSION: Recognition of coping strategies of the parents is important and useful for the development of therapeutic interventions aimed at facilitating family adaptation in families with a child with developmental disabilities.

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