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**Professor Nadia Badawi AM**

Macquarie Group Foundation Chair of Cerebral Palsy

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## Interventions and Management

### 1. *J Phys Ther Sci*. 2016 Mar;28(3):774-80. doi: 10.1589/jpts.28.774. Epub 2016 Mar 31.

Efficacy of neurodevelopmental treatment combined with the Nintendo(®) Wii in patients with cerebral palsy.

Acar G, Altun GP, Yurdalan S, Polat MG.

[Purpose] The aim of this study was to investigate the efficiency of Nintendo(®) Wii games in addition to neurodevelopmental treatment in patients with cerebral palsy. [Subjects and Methods] Thirty hemiparetic cerebral palsy patients (16 females, 14 males; mean age, 6-15 years) were included in the study and divided into two groups: a neurodevelopmental treatment+Nintendo Wii group (group 1, n=15) and a neurodevelopmental treatment group (group 2, n=15). Both groups received treatment in 45-minute sessions 2 days/week for six weeks. Use of the upper extremities, speed, disability and functional independence were evaluated using the Quality of Upper Extremity Skills Test, Jebsen Taylor Hand Function Test, ABILHAND-Kids test, and Pediatric Functional Independence Measure (self-care) before and after treatment. [Results] There were statistically significant improvements in all parameters for group 1 and group 2 (except quality of function) after six weeks of treatment. Intergroup analysis showed that group 1 was superior to group 2 in mean change differences in the Jebsen Taylor Hand Function Test. [Conclusion] Our results showed that neurodevelopmental treatment is effective for improving hand functions in hemiplegic cerebral palsy. To provide a enjoyable, motivational, safe, and effective rehabilitation program, the Nintendo(®) Wii may be used in addition to neurodevelopmental treatment.

[PMID: 27134357](#)

### 2. *Lasers Med Sci*. 2016 May 4. [Epub ahead of print]

Laser acupuncture as an adjunctive therapy for spastic cerebral palsy in children.

Dabbous OA, Mostafa YM, El Noamany HA, El Shennawy SA, El Bagoury MA.

Laser acupuncture is widely used as an alternative line of treatment in several chronic pediatric diseases. To investigate whether biostimulation by low-level laser on acupuncture points adds a clinical benefit to conventional physiotherapy in hemiplegic spastic cerebral palsy (CP) children. Forty spastic hemiplegic cerebral palsy children by age 1-4 years were chosen from the pediatric outpatient clinic of the National Institute of Laser Enhanced Sciences (NILES), Cairo University, and Menofya University hospitals. They were randomly divided into control and study groups; 20 children each. Both groups received physiotherapy for 3 months, while only the study group also received laser acupuncture (low-level laser 650 nm with 50 mW power was applied at each acupoint for 30 s giving an energy density of 1.8 J/cm<sup>2</sup>). Preassessment and postassessment of muscle tone, the range of motion (ROM), and gross motor function measurements (GMFMs) were obtained, and the results were statistically analyzed. Comparison between posttreatment measures for the control vs. study groups showed significant difference in muscle tone (wrist flexors and plantar flexors) in favor of the study group, while range of motion showed no significant differences. GMFM showed no significant difference in total score while there was a significant difference in goal total score (sum of % scores for each dimension identified as goal area divided by number of

goal areas) in favor of the study group. Laser acupuncture has a beneficial effect on reducing spasticity in spastic cerebral palsy and may be helpful in improving their movement.

[PMID: 27147077](#)

### 3. *Front Physiol.* 2016 Apr 13;7:121. doi: 10.3389/fphys.2016.00121. eCollection 2016.

External Mechanical Work and Pendular Energy Transduction of Overground and Treadmill Walking in Adolescents with Unilateral Cerebral Palsy.

Zollinger M, Degache F, Currat G, Pochon L, Peyrot N, Newman CJ, Malatesta D.

**PURPOSE:** Motor impairments affect functional abilities and gait in children and adolescents with cerebral palsy (CP). Improving their walking is an essential objective of treatment, and the use of a treadmill for gait analysis and training could offer several advantages in adolescents with CP. However, there is a controversy regarding the similarity between treadmill and overground walking both for gait analysis and training in children and adolescents. The aim of this study was to compare the external mechanical work and pendular energy transduction of these two types of gait modalities at standard and preferred walking speeds in adolescents with unilateral cerebral palsy (UCP) and typically developing (TD) adolescents matched on age, height and body mass. **METHODS:** Spatiotemporal parameters, external mechanical work and pendular energy transduction of walking were computed using two inertial sensors equipped with a triaxial accelerometer and gyroscope and compared in 10 UCP ( $14.2 \pm 1.7$  year) and 10 TD ( $14.1 \pm 1.9$  year) adolescents during treadmill and overground walking at standard and preferred speeds. **RESULTS:** The treadmill induced almost identical mechanical changes to overground walking in TD adolescents and those with UCP, with the exception of potential and kinetic vertical and lateral mechanical works, which are both significantly increased in the overground-treadmill transition only in UCP ( $P < 0.05$ ). **CONCLUSIONS:** Adolescents with UCP have a reduced adaptive capacity in absorbing and decelerating the speed created by a treadmill (i.e., dynamic stability) compared to TD adolescents. This may have an important implication in rehabilitation programs that assess and train gait by using a treadmill in adolescents with UCP.

[PMID: 27148062](#)

### 4. *Gait Posture.* 2016 May;46:184-7. doi: 10.1016/j.gaitpost.2016.03.014. Epub 2016 Mar 26.

The impact of walking devices on kinematics in patients with spastic bilateral cerebral palsy.

Krautwurst BK, Dreher T, Wolf SI.

Increased anterior pelvic and trunk tilt is a common finding in patients with bilateral cerebral palsy especially during walking with assistive devices. As previous studies demonstrate various gait alterations when using assistive devices, the assessment of surgical interventions may be biased when the patients become independent of (or dependent on) assistive devices after therapy. Furthermore, some of these patients in fact are able to walk without devices even though in daily life they prefer to use them. Consequently, for such patients the classification into GMFCS level II or III may be ambiguous. The specific aim of this study was therefore to assess the influence of the use of forearm crutches and posterior walker during walking and to set this influence in relation to outcome effects of surgical intervention studies. 26 ambulatory patients with spastic bilateral CP (GMFCS II-III) were included who underwent 3D gait analysis. All patients used forearm crutches or posterior walkers in everyday life even though they were able to walk without assistive devices for short distances. Independent of the type of assistive devices, the patients walk on average with more anterior trunk tilt and pelvic tilt ( $7^\circ \pm 6^\circ$  and  $3^\circ \pm 2^\circ$ ) and with a maximum ankle dorsiflexion decreased by  $2^\circ (\pm 3^\circ)$  when walking with assistive devices, enhancing the mal-positioning present without device. Oppositely, the knees on average are more extended by  $6^\circ (\pm 4^\circ)$  when using the assistive devices. These effects have to be taken into account when assessing gait patterns or when monitoring the outcome after intervention as assistive devices may partially hide or exaggerate therapeutic effects.

[PMID: 27131199](#)

**5. PLoS One. 2016 May 2;11(5):e0154749. doi: 10.1371/journal.pone.0154749. eCollection 2016.**

Factors Contributing to Satisfaction with Changes in Physical Function after Orthopedic Surgery for Musculoskeletal Dysfunction in Patients with Cerebral Palsy.

Kusumoto Y, Nitta O, Matsuo A, Takaki K, Matsuda T.

**BACKGROUND:** The recognition of required treatments for cerebral palsy (CP) patients, including orthopedic surgery, differs according to region. This study was performed to identify factors associated with satisfactory changes in physical function after orthopedic surgery. **METHODS:** 358 patients were selected for the questionnaire survey. The following information was collected: gender, primary disease, age of initial surgery, total procedural count, operated sites, satisfaction of postoperative rehabilitation frequency, ideal amount of postoperative rehabilitation sessions per week, frequency of voluntary home training per week, satisfaction of the timing of surgery and the current satisfaction with the changes in physical function after the orthopedic surgery. We classified the patients into the satisfied and dissatisfied group according to satisfactory changes in physical function after the surgery. We performed unpaired t-tests and chi-square tests to determine the variables that differed significantly between the groups. Variables with a p value of <0.2 were included in the multivariate logistic regression analysis. **RESULTS:** The logistic model was revised and summed up to two potential predictors of postsurgical satisfaction with physical function: satisfaction with the frequency of postoperative rehabilitation sessions and the orthopedic surgery of the hip (distinction hit ratio, 75.4%). **CONCLUSIONS:** This study demonstrated that the frequency of postoperative rehabilitation and history of hip surgery seemed to be related to the satisfaction with the changes in physical function after orthopedic surgery.

[PMID: 27135609](#)

**6. J Biomech. 2016 Apr 1. pii: S0021-9290(16)30413-4. doi: 10.1016/j.jbiomech.2016.03.052. [Epub ahead of print]**

Joint kinematic calculation based on clinical direct kinematic versus inverse kinematic gait models.

Kainz H, Modenese L, Lloyd DG, Maine S, Walsh HP, Carty CP.

Most clinical gait laboratories use the conventional gait analysis model. This model uses a computational method called Direct Kinematics (DK) to calculate joint kinematics. In contrast, musculoskeletal modelling approaches use Inverse Kinematics (IK) to obtain joint angles. IK allows additional analysis (e.g. muscle-tendon length estimates), which may provide valuable information for clinical decision-making in people with movement disorders. The twofold aims of the current study were: (1) to compare joint kinematics obtained by a clinical DK model (Vicon Plug-in-Gait) with those produced by a widely used IK model (available with the OpenSim distribution), and (2) to evaluate the difference in joint kinematics that can be solely attributed to the different computational methods (DK versus IK), anatomical models and marker sets by using MRI based models. Eight children with cerebral palsy were recruited and presented for gait and MRI data collection sessions. Differences in joint kinematics up to 13° were found between the Plug-in-Gait and the gait 2392 OpenSim model. The majority of these differences (94.4%) were attributed to differences in the anatomical models, which included different anatomical segment frames and joint constraints. Different computational methods (DK versus IK) were responsible for only 2.7% of the differences. We recommend using the same anatomical model for kinematic and musculoskeletal analysis to ensure consistency between the obtained joint angles and musculoskeletal estimates.

[PMID: 27139005](#)

**7. Orthopedics. 2016 May 2:1-6. doi: 10.3928/01477447-20160427-04. [Epub ahead of print]**

Biomechanical Assessment of Patellar Advancement Procedures for Patella Alta.

Seidl A, Baldini T, Krughoff K, Shapiro JA, Lindeque B, Rhodes J, Carollo J.

Crouch gait deformity is common in children with cerebral palsy and often is associated with patella alta. Patellar tendon advancement typically is used to correct patella alta and restore normal knee mechanics. The purpose of this study was to determine the mechanical strength of surgical constructs used for fixation during patellar advancement procedures. This study used a cadaveric model to determine which of 3 surgical techniques is biomechanically optimal for patellar tendon advancement in treating patella alta. Twenty-four human cadaveric knees (8 per group) were prepared using 1 of 3 different common surgical techniques: tibial tubercle osteotomy, patellar tendon partial resection and repair at the distal patella, and patellar tendon imbrication. The patella was loaded from 25 to 250 N at 1 Hz for 1000 cycles. A significant difference in

patella displacement under cyclical loading was found between surgical techniques. Tibial tubercle osteotomy exhibited significantly less displacement under cyclical loading than distal patella excision and repair ( $P < .0001$ ) or imbrication ( $P = .0088$ ). Imbrication exhibited significantly less displacement than distal patella excision and repair ( $P = .0006$ ). Tibial tubercle osteotomy survived longest. Based on failure criteria of 5 mm of displacement, tibial tubercle osteotomy lasted between 250 and 500 cycles. The other 2 techniques failed by 25 cycles. This study offers quantitative evidence regarding the relative mechanical strength of each construct and may influence choice of surgical technique. [Orthopedics].

[PMID: 27135457](#)

### **8. Gait Posture. 2016 May;46:104-11. doi: 10.1016/j.gaitpost.2016.03.001. Epub 2016 Mar 9.**

An individual approach for optimizing ankle-foot orthoses to improve mobility in children with spastic cerebral palsy walking with excessive knee flexion.

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

Ankle-Foot Orthoses (AFOs) are commonly prescribed to promote gait in children with cerebral palsy (CP). The AFO prescription process is however largely dependent on clinical experience, resulting in confusing results regarding treatment efficacy. To maximize efficacy, the AFO's mechanical properties should be tuned to the patient's underlying impairments. This study aimed to investigate whether the efficacy of a ventral shell AFO (vAFO) to reduce knee flexion and walking energy cost could be improved by individually optimizing AFO stiffness in children with CP walking with excessive knee flexion. Secondly, the effect of the optimized vAFO on daily walking activity was investigated. Fifteen children with spastic CP were prescribed with a hinged vAFO with adjustable stiffness. Effects of a rigid, stiff, and flexible setting on knee angle and the net energy cost (EC) [ $\text{Jkg}^{-1}\text{m}^{-1}$ ] were assessed to individually select the optimal stiffness. After three months, net EC, daily walking activity [ $\text{stridesmin}^{-1}$ ] and knee angle [ $\text{deg}$ ] while walking with the optimized vAFO were compared to walking with shoes-only. A near significant 9% ( $p = 0.077$ ) decrease in net EC ( $-0.5\text{Jkg}^{-1}\text{m}^{-1}$ ) was found for walking with the optimized vAFO compared to shoes-only. Daily activity remained unchanged. Knee flexion in stance was reduced by  $2.4^\circ$  ( $p = 0.006$ ). These results show that children with CP who walk with excessive knee flexion show a small, but significant reduction of knee flexion in stance as a result of wearing individually optimized vAFOs. Data suggest that this also improves gait efficiency for which an individual approach to AFO prescription is emphasized.

[PMID: 27131186](#)

### **9. J Paediatr Child Health. 2016 Apr;52(4):417-21. doi: 10.1111/jpc.13097.**

Body mass index in ambulatory children with cerebral palsy: A cohort study.

Pascoe J, Thomason P, Graham HK, Reddihough D, Sabin MA.

AIM: Children with cerebral palsy (CP) have reduced levels of physical activity compared with children without physical disability and experience risk factors for becoming overweight or obese. In the Australian CP population, there is little information available about the weight status of children with CP. The aims of this study were to compare the distribution of body mass index (BMI) in a cohort of ambulant children with CP with the BMI distribution of Australian children and explore the relationship between BMI and gross motor function. METHODS: A retrospective cohort study of 587 children with CP Gross Motor Function Classification System (GMFCS) levels I-III who attended a Gait Laboratory between July 1995 and January 2012 was carried out. The BMI and Z-score were calculated at each assessment. Data were grouped into the categories of underweight, healthy, overweight and obese according to age-specific and sex-specific percentiles. RESULTS: There were 348 boys and 240 girls with a mean age 11.2 (standard deviation 3.2) years. Mean BMI Z-score was 0.11 (standard deviation 1.33). Seven percent of children were underweight, 73.6% healthy, 7.3% overweight and 12.1% obese. This was similar to the distribution of children without disability. The largest percentage of children in the healthy group were classified GMFCS I. The largest percentage of children in the obese group were classified GMFCS III. CONCLUSIONS: In this cohort, 19.4% of ambulant children with CP were overweight or obese. This is of concern as BMI may impact on the outcomes of surgical intervention and rehabilitation. Further research is needed to determine the consequences of obesity for children with CP.

[PMID: 27145505](#)

**10. Hong Kong Med J. 2016 May 6. doi: 10.12809/hkmj154588. [Epub ahead of print]**

The effect of anticonvulsant use on bone mineral density in non-ambulatory children with cerebral palsy.

Cheng SW, Ko CH, Lee CY.

**INTRODUCTION:** Studies showed that use of anticonvulsants (antiepileptic drugs) might be associated with reduced bone mineral density. The primary objective of this study was to evaluate the effect of anticonvulsants on bone mineral density in non-ambulatory children with cerebral palsy. The secondary objective was to identify their risk factors for low bone mineral density. **METHODS:** This case series with internal comparisons was conducted in a paediatric residential rehabilitation centre in Hong Kong. Overall, 32 patients were enrolled. The study group comprised 18 patients (6 males, 12 females) aged 5.0 to 19.5 years (mean  $\pm$  standard deviation,  $13.8 \pm 4.7$  years); all were prescribed anticonvulsant therapy for more than 2 years. The comparison group comprised 14 patients (6 males, 8 females) aged 7.0 to 19.1 years (mean,  $16.4 \pm 3.0$  years) who were concomitant non-ambulatory residents with cerebral palsy and were not prescribed any anticonvulsant therapy prior to study recruitment. Patients underwent a physical examination, blood tests, nutritional assessment, and dual-energy X-ray absorptiometry scan of the total body less head. Z-scores were calculated. **RESULTS:** There was no significant difference in Z-scores of total body less head between groups. Among children with low bone mineral density (Z-scores  $\leq -2.0$ ) and normal bone mineral density, multivariate analysis revealed that higher weight-for-age Z-score (adjusted odds ratio=0.015) and presence of puberty (adjusted odds ratio=0.027) were independent factors for bone mineral density improvement. Hosmer-Lemeshow goodness of fit test ( $P=0.315$ ) was not significant. Nagelkerke  $R^2$  was 0.677, signifying a relatively well-fitting model. **CONCLUSION:** There was no evidence that anticonvulsant therapy has any detrimental effect on bone mineral density in non-ambulatory children with cerebral palsy. A low weight-for-age Z-score was associated with low bone mineral density. Early nutritional intervention to optimise body weight may help to increase bone mineral density.

[PMID: 27149974](#)

**11. Am J Phys Med Rehabil. 2016 May 4. [Epub ahead of print]**

Site-Specific Bone Mineral Density Is Unaltered Despite Differences in Fat-Free Soft Tissue Mass Between Affected and Nonaffected Sides in Hemiplegic Paralympic Athletes with Cerebral Palsy: Preliminary Findings.

Runciman P, Tucker R, Ferreira S, Albertus-Kajee Y, Micklesfield L, Derman W.

**OBJECTIVE:** This study investigated bone mineral density (BMD, g/cm), fat mass (FM, kg), and fat-free soft tissue mass (FFSTM, kg) in Paralympic athletes with cerebral palsy (CP) using dual-energy x-ray absorptiometry. **METHODS:** Bone mineral density, BMD Z scores (standard deviations), FM, and FFSTM were measured for the whole body and at the lumbar spine, femoral neck, and total hip sites on both nonaffected and affected sides of 6 athletes with hemiplegic CP. **RESULTS:** There were no differences between nonaffected and affected sides with respect to site-specific BMD and BMD Z scores and FM. Fat-free soft tissue mass was significantly lower on the affected side in both upper and lower limbs (15% lower;  $P < 0.05$ ). **CONCLUSION:** The present study is the first to describe similar BMD between sides, symmetry in FM, and asymmetry in FFSTM in Paralympic athletes with CP. These findings have important consequences for rehabilitation, as they indicate the potential for positive physiological adaptation as a result of exercise training over long periods of time.

[PMID: 27149600](#)

**12. Dev Med Child Neurol. 2016 May 4. doi: 10.1111/dmcn.13146. [Epub ahead of print]**

Osteopenic features of the hip joint in patients with cerebral palsy: a hospital-based study.

Moon SY, Kwon SS, Cho BC, Chung CY, Lee KM, Sung KH, Chung MK, Zulkarnain A, Kim YS, Park MS.

**AIM:** We aimed to evaluate the bone mineral density of the hip joint in patients with cerebral palsy (CP). **METHOD:** Patients with CP younger than 18 years who underwent three-dimensional hip examination by computed tomography were analysed. Bone attenuation of the acetabulum and femur was measured as Hounsfield units (HU), and was adjusted for affecting factors such as hip instability and Gross Motor Function Classification System (GMFCS). **RESULTS:** One hundred and twenty-six patients with CP and 86 typically developing participants were included. The average bone attenuation was significantly lower in those with CP than in the comparison group (acetabulum: 70.8HU, 95% confidence interval [95% CI] 59.9-81.8; femur: 82.2HU, 95% CI 70.4-95.8). Compared with GMFCS levels I to III, bone attenuation was significantly lower for GMFCS

levels IV (acetabulum: 30.9HU, 95% CI 15.7-46.2; femur: 39.7HU, 95% CI 19.9-59.5) and V (acetabulum: 51.7HU, 95% CI 35.9-67.5; femur: 72.5HU, 95% CI 51.9-93.0). The average bone attenuation decreased when the migration percentage was over 37% (acetabulum: 11.6HU, 95% CI 1.4-24.6; femur: 26.8HU, 95% CI 9.9-43.6). INTERPRETATION: Bone attenuation of the acetabulum and femur was significantly affected both by GMFCS level and by severity of hip instability.

[PMID: 27145375](#)

### 13. Eur J Phys Rehabil Med. 2016 May 6. [Epub ahead of print]

Can we prevent hip dislocation in children with CP? Effects of postural management.

Picciolini O, Le Métayer M, Consonni D, Cozzaglio M, Porro M, Gasparroni V, Panou A, Mosca F, Portinaro N.

**BACKGROUND:** Hip dislocation is common in children with cerebral palsy (CP). At birth they don't have musculoskeletal deformities but they develop over time due to the combined effects of the movement disorder and impaired gross motor function. Early detection and treatment of a hip at risk is needed to modify the natural of hip development in CP. **AIM:** To determine the effect of postural management treatment on hip displacement's progression in children CP. **DESIGN:** Prospective comparative non-randomized study. **SETTING:** Rehabilitative outpatient unit. Pediatric Rehabilitation Unit, Department of Clinical Sciences and Community Health, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico - Università degli Studi di Milano. **POPULATION:** 51 children with CP were studied; the treated group (n=30) was compared to a control group (n=21). **METHODS:** The treated group followed a two year's long combined treatment program consisting a neurodevelopment treatment (NDT) two times a week and a 5 hours daily siège moulé postural program. The control group underwent only NDT twice a week for two years. Hip radiographs were measured with the migration percentage (MP) method at baseline, at 1 and 2 years of follow-up. **RESULTS:** A significant difference has been observed in the MP (%) trend ( $p<0.001$ ) between treatment and control groups. At 2 years, there was a marked worsening (MP from 23.0 to 37.7) in the control group, compared to the stability (from 28.8 to 26.8) in the treatment group. **CONCLUSIONS:** This study supports the evidence that conservative postural management of hip deformity is useful to prevent the natural progression of hip dislocation.

[PMID: 27153480](#)

### 14. Res Dev Disabil. 2016 Apr 28;55:207-217. doi: 10.1016/j.ridd.2016.04.008. [Epub ahead of print]

A telehealth approach to conducting clinical swallowing evaluations in children with cerebral palsy.

Kantarcigil C, Sheppard JJ, Gordon AM, Friel KM, Malandraki GA.

**BACKGROUND:** Accurate and timely evaluation of dysphagia in children with cerebral palsy (CP) is critical. For children with limited access to quality healthcare, telehealth is an option; however, its reliability needs to be investigated. **AIM:** To test the reliability of an asynchronous telehealth model for evaluating dysphagia in children with CP using a standardized clinical assessment. **METHODS AND PROCEDURES:** Nineteen children (age range 6.9-17.5) were assessed at three mealtimes via the Dysphagia Disorder Survey (DDS) by three clinicians (face-to-face evaluations). Mealtimes were video-recorded to allow asynchronous evaluations by a remote clinician who also completed approximately 1/3 of face-to-face evaluations. Agreement was tested on DDS variables and dysphagia severity. **OUTCOMES AND RESULTS:** Results revealed substantial to excellent agreement between face-to-face and remote assessments by the same rater (78-100%,  $KW=0.64-1$ ) on all, but two variables (oral transport and oral pharyngeal swallow) and by different raters (69-89%,  $KW=0.6-0.86$ ) on all but one variable (orienting). For dysphagia severity, intrarater agreement was excellent (100%,  $KW=1$ ); interrater agreement was substantial (85%;  $KW=0.76$ ). **CONCLUSIONS AND IMPLICATIONS:** Asynchronous clinical swallowing evaluations using standardized tools have acceptable levels of agreement with face-to-face evaluations, and can be an alternative for children with limited access to expert swallowing care.

[PMID: 27132060](#)

**15. Ann Rehabil Med. 2016 Apr;40(2):230-6. doi: 10.5535/arm.2016.40.2.230. Epub 2016 Apr 25.**

Effects of Hippotherapy on Psychosocial Aspects in Children With Cerebral Palsy and Their Caregivers: A Pilot Study.

Jang CH, Joo MC, Noh SE, Lee SY, Lee DB, Lee SH, Kim HK, Park HI.

**OBJECTIVE:** To investigate the effects of hippotherapy on psychosocial and emotional parameters in children with cerebral palsy (CP) and their caregivers. **METHODS:** Eight children with CP were recruited (three males and five females; mean age, 7.3 years; Gross Motor Function Classification System levels 1-3). Hippotherapy sessions were conducted for 30 minutes once weekly for 10 consecutive weeks in an indoor riding arena. The Gross Motor Function Measure (GMFM), Pediatric Balance Scale (PBS), and the Korean version of the Modified Barthel Index were evaluated. All children were evaluated by the Children's Depression Inventory, Trait Anxiety Inventory for Children, State Anxiety Inventory for Children, Rosenberg Self Esteem Scale, and the Korean-Satisfaction with Life Scale (K-SWLS). Their caregivers were evaluated with the Beck Depression Inventory, the Beck Anxiety Inventory, and the K-SWLS. We assessed children and their caregivers with the same parameters immediately after hippotherapy. **RESULTS:** Significant improvements on the GMFM, dimension E in the GMFM, and the PBS were observed after hippotherapy compared with the baseline assessment ( $p < 0.05$ ). However, no improvements were detected in the psychosocial or emotional parameters in children with CP or their caregivers. None of the participants showed any adverse effects or accidents during the 10 weeks hippotherapy program. **CONCLUSIONS:** Hippotherapy was safe and effectively improved gross motor and balance domains in children with CP. However, no improvements were observed in psychosocial or emotional parameters.

[PMID: 27152272](#)

**16. Curr Opin Urol. 2016 May 5. [Epub ahead of print]**

Medical and surgical management of neurogenic bowel.

Gor RA, Katorski JR, Elliott SP.

**PURPOSE OF REVIEW:** Neurogenic bowel dysfunction (NBoD) commonly affects patients with spina bifida, cerebral palsy, and spinal cord injury among other neurologic insults. NBoD is a significant source of physical and psychosocial morbidity. Treating NBoD requires a diligent relationship between patient, caretaker, and provider in establishing and maintaining a successful bowel program. A well designed bowel program allows for regular, predictable bowel movements and prevents episodes of fecal incontinence. **RECENT FINDINGS:** Treatment options for NBoD span conservative lifestyle changes to fecal diversion depending on the nature of the dysfunction. Lifestyle changes and oral laxatives are effective for many patients. Patients requiring more advanced therapy progress to transanal irrigation devices and retrograde enemas. Those receiving enemas may opt for antegrade enema administration via a Malone antegrade continence enema or Chait cecostomy button, which are increasingly performed in a minimally invasive fashion. Select patients benefit from fecal diversion, which simplifies care in more severe cases. **SUMMARY:** Many medical and surgical options are available for patients with NBoD. Selecting the appropriate medical or surgical treatment involves a careful evaluation of each patient's physical, psychosocial, financial, and geographic variables in an effort to optimize bowel function.

[PMID: 27152922](#)

## Prevention and Cure

**17. Eur J Obstet Gynecol Reprod Biol. 2016 Apr 11;201:140-145. doi: 10.1016/j.ejogrb.2016.03.048. [Epub ahead of print]**

Magnesium sulphate and perinatal mortality and morbidity in very-low-birthweight infants born between 24 and 32 weeks of gestation in Japan.

Ohhashi M, Yoshitomi T, Sumiyoshi K, Kawagoe Y, Satoh S, Sameshima H, Ikenoue T.

**OBJECTIVE:** Maternal exposure to magnesium sulphate has a neuroprotective effect in premature infants. This study aimed to examine this neuroprotective effect and the dose-response relationship in very-low-birthweight infants born between 24 and 32 weeks of gestation. **STUDY DESIGN:** A retrospective cohort study compared the rates of mortality and brain damage between three groups: no magnesium sulphate, low-dose (<50g) magnesium sulphate and high-dose (≥50g) magnesium sulphate. **RESULTS:** Japanese maternal and neonatal databases were linked using six key parameters from 2003 to 2007. Of 298,514 deliveries, 9101 were very-low-birthweight infants. Among these, full matching was possible for 5562 infants. Of the fully-matched infants, 3763 were born between 24 and 32 weeks of gestation, and 1813 (48%) were followed-up beyond 18 months. A multivariate analysis of the data, including gestational age, sex, fetal growth restriction, antenatal steroids and low pH (<7.1), showed that the low-dose group had no beneficial effects in terms of a reduction in mortality or incidence of brain damage (cerebral palsy or mental retardation). The high-dose group showed a significantly higher mortality rate [odds ratio (OR) 1.9, 95% confidence interval (CI) 1.2-2.9]. A stratified subgroup analysis of infants born between 28 and 32 weeks of gestation showed that survivors in the low-dose group had significantly lower rates of cerebral palsy (OR 0.4, 95% CI 0.2-0.98) and brain damage (OR 0.2, 95% CI 0.1-0.9), while the high-dose group did not show any significant changes. **CONCLUSION:** This study found that antepartum exposure to magnesium sulphate did not reduce the infant mortality rate or influence neurological outcomes. However, among infants born between 28 and 32 weeks of gestation, rates of cerebral palsy and brain damage were found to be significantly lower among survivors in the low-dose group.

[PMID: 27131232](#)

**18. Acta Paediatr. 2016 Jun;105(6):572-3. doi: 10.1111/apa.13389.**

Providing important evidence for the major causal contributors to cerebral palsy in Africa.

Donald KA.

[PMID: 27153365](#)

**19. Mater Sociomed. 2016 Apr;28(2):99-103. doi: 10.5455/msm.2016.28.99-103. Epub 2016 Mar 25.**

Appearance of Neurodevelopmental Disorders in Children Delivered Post-Term: A Cross-Section Study.

Vukojevic M, Trninic I, Dodaj A, Malenica M, Barisic T, Stojic S.

**GOAL:** To analyze the appearance of neurodevelopmental disorders in children delivered post-term and to find out whether prolonged pregnancy may be a cause of such disorders in a selected group participants. **PATIENTS AND METHODS:** This study included a cohort of 34 children born post-term suffering from neurodevelopmental disorders who were treated at the Service for psycho-physiological and speaking disorders in Mostar, Bosnia and Herzegovina during an 18-year period. **RESULTS:** There were 59.4% of male and 40.6% female patients (P=0.002). The most common neurodevelopmental disorder in the sample was intellectual disability (38.2%), followed by epilepsy (26.4%), delayed psychomotor development (14.7%), and cerebral palsy (11.7%) (P<0.001). The correlation between mothers' parity and post-term delivery was found (P=0.016). **CONCLUSION:** Post-term delivery may be the cause of neurodevelopmental disorders. The most common disorder among them were intellectual difficulties.

[PMID: 27147913](#)



**20. Twin Res Hum Genet. 2016 May 3:1-7. [Epub ahead of print]**

Long-Term Neurodevelopmental Outcome in Survivors of Twin-to-Twin Transfusion Syndrome.

van Klink JM, Koopman HM, Rijken M, Middeldorp JM, Oepkes D, Lopriore E.

Twin-twin transfusion syndrome (TTTS) is a severe complication of monochorionic (MC) twin pregnancies associated with high perinatal mortality and morbidity rates. Management in TTTS is a major challenge for obstetricians and neonatologists. Twins with TTTS are often born prematurely after an extremely distressing and highly hazardous fetal period. Follow-up studies report varying rates of cerebral palsy (CP) and long-term neurodevelopmental impairment (NDI). This review discusses the latest findings on the long-term outcome of TTTS survivors, possible risk factors for long-term impairment, and provides recommendations for future research.

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