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Interventions and Management

1. Dev Med Child Neurol. 2014 Jan 20. doi: 10.1111/dmcn.12364. [Epub ahead of print]

Motor learning in children with hemiplegic cerebral palsy: feedback effects on skill acquisition.

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AIM: Motor learning is enhanced with practice and feedback. This cohort control study investigated the effect of different relative feedback frequencies during skill acquisition in children with cerebral palsy (CP) and children with typical development. **METHOD:** Nineteen children with spastic hemiplegic CP (nine males, 10 females; mean age 11y 7mo; range 8-16y) and 20 children with typical development (12 males, eight females; mean age 10y 8mo; range 8-14y) were assigned to 100% or reduced (62%) feedback subgroups as they practised 200 trials of a discrete arm movement with specific spatiotemporal parameters. Children with CP used their less involved hand. Learning was inferred by delayed (24h) retention and reacquisition tests. **RESULTS:** All children improved in accuracy and consistency. Children with typical development demonstrated significantly greater accuracy than children with CP during acquisition ($p=0.001$), retention ($p=0.031$), and reacquisition ($p=0.001$), and greater consistency during retention ($p=0.038$). The typically developing group who received 100% feedback performed with significantly less error than the 62% feedback group during acquisition ($p=0.001$), and with greater retention ($p=0.017$). No statistically significant difference was found between feedback subgroups of children with CP, although the 100% feedback group consistently demonstrated less error. **INTERPRETATION:** Children with CP use feedback in a manner similar to children with typical development when learning new skills with their less involved hand, but demonstrate less accuracy and consistency.

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2. J Neurosurg Pediatr. 2013 Dec;12(6):664-5. doi: 10.3171/2013.7.PEDS13353. Epub 2013 Oct 11.

Long-term outcomes of dorsal rhizotomy.

Langerak NG, Vaughan CL, Peter JC, Fieggen AG, Peacock WJ.

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Comment on

J Neurosurg Pediatr. 2013 Aug;12(2):142-50.

[PMID: 24116984](#) [PubMed - indexed for MEDLINE]

3. Gait Posture. 2013 Dec 27. pii: S0966-6362(13)00719-4. doi: 10.1016/j.gaitpost.2013.12.024. [Epub ahead of print]

Can we unmask features of spasticity during gait in children with cerebral palsy by increasing their walking velocity?

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BACKGROUND AND AIM: Spasticity is a velocity dependent feature present in most patients with cerebral palsy (CP). It is commonly measured in a passive condition. The aim of this study was to highlight markers of spasticity of gastrocnemius and hamstring muscles during gait by comparing the effect of increased walking velocity of CP and typical developing (TD) children. **METHODS:** 53 children with spastic CP and 17 TD children were instructed to walk at self-selected speed, faster and as fast as possible without running. Kinematics, kinetics and electromyography (EMG) were collected and muscle length and muscle lengthening velocity (MLV) were calculated. To compare the data of both groups, a linear regression model was created which resulted in two non-dimensional gait velocities. A difference score (DS) was calculated between the high and low velocity values for both groups. **RESULTS:** 103 gait parameters were analyzed of which 16 had a statistically significant DS between TD and CP groups. The spastic gastrocnemius muscle presented at high velocity with a higher ankle angular velocity, plantar flexion moment, power absorption and increased EMG signal during loading response. The spastic hamstrings demonstrated at high velocity a delayed maximum knee extension moment at mid-stance and increasing hip extension moment and hip power generation. The hamstrings also presented with a lower MLV during swing phase. **CONCLUSIONS:** A limited number of gait parameters differ between CP and TD children when increasing walking velocity, giving indirect insight on the effect of spasticity on gait.

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4. Acta Ortop Bras. 2013;21(6):336-9. doi: 10.1590/S1413-78522013000600008.

Bone age in cerebral palsy.

Miranda ER, Palmieri MD, de Assumpção RM, Yamada HH, Rancan DR, Fucs PM.

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OBJECTIVE: To compare the chronological age and bone age among cerebral palsy patients in the outpatient clinic and its correlation with the type of neurological involvement, gender and functional status. **METHODS:** 401 patients with spastic cerebral palsy, and ages ranging from three months to 20 years old, submitted to radiological examination for bone age and analyzed by two independent observers according Greulich & Pyle. **RESULTS:** In the topographic distribution, there was a significant delay ($p < 0.005$) in tetraparetic (17.7 months), hemiparetic (10.1 months), and diparetic patients (7.9 months). In the hemiparetic group, the mean bone age in the affected side was 96.88 months and the uncompromised side was 101.13 months ($p < 0.005$). Regarding functional status, the

ambulatory group showed a delay of 18.73 months in bone age ($p < 0.005$). Comparing bone age between genders, it was observed a greater delay in males (13.59 months) than in females (9.63 months), but not statistically significant ($p = 0.54$). **CONCLUSION:** There is a delay in bone age compared to chronological age influenced by the topography of spasticity, functional level and gender in patients with cerebral palsy. Level of Evidence IV, Case Series.

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5. BMC Health Serv Res. 2014 Jan 22;14(1):29. [Epub ahead of print]

Prevalence of neurological conditions across the continuum of care based on interRAI assessments.

Danila O, Hirdes JP, Maxwell CJ, Marrie RA, Patten S, Pringsheim T, Jette N.

BACKGROUND: Although multiple studies have estimated the prevalence of neurological conditions in the general Canadian population, limited research exists regarding the proportion affected with these conditions in non-acute health care settings in Canada. Data from standardized clinical assessments based on the interRAI suite of instruments were used to estimate the prevalence of eight neurological conditions across the continuum of care including Alzheimer's disease, Parkinson's disease, epilepsy, traumatic brain injury, multiple sclerosis, cerebral palsy, Huntington's disease, and amyotrophic lateral sclerosis. **METHODS:** Cohorts of individuals receiving care in nursing homes (N=103,820), home care (N=91,021), complex continuing care (N=10,581), and psychiatric hospitals (N=23,119) in Canada were drawn based on their most recent interRAI assessment within each sector for a six-month period in 2010. These data were linked to the Discharge Abstract Database and National Ambulatory Care Reporting System data sets to develop five different case definition scenarios for estimating prevalence. **RESULTS:** The conditions with the highest estimated prevalences in these care settings in Canada were Alzheimer's disease and related dementias, Parkinson's disease, epilepsy, and traumatic brain injury. However, there were notable cross-sector differences in the prevalence of each condition, and regional variations. Prevalence estimates based on acute hospital administrative data alone were substantially lower for all conditions evaluated. **CONCLUSIONS:** The proportion of persons with neurological conditions in non-acute health care settings in Canada is substantially higher than is generally reported for the general population. It is essential for these care settings to have the expertise and resources to respond effectively to the strengths, preferences, and needs of the growing population of persons with neurological conditions. The use of hospital or emergency department records alone is likely to substantially underestimate the true prevalence of neurological conditions across the continuum of care. However, interRAI assessment records provide a helpful source of information for obtaining these estimates in nursing home, home care, and mental health settings.

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Prevention and Cure

6. Pediatr Dev Pathol. 2014 Jan 22. [Epub ahead of print]

A follow-up study of lympho-histiocytic villitis and of incidental retroplacental hematoma.

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Background: Placentas are usually submitted for pathological examination based on obstetrical indications. We hypothesized that the placenta may have diagnostic value to the infant independent of obstetrical events. We specifically tested whether lympho-histiocytic villitis (non-infectious) would predict autoimmune or alloimmune disease based on transfer of activated maternal T-cells to the fetus and whether clinically silent placental separations (retroplacental hematomas, RPH) would predict neurologic injury in the infant. **Methods:** All placentas from consecutive deliveries had a routine pathological examination of the placenta. The infants with placentas demonstrating inflammation of more than 1% of villi, or RPH larger than 2 cm and matched controls had

their hospital charts reviewed and parental interviews by telephone at five to seven years of age. The children of consented patients were also searched for in the office visits of the University of Louisville Pediatric Neurology and Rheumatology divisions. Principal Results: 1,684 patients consented to the follow up study. We found no cases of autoimmune disease among 17 children with villitis >1%. Of 16 infants with RPH, one infant had cerebral palsy but with other findings, one had lethal hydranencephaly, and the remainder had no adverse outcome. Of 15 children seen by a pediatric neurologist, none had the same placental lesion. Conclusion: The specific lesions of lymphohistiocytic villitis or asymptomatic retroplacental hematoma do not predict significant pediatric disease by seven years of age. At least for these two lesions, the placenta does not have diagnostic value to the infant.

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7. Neuroscience. 2014 Jan 17. pii: S0306-4522(14)00029-3. doi: 10.1016/j.neuroscience.2014.01.018. [Epub ahead of print]

Effects of intravenous administration of umbilical cord blood CD34(+) cells in a mouse model of neonatal stroke.

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Neonatal stroke occurs in approximately 1/4000 live births and results in life-long neurological impairments: e.g., cerebral palsy. Currently, there is no evidence-based specific treatment for neonates with stroke. Several studies have reported the benefits of umbilical cord blood (UCB) cell treatment in rodent models of neonatal brain injury. However, all of the studies examined the effects of administering either the UCB mononuclear cell fraction or UCB-derived mesenchymal stem cells in neonatal rat models. The objective of this study was to examine the effects of human UCB CD34(+) cells (hematopoietic stem cell/endothelial progenitor cells) in a mouse model of neonatal stroke, which we recently developed. On postnatal day 12, immunocompromised (SCID) mice underwent permanent occlusion of the left middle cerebral artery (MCAO). Forty-eight hours after MCAO, human UCB CD34(+) cells (1×10^5 cells) were injected intravenously into the mice. The area in which cerebral blood flow was maintained was temporarily larger in the cell-treated group than in the phosphate-buffered saline (PBS)-treated group at 24 h after treatment. With cell treatment, the percent loss of ipsilateral hemispheric volume was

significantly ameliorated ($21.5\pm 1.9\%$) compared with the PBS group ($25.6\pm 5.1\%$) when assessed at 7 weeks after MCAO. The cell-treated group did not exhibit significant differences from the PBS group in either rotarod (238 ± 46 sec in the sham-surgery group, 175 ± 49 sec in the PBS group, 203 ± 54 sec in the cell-treated group) or open-field tests. The intravenous administration of human UCB CD34(+) cells modestly reduced histological ischemic brain damage after neonatal stroke in mice, with a transient augmentation of cerebral blood flow in the peri-infarct area.

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