

Monday 13 September 2010

This free weekly bulletin lists the latest research on cerebral palsy (CP), as indexed in the NCBI, PubMed (Medline) and Entrez (GenBank) databases. These articles were identified by a search using the key term "cerebral palsy".

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## Interventions

### 1. *J Dev Phys Disabil.* 2010 Oct 1;22(5):497-508.

#### **Self-generated Domains of Quality of Life in Children with and Without Cerebral Palsy.**

Vinson J, Shank L, Thomas PD, Warschausky S.

Michigan State University, East Lansing, MI, USA.

This study was conducted to demonstrate feasibility of utilizing a modified SEIQoL-DW with children by examining self-generated domains of quality of life in children with and without cerebral palsy. Study samples were children, ages 6-12, (mean 8.9, SD 1.8) including 41 children with cerebral palsy (CP) and 60 children who were age and gender matched peers without disability. Quality of life was assessed with a modified Schedule for the Evaluation of Individual Quality of Life-Direct Weight (SEIQoL-DW). Group differences in overall ratings of quality of life were not significant; however, there were significant group differences in the frequency and hierarchy of self-generated domains. Within the group with CP, functional ability was not associated with quality of life.

PMID: 20824200 [PubMed]PMCID: PMC2930836 [Available on 2011/10/1]

### 2. *J Child Neurol.* 2010 Sep 7. [Epub ahead of print]

#### **Depressed Brainstem Auditory Function in Children With Cerebral Palsy.**

Jiang ZD, Wu YY, Liu XY, Wilkinson AR.

Children's Hospital, Fudan University, Shanghai, China, and Neonatal Unit, University of Oxford, Dept of Paediatrics, John Radcliffe Hospital, United Kingdom.

Brainstem auditory evoked responses were studied to examine brainstem auditory function in 80 children with cerebral palsy. The response waveform, particularly later waves, tended to be depressed. Thirty-three (41.3%) showed abnormal results. The main abnormality was reduced wave V amplitude. Other abnormalities were decreased V/I amplitude ratio, missing waves, prolonged I-V interval, and increased interaural difference in I-V interval. The abnormalities were persistent during the follow-up. In contrast to common findings in the responses in progressive neurologies, abnormalities in interpeak intervals were rare in children with cerebral palsy. There were some characteristic changes in the responses in certain etiologies. These results suggest that brainstem auditory function in children with cerebral palsy is depressed, which may be owing to decreased or altered neural firing or synchrony in the auditory brainstem. A detailed analysis of central components of the responses is valuable in detecting central auditory dysfunction in children with cerebral palsy.

PMID: 20823031 [PubMed - as supplied by publisher]

### 3. Phys Occup Ther Pediatr. 2010 Sep 7. [Epub ahead of print]

#### **Development and Pilot Testing of the Challenge Module: A Proposed Adjunct to the Gross Motor Function Measure for High-Functioning Children with Cerebral Palsy.**

Wilson A, Kavanaugh A, Moher R, McInroy M, Gupta N, Salbach NM, Wright FV.

Ashlea Wilson, MSc(PT), Hon.BKin., Abi Kavanaugh, MSc(PT), BA, Rosemarie Moher, MSc(PT), BSCHK, Megan McInroy, MSc(PT), BScKin, and Neena Gupta, MSc(PT), BSc, were all MSc(PT) students in the Department of Physical Therapy, Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada, at the time of the research.

The aim was to develop a Challenge Module (CM) as a proposed adjunct to the Gross Motor Function Measure for children with cerebral palsy who have high-level motor function. Items were generated in a physiotherapist (PT) focus group. Item reduction was based on PTs' ratings of item importance and safety via online surveys. The proposed CM items were pilot-tested with children in Gross Motor Function Classification System Level I. The focus group identified 35 items for consideration. The first item-reduction survey (n = 86 PT respondents) resulted in 20 items. A second survey yielded two additional items. Seven pilot-test participants (6-14 years) had a CM total mean score of 74.5% (SD = 19.4). Three easy items were subsequently removed and two items combined. Of seven additional items suggested by the children during testing, two were accepted in a third item-reduction survey. The final result was a 20-item CM to evaluate advanced motor skills. The CM requires refinement through Rasch scaling and formal validation.

PMID: 20822396 [PubMed - as supplied by publisher]

### 4. Child Care Health Dev. 2010 Sep 5. [Epub ahead of print]

#### **Comparison of the GMFM-66 and the PEDI Functional Skills Mobility domain in a group of Chinese children with cerebral palsy.**

Han T, Gray N, Vasquez MM, Zou LP, Shen K, Duncan B.

Department of Neurology & Rehabilitation, The Beijing Children's Hospital (affiliated with Capital Medicine University).

**Background:** Previous research has suggested there is a high level of comparability between the Gross Motor Function Measure-66 (GMFM-66) and the Pediatric Evaluation of Disability Inventory (PEDI) Functional Skills Mobility domain. However, there are only a few studies that have examined the correlations between these instruments. The purpose of this study was to determine the correlation between the GMFM-66 and the PEDI Functional Skills Mobility domain scaled scores in a group of Chinese children with spastic cerebral palsy, at the ages of 12-70 months, in order to explore the feasibility of using them interchangeably. **Methods:** Secondary data analysis was conducted of data collected during a prospective international collaborative study that used the GMFM-66 and the PEDI to examine the impact of treatment. This study examined the Pearson correlations between the GMFM-66 and the PEDI Functional Skills Mobility domain at six time points over the course of 28 consecutive weeks for 115 Chinese children who participated at baseline. **Results:** Pearson correlations between the GMFM-66 and the PEDI Functional Skills Mobility domain ranged from 0.83 to 0.90 for the six time points of data collection, with statistically significant P-values <0.0001 for each correlation. **Conclusions:** These results support previous research that the GMFM-66 and the PEDI Functional Skills Mobility domain are complementary assessments that may be used interchangeably when it is not possible to administer both.

PMID: 20825421 [PubMed - as supplied by publisher]

**5. Disabil Rehabil. 2010 Sep 3. [Epub ahead of print]****Agreement between parents and clinicians for the motor functional classification systems of children with cerebral palsy.**

Mutlu A, Kara OK, Gunel MK, Karahan S, Livanelioglu A.

Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Hacettepe University, Ankara, Turkey.

**Purpose.** This study aimed to evaluate whether parental ratings of expanded and revised Gross Motor Function Classification System (GMFCS E&R) and Manual Ability Classification System (MACS) had agreement with clinicians' ratings when classifying children with CP to these two well-known classifications of motor functioning and hereby to evaluate intertester reliability of the classification systems between clinicians and parents. **Method.** The process of study was designed to collect data from parents using the GMFCS E&R and MACS. The total participants consisted of 100 children with CP and their parents. The overall agreement between the parents and physiotherapist GMFCS and MACS scores was analysed using intraclass correlation coefficient (ICC). **Results.** The ICC value between parents and physiotherapist was 0.96 (95% confidence interval [CI] 0.95-0.97) for GMFCS and 0.96 (95% CI 0.94-0.97) for MACS and indicated excellent agreement. **Conclusions.** The excellent agreement between parents and clinicians indicated that parents and clinicians can talk in the same language for the motor functional classification systems of children with CP if careful administrations are provided.

PMID: 20815692 [PubMed - as supplied by publisher]

**6. An Pediatr (Barc). 2010 Sep 2. [Epub ahead of print]****Gastrointestinal disorders in children with cerebral palsy and neurodevelopmental disabilities. [Article in Spanish]**

González Jiménez D, Díaz Martín JJ, Bousoño García C, Jiménez Treviño S.

Hospital Universitario Central de Asturias, Servicio de pediatría, Oviedo, Asturias, España.

Recent data suggest that, contrary to initial expectations with improvements in perinatal medicine, the prevalence of cerebral palsy has not decreased over the last 20 years. Gastrointestinal disorders are a major chronic problem in most of children with cerebral palsy and in children with neurodevelopmental disabilities. A multidisciplinary approach, with input from neurologists, gastroenterologists, nurses, dieticians and other specialists, can make a major contribution to the medical wellbeing and quality of life of these children and their caregivers. This article focuses on diagnostic methods and therapeutic options available for major nutritional and gastrointestinal problems in patients with neurological disabilities: gastroesophageal reflux, constipation and swallowing disorders.

PMID: 20817582 [PubMed - as supplied by publisher]

**7. Expert Rev Med Devices. 2010 Sep;7(5):667-79.****Development of speech prostheses: current status and recent advances.**

Brumberg JS, Guenther FH.

Department of Cognitive and Neural Systems, Boston University, 677 Beacon Street, Boston, MA 02215, USA.

Brain-computer interfaces (BCIs) have been developed over the past decade to restore communication to persons with severe paralysis. In the most severe cases of paralysis, known as locked-in syndrome, patients retain cognition and sensation, but are capable of only slight voluntary eye movements. For these patients, no standard communication method is available, although some can use BCIs to communicate by selecting letters or words on a computer. Recent research has sought to improve on existing techniques by using BCIs to create a direct prediction of speech utterances rather than to simply control a spelling device. Such methods are the first steps towards speech prostheses as they are intended to entirely replace the vocal apparatus of paralyzed users. This article outlines many well known methods for restoration of communication by BCI and illustrates the difference between spelling

devices and direct speech prediction or speech prosthesis.

PMID: 20822389 [PubMed - in process]

#### **8. Ann Phys Rehabil Med. 2010 Aug 14. [Epub ahead of print]**

##### **Intrathecal baclofen in cerebral palsy. A retrospective study of 25 wheelchair-assisted adults.**

Tass el Ponche S, Ferrapie AL, Chenet A, Menei P, Gambart G, M n galli Bogeli D, Perrouin Verbe B, Gay S, Richard I.

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**OBJECTIVE:** To study the efficacy and safety of intrathecal baclofen therapy (ITB) in wheelchair-dependent adults with cerebral palsy. **PATIENTS AND METHODS:** A retrospective analysis and clinical examination of 25 wheelchair-assisted adults with cerebral palsy receiving ITB initiated between 1999 and 2009 in three different cities in western France. **RESULTS:** ITB improves spasticity and facilitates wheelchair comfort and nursing care. The therapy has an effect on motor disorders and pain. Eighty percent of the ITB patients were satisfied. Dissatisfaction was related to complications or adverse events and not lack of efficacy. Complications occurred in 32% of the patients and transient interruption of the treatment or surgical removal of the ITB pump was necessary in 16% of cases. **DISCUSSION AND CONCLUSION:** Wider use of ITB in this indication is likely and should lead to a better understanding of the drug's pharmacological effects on motor disorders and pain. Use of the Goal Attainment Assessment Scale or Caregiver Questionnaire can help us.

PMID: 20829144 [PubMed - as supplied by publisher]

#### **9. Am J Occup Ther. 2010 Jul-Aug;64(4):614-20.**

##### **Manual ability classification system for children with cerebral palsy in a school setting and its relationship to home self-care activities.**

Kuijper MA, van der Wilden GJ, Ketelaar M, Gorter JW.

Rehabilitation Center De Hoogstraat, Rembrandtkade 10, 3583TM Utrecht, The Netherlands. MA-Kuyper@dehoogstraat.nl

**OBJECTIVE:** Our aim in this study was to investigate the relationship between (a) the manual abilities of children with cerebral palsy (CP), assessed with the Manual Ability Classification System (MACS) in a school rehabilitation setting, and (b) the children's performance of self-care activities at home, assessed with the Pediatric Evaluation of Disability Inventory (PEDI). In addition, we assessed the interobserver reliability of the MACS. **METHOD:** Sixty-one children with CP were included (mean age = 10.3 yr, range = 5-14). The MACS was classified by 2 independent raters. The PEDI was scored in a structured interview. **RESULTS:** The Spearman correlation coefficient between the MACS and the self-care domain of the PEDI Caregiver Assistance Scale was high and statistically significant ( $r = .72$ ). The interobserver reliability of the MACS was good (weighted kappa = .86). **CONCLUSION:** The MACS is a reliable instrument in a school environment and is related to the performance of daily life self-care activities at home.

PMID: 20825133 [PubMed - in process]

**10. Proc Natl Acad Sci U S A. 2010 Aug 10;107(32):14413-8. Epub 2010 Jul 26.****Sniffing enables communication and environmental control for the severely disabled.**

Plotkin A, Sela L, Weissbrod A, Kahana R, Haviv L, Yeshurun Y, Soroker N, Sobel N.

Department of Neurobiology, The Weizmann Institute of Science, Rehovot 76100, Israel.

Comment in:

Proc Natl Acad Sci U S A. 2010 Aug 10;107(32):13979-80.

Paradoxically, improvements in emergency medicine have increased survival albeit with severe disability ranging from quadriplegia to "locked-in syndrome." Locked-in syndrome is characterized by intact cognition yet complete paralysis, and hence these individuals are "locked-in" their own body, at best able to communicate using eye blinks alone. Sniffing is a precise sensory-motor acquisition entailing changes in nasal pressure. The fine control of sniffing depends on positioning the soft palate, which is innervated by multiple cranial nerves. This innervation pattern led us to hypothesize that sniffing may remain conserved following severe injury. To test this, we developed a device that measures nasal pressure and converts it into electrical signals. The device enabled sniffs to control an actuator with speed similar to that of a hand using a mouse or joystick. Functional magnetic resonance imaging of device usage revealed a widely distributed neural network, allowing for increased conservation following injury. Also, device usage shared neural substrates with language production, rendering sniffs a promising bypass mode of communication. Indeed, sniffing allowed completely paralyzed locked-in participants to write text and quadriplegic participants to write text and drive an electric wheelchair. We conclude that redirection of sniff motor programs toward alternative functions allows sniffing to provide a control interface that is fast, accurate, robust, and highly conserved following severe injury.

PMID: 20660716 [PubMed - indexed for MEDLINE]PMCID: PMC2922523Free PMC Article

**11. Ann Trop Paediatr. 2010;30(3):181-96.****A review of the incidence and prevalence, types and aetiology of childhood cerebral palsy in resource-poor settings.**

Gladstone M.

Department of Community Child Health, Alder Hey Children's NHS Foundation Trust, Liverpool, UK.

**BACKGROUND:** With 80% of children with disabilities living in resource-poor settings, it is likely that there is a high prevalence of cerebral palsy (CP) and neurological impairment in these settings. The prevalence and incidence rates of disability, in particular of children with CP in resource-poor settings, are difficult to access and clarify. **AIM:** To review the recent literature relating to the prevalence, incidence, type and aetiology of cerebral palsy in low-income settings. **METHODS:** A systematic search of studies published between 1990 and 2009 was performed using PubMed, Cinahl on Ovid, the Cochrane database, SCOPUS and information from international disability organisations. All studies with information about neurodisability, CP or disability in resource-poor settings were included. Titles and/or s of all studies were reviewed and full texts of relevant studies were obtained. **RESULTS:** Disparities in methodology, age range, classification systems and populations made studies difficult to compare. Population-based studies provided rates of childhood disability of 31-160/1000. When using limited age ranges of 2-9 years with the Ten Question Questionnaire, rates were 82-160/1000 for children disability and 19-61/1000 for neurological impairment. Rates of CP in population-based settings in China and India gave figures of 2-2.8/1000 births, similar to western settings. Hospital-based studies of CP showed increased rates of spastic quadriplegia rather than diplegia or hemiplegia and possibly increased rates of meningitis, jaundice and asphyxia and lower rates of low birthweight and prematurity in CP populations. These studies were small and not case-controlled or population-based. **CONCLUSIONS:** Rates of CP and neurological impairment are difficult to obtain in resource-poor settings. Methods of identifying children with CP and causal factors and the effects of disability need to be better classified in order to improve management and help shape preventive measures.

PMID: 20828451 [PubMed - in process]

**12. Dev Neurorehabil. 2010;13(5):335-45.****Interfacing a haptic robotic system with complex virtual environments to treat impaired upper extremity motor function in children with cerebral palsy.**

Fluet GG, Qiu Q, Kelly D, Parikh HD, Ramirez D, Saleh S, Adamovich SV.

Department of Rehabilitation and Movement Science, University of Medicine and Dentistry of New Jersey, Newark, NJ, USA.

**Objective:** To investigate the ability of the New Jersey Institute of Technology Robot Assisted Virtual Rehabilitation (NJIT-RAVR) system training to elicit changes in upper extremity (UE) function in children with hemiplegia secondary to cerebral palsy. **Methods:** Nine children (mean age 9 years, three males) participated in three pilots. Subjects trained 1 hour, 3 days a week for 3 weeks. Two groups performed this protocol as their only intervention. The third group also performed 5-6 hours of constraint-induced movement therapy. **Results:** All subjects participated in a short programme of nine, 60-minute training sessions without adverse effects. As a group, subjects demonstrated statistically significant improvements in Melbourne Assessment of Unilateral Upper Limb Function Test, a composite of three timed UE tasks and several measurements of reaching kinematics. Several subjects demonstrated clinically significant improvements in active shoulder abduction and flexion as well as forearm supination. **Conclusion:** Three small pilots of NJIT-RAVR training demonstrated measurable benefit with no complications, warranting further examination.

PMID: 20828330 [PubMed - in process]

**13. Am J Occup Ther. 2010 Jul-Aug;64(4):596-604.****Effect of seated position on upper-extremity access to augmentative communication for children with cerebral palsy: preliminary investigation.**

Costigan FA, Light J.

Department of Communication Sciences and Disorders, 308 Ford Building, The Pennsylvania State University, University Park, PA 16802, USA. fac3@psu.edu

**OBJECTIVE:** Our goal in this study was to determine the effect of seated position on upper-extremity access to augmentative communication for a child with cerebral palsy. **METHOD:** A single-subject ABAB design was used with one 5-yr-old participant. We compared accuracy and speed of selection of targets on a speech-generating device in the participant's typical position and in an intervention position. The intervention position conformed to current clinical conventions and research on promoting upper-extremity movement. The intervention position was achieved through simple modifications to the participant's typical seating.

**RESULTS:** Accuracy of target selection was moderately improved in the intervention position compared with the typical position.

**CONCLUSION:** Results provide preliminary empirical evidence of the positive effects of functional seating on access to augmentative communication for children with cerebral palsy. Further research is required to confirm the positive effect of the intervention position across other people who use augmentative communication.

PMID: 20825131 [PubMed - in process]

**14. Zh Vopr Neurokhir Im N N Burdenko. 2010 Apr-Jun;(2):14-8 ; discussion 18.****Posterior selective rhizotomy in treatment of severe spastic syndrome in cerebral palsy [Article in Russian]**

[No authors listed]

**BACKGROUND:** Aim of this study was to optimize surgical technique of posterior selective rhizotomy for prevention of possible complications. **MATERIALS AND METHODS:** 11 patients (age 3-30 years) with severe spastic tetraparesis due to cerebral palsy were operated. Muscle tone in lower limbs reached 4-5 points (Ashworth scale). In all cases posterior selective rhizotomy of L1-S1 spinal roots was performed using laminoplasty and intraoperative

electromyographic monitoring. Results were assessed in early postoperative period and during follow-up. RESULTS: In all cases in the early postoperative period we observed decrease of muscle tone to 1-2 points and increase of volume of passive movements. In the follow-up period 4 patients developed improvement of locomotor status, in 6 no changes were observed. In 1 case spastic syndrome recurred. We had no complications due to orthopaedic deformities of spinal column, sensory and pelvic disorders, muscular hypotonia. CONCLUSION: Posterior selective rhizotomy may be the method of choice in treatment of patients with severe spastic forms of cerebral palsy. Application of optimized surgical technique (laminoplasty, intraoperative stimulation electromyography) allows to decrease the risk of possible complications.

PMID: 20825076 [PubMed - in process]

## 15. Brain. 2010 Sep 7. [Epub ahead of print]

### **Implicit awareness in anosognosia for hemiplegia: unconscious interference without conscious re-representation.**

Fotopoulou A, Pernigo S, Maeda R, Rudd A, Kopelman MA.

1 Institute of Psychiatry, King's College London, London SE5 8AF, UK.

Some patients with anosognosia for hemiplegia, i.e. apparent unawareness of hemiplegia, have been clinically observed to show 'tacit' or 'implicit' awareness of their deficits. Here we have experimentally examined whether implicit and explicit responses to the same deficit-related material can dissociate. Fourteen stroke patients with right hemisphere lesions and contralesional paralysis were tested for implicit and explicit responses to brief sentences with deficit-related themes. These responses were elicited using: (i) a verbal inhibition test in which patients had to inhibit completing each sentence with an automatic response (implicit task) and (ii) a rating procedure in which patients rated the self-relevance of the same sentences (explicit task). A group of anosognosic hemiplegic patients was significantly slower than a control group of aware hemiplegic patients in performing the inhibition task with deficit-related sentences than with other emotionally negative themes (relative to neutral themes). This occurred despite their explicit denial of the self-relevance of the former sentences. Individual patient analysis showed that six of the seven anosognosic patients significantly differed from the control group in this dissociation. Using lesion mapping procedures, we found that the lesions of the anosognosic patients differed from those of the 'aware' controls mainly by involving the anterior parts of the insula, inferior motor areas, basal ganglia structures, limbic structures and deep white matter. In contrast, the anosognosic patient without implicit awareness had more cortical lesions, mostly in frontal areas, including lateral premotor regions, and also in the parietal and occipital lobes. These results provide strong experimental support for a specific dissociation between implicit and explicit awareness of deficits. More generally, the combination of our behavioural and neural findings suggests that an explicit, affectively personalized sensorimotor awareness requires the re-representation of sensorimotor information in the insular cortex, with possible involvement of limbic areas and basal ganglia circuits. The delusional features of anosognosia for hemiplegia can be explained as a failure of this re-representation.

PMID: 20823084 [PubMed - as supplied by publisher]

## Epidemiology / Aetiology / Diagnosis & Early Treatment

*Please note: This is not yet a comprehensive outline of cerebral palsy prevention literature. It is expected that more research will be included when the search terms are expanded to include key terms other than "cerebral palsy". It is a work-in-progress and it will be expanded in coming months.*

### 16. J Cereb Blood Flow Metab. 2010 Sep 8. [Epub ahead of print]

#### Decreased cortical serotonin in neonatal rabbits exposed to endotoxin in utero.

Kannan S, Saadani-Makki F, Balakrishnan B, Dai H, Chakraborty PK, Janisse J, Muzik O, Romero R, Chugani DC.

Department of Pediatrics, Children's Hospital of Michigan, Wayne State University School of Medicine, Detroit, Michigan, USA.

Maternal intrauterine inflammation is implicated in neurodevelopmental disorders in the offspring. Serotonin is crucial for regulating maturation in the developing brain, and maternal inflammation may result in disruption of the serotonergic system in the perinatal period. Saline or endotoxin was injected intrauterine in pregnant rabbits term. Newborn rabbits underwent positron emission tomography (PET) imaging with  $\alpha$ [(11)C]methyl-L-tryptophan (AMT) to evaluate tryptophan metabolism in vivo. Decrease in standard uptake value for AMT and decrease in serotonin concentration was noted in the frontal and parietal cortices of endotoxin kits when compared with controls. In addition, a significant decrease in serotonin-immunoreactive fibers and decreased expression of serotonin transporter (5HTT) was measured in the somatosensory cortex. There was a three-fold increase in the number of apoptotic cells in the ventrobasal (VB) thalamus without loss of raphe serotonergic cell bodies in endotoxin kits when compared with controls. Glutamatergic VB neurons projecting to somatosensory cortex transiently express 5HTT and store serotonin, regulating development of the somatosensory cortex. Intrauterine inflammation results in alterations in cortical serotonin and disruption of serotonin-regulated thalamocortical development in the newborn brain. This may be a common link in neurodevelopmental disorders resulting in impairment of the somatosensory system, such as cerebral palsy and autism. *Journal of Cerebral Blood Flow & Metabolism* advance online publication, 8 September 2010; doi:10.1038/jcbfm.2010.156.

PMID: 20827261 [PubMed - as supplied by publisher]

### 17. Bull Math Biol. 2010 Sep 4. [Epub ahead of print]

#### Attractor Dynamics and Thermodynamic Analogies in the Cerebral Cortex: Synchronous Oscillation, the Background EEG, and the Regulation of Attention.

Wright JJ.

Liggins Institute and Department of Psychological Medicine, University of Auckland, Auckland, New Zealand, jj.w@xtra.co.nz.

Ongoing changes in attention and cognition depend upon cortical/subcortical interactions, which select sequences of different spatial patterns of activation in the cortex. It is proposed that each pattern of cortical activation permits evolution of electrocortical wave activity toward statistically stationary states, analogous to thermodynamic equilibrium. In each steady-state, neurons fire with an intrinsic Poisson spike probability and also with a bursting pattern related to network oscillations. Excitatory cell dendrites act as a regenerative reservoir in which pulse generation is balanced against dissipations. Equilibria exhibit contrasting limits. One limit, at high cortical activation, generates widespread zero-lag synchrony among excitatory cells, with partial suppression of noise. Excitatory and inhibitory cells approach zero-lag local correlation, with 1/4 cycle lag-correlation at greater distances of separation. The high-activation limit defines a correlated system of attractor basins, capable of co-ordinating synaptic modifications and intracortical signal generation. Suppression of noise would enhance convergence about attractor basins in the manner of simulated annealing, while, conversely, the persistence of some noise prevents network paralysis by phase locking. At the opposite limit—that of low activation—spikes and waves have low cross- and auto-correlation, but have wide-spectrum sensitivity to inputs. It is hypothesised that cortical regions, transiently at equilibrium near these extremes, engage in interaction with each other and with subcortical systems, to generate ongoing sequences of at-

tention and cognition. This account is compatible with classical and recently observed experimental phenomena. The principle features inferred from a simplified linear mathematical account are reproduced in a more physiologically realistic and non-linear numerical simulation.

PMID: 20821066 [PubMed - as supplied by publisher]

**18. An Pediatr (Barc). 2010 Sep 2. [Epub ahead of print]**

**Prematurity with cerebral palsy and ceroid lipofuscinosis. [Article in Spanish]**

Peña-Segura JL, Póo Argüelles P, Lafuente Hidalgo M, García Sánchez V, Pérez Delgado R, Monge Galindo L, García Jiménez MC, Rebage Moisés V, López Pisón J.

Sección de Neuropediatría, Hospital Universitario Miguel Servet, Zaragoza, España; Grupo de Investigación Neurometabólico, Instituto Aragonés Ciencias de la Salud, Zaragoza, España.

PMID: 20817581 [PubMed - as supplied by publisher]