



9th International Congress on Cerebral Palsy: May 15–18 2013, Bled, Slovenia

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Biological Abstracts
Biomedicina Slovenica
Bowker International
Chemical Abstract
Nutritional Abstracts

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WELCOME MESSAGE

It is my great pleasure to welcome you at the already 9th International Congress on Cerebral Palsy in our small country Slovenia.

Cerebral palsy is a leading motor problem in childhood. In many countries its prevalence is predicted to increase. The therapeutic approaches are diverse. However, they face many common challenges. These challenges are shared by health systems over the world, many of whom are pioneering innovative solutions. There is no single »best« treatment for all the problems experienced by people with cerebral palsy, but there is no doubt that if we start to treat a problem early on, we will achieve better results.

The aim of the present congress is to provide participants with up-to-date therapeutic approaches in the field of »Evidence Based Medicine« and also to cover the traditional and everyday approaches used when the services provided in advanced countries are not available.

Dogma is a dictatorship of ideology; especially in treatment approaches. It should be omitted. But wrong ideas are worse than ignorance, too!

The Scientific Program will include Plenary Sessions, Free Paper Sessions, and Instructional Course Lectures, Family Forum, Live demonstrations and Videos.

The Poster session will include Scientific, Demonstration and Student Posters.

We will also feature the popular »Meet the Experts« sessions each morning.

However, with over 60 speakers and many poster displays coming from more than 35 different countries and nearly all continents the congress is a truly global event that happens to be hosted in Slovenia traditionally for already 30 years. Whatever challenges you face within your clinical work and/or research influencing by a health system you have in your environment, you will find solutions to address them here.

As well as benefitting from the scientific sessions we hope you will enjoy the attractions of Slovenia and take home pleasant and useful memories of the time spent with colleagues.

Welcome again at the 9th International Congress on Cerebral Palsy at beautiful alpine lake Bled.

Milivoj Veličković Perat
President of Organizing Committee

Committees

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- **Janez Fajfar**, Mayor of Municipality Bled

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- **Tatjana Dolenc Veličković**

Programme

Pre-Congress Programme

Wednesday, 15 May 2013

Pre-Congress Workshops

Venue: Hotel Kompas, Bled

13:00–17:00 Parents Forum

Organized by **Mojca Žižek** (Slovenia), **Andreja Kovač** (Slovenia)

Chair: **Veronica Deysi Colombo** (Bolivia, Italy), **Mladenka Naletilić**
(Bosnia and Herzegovina), **Tatjana Dolenc Veličković** (Slovenia)

- **Esther Mundia** (Zambia): Parents Should Exchange Experiences

Main Congress Programme

Wednesday, 15 May 2013

Venue: Festival Hall at Lake Bled

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12:00–17:45 Registration of Participants

18:00–18:30 Informal Get-Together Party

18:30–19:00 Opening Ceremony

19:00–20:00 Introductory Lecture

Thursday, 16 May 2013

Venue: Festival Hall at Lake Bled

09:00–09:45 Meet the Experts; Diagnostic Procedures

Chair: **Biserka Rešić** (Croatia), **Breda Šušteršič** (Slovenia)

- **Christa Einspieler** (Austria): How Specific are Abnormal GMs for the Prediction of Cerebral Palsy?

09:45–10:15 Break

10:15–12:00 Plenary Session

Chair: **Michael Johnston** (USA)

- **Francesco Guzzetta, Domenico Battaglia, Emma Losito, Eugenio Mercuri** (Italy): Thalamic Involvement in Early Brain Injuries; its Role in Determining Status Epilepticus in Sleep

- **Ajda Anžič, David Neubauer, Maja Jekovec - Vrhovšek** (Slovenia): Correlation between Muscle Tone and Motor Developmental Impairment with Biochemical Levels of Carbohydrates in Urine

12:30–14:00 Luncheon Poster Session

Poster Guide: **Beata Kasprovicz** (Poland)

- **Elena Ziakova** (Slovakia): The Impact of EEG Biofeedback for Voluntary and Involuntary Movement Disorders of Children Compared to Classical Rehabilitation
- **Yolanda González-Alonso** (Spain): Families and People with Aging Cerebral Palsy: Supports and Services
- **Júlia Ballester-Plané, Olga Laporta-Hoyos, Violeta Lozano, Ana Narberhaus, Dolors Segarra, Leire Zubiaurre-Elorza, Pilar Póo, Alfons Macaya, Mar Meléndez, Teresa Castelló-Verdú, Violeta Tenorio, Elida Vázquez, Ignacio Delgado, Maria Eugenia Russi, Roser Pueyo** (Spain): Executive Function Influences Quality of Life in Adolescents and Adults with Cerebral Palsy
- **Marija Avsenik** (Slovenia): Outcomes of Children with Developmental Delay Referred to the Department for Developmental Disorders, after a 20 Month Period

14:00–15:30 Plenary Session

Chair: **Yuri Romanov** (Russia), **Maja Jekovec - Vrhovšek** (Slovenia)

- **Michael Johnston** (USA): Potential for Cell-Based Therapies for Cerebral Palsy
- **Biserka Rešić** (Croatia): Cerebral Palsy and Genetics

15:30–16:00 Break

16:00–18:00 Poster Session

Poster Guide: **Mohammed Al Jabri** (Saudi Arabia), **Ajda Anžič** (Slovenia)

- **Stanislava Klobucka, Michal Kovac, Elena Ziakova** (Slovakia): Improvement of Gross Motor Functions Depending on the Number of Therapeutic Units of Robotic Assisted Treadmill Training in Patients with Cerebral Palsy
- **Alexey Kholin, Elena Ilina, Raisa Bembeeva, Ekaterina Simbirceva, Inessa Fedonyuk, Larisa Kolpakchi, Svetlana Nemkova, Nikolay Zavadenko** (Russia): Cortexin® in Additional Therapy of Cerebral Palsy Associated with Epilepsy
- **Maria Guseva** (Russia): Colour Therapy and Medical Drugs as Components of Neuroprotection
- **Júlia Ballester-Plané, Olga Laporta-Hoyos, Elida Vázquez, Ignacio Delgado, Leire Zubiaurre-Elorza, Dolors Segarra, Ana Narberhaus, Alfons Macaya, Pilar Póo, Mar Meléndez, Teresa Castelló-Verdú, Violeta Tenorio, Maria Eugenia Russi, Roser Pueyo** (Spain): The Peabody Picture Vocabulary Test-III is a Good Indicator of the Volume of White Matter in Cerebral Palsy
- **Edina Karabeg, Biserka Rešić, Enes Karabeg, Adi Karabeg** (Bosnia and Herzegovina): Neurodevelopment of Children with Perinatal Risk Factors – Follow-up at Outpatient Clinic in Bosnia and Herzegovina
- **Liang Tang, Zi-Cai** (China): A Preliminary Study on SPECT Regional Cerebral Blood Flow Imaging and Clinical Significance of Dyskinesia in Children with Cerebral Palsy

20:00 Concert of classical music at Parich Church at Bled

Friday, 17 May 2013

08:00–08:45 Meet the Experts; Exercises in Vasa Concept

Chair: **Júlia Ballester-Plané** (Spain)

- **Rajul Vasa** (India): »Negative contribution« of Automatic Postural Control on Development of Child with Brain Lesion

09:00–10:30 Plenary Session

Chair: **Francesco Guzzetta** (Italy), **Tatjana Dolenc Veličković** (Slovenia)

- **Karin Prechtl-Roth, Heinz F. Prechtl** (Austria): The Choreiform Syndrome – a Forgotten Cerebral Palsy Disorder
- **Liu Zhen-Huan, Q Yan-Chao, Pan Pei-Guang, Ma Mei-Mei, Qian Xu-Guang, Fu Wen-Jie** (China): Brain Nervous Development and Neuro-Restoration of Children with Cerebral Palsy by Acupuncture

10:30–11:00 Break

11:00–12:30 Plenary Session

Chair: **Karin Prechtl-Roth** (Austria)

- **Liu Zhen-Huan, Ding Jianying** (China): The Clinical Research of Early Intervention to Cerebral Sub-Health Infants by Traditional Chinese Medicine
- **Esther Mundia** (Zambia): Cerebral Palsy Rehabilitation Centre in Zambia

12:30–14:00 Luncheon Poster Session

Poster guide: **Alexey Kholin** (Russia)

- **Yolanda González-Alonso** (Spain): Implementation of the ICF (International Classification of Functioning, Disability and Health) in the Entities Aspace
- **Elena Aronskind, Olga Lvova, Ekaterina Zyuzgina, Viktor Shershnev, Elena Dugina, Ekaterina Zotova, Anastasiya Popova, Yevgeniya Tihomirova, Polina Nikiforova** (Russia): Efficiency of Air-Neuro-Orthopaedic Rehabilitation Method in Children with Cerebral Palsy
- **Yuri Romanov, Oleg Tarakanov, Sergey Radaev, Tamara Dugina, Svetlana Ryaskina, Anna Darevskaya, Nelli Zotova, Gennady Sukhikh, Vladimir Smirnov** (Russia): Human Allogeneic AB0/Rh-Identical Umbilical Cord Blood Cells in the Treatment of Patients with Cerebral Palsy

14:00–15:30 Plenary Session

Chair: **Gabriella Czifra** (United Kingdom), **Andreja Kovač** (Slovenia)

- **Milivoj Veličković Perat** (Slovenia): Definition of Alternative Medicine (CAM)
- **Liu Zhen-Huan, Zhao Yong, Luo Guanjun, Li Nuo, Zhao Wenjian** (China): Clinical Study of Chinese Massage Combined with Music Therapy in Treatment of Cerebral Palsy
- **Liu Zhen-Huan** (China): Clinical Research on Improving the Brain Microcirculation of Children with Cerebral Palsy by Acupuncture

15:30–16:00 Break

16:00–18:00 Plenary Session

Chair: **Liu Zhen-Huan** (China), **Janja Drobež** (Slovenia)

- **Veronica Deysi Colombo, Domitilla Pagani** (Bolivia): »Feeding with Love«: the Severe Anemias and Neurodisabilities in Bolivian Population
- **Maja Jekovec-Vrhovšek, Damjan Osredkar, David Neubauer** (Slovenia): First Slovenian Data within European Cerebral Palsy Register
- **Alexey Kholin, Elena Ilina, Raisa Bembeeva, Ekaterina Simbirceva, Marina Zaiceva, Svetlana Nemkova, Nikolay Zavadenko** (Russia): Forms of Epilepsy in Children with Cerebral Palsy

20:00–23:00 Farewell Dinner (Limited spaces!) at Avsenik, Begunje

Saturday, 18 May 2013

08:00–08:45 Meet the Experts; Stojčević Polovina Therapeutic Approach

Chair: **Elena Ziakova** (Slovakia)

- **Milena Stojčević Polovina, Andrea Polovina, Svetislav Polovina, Tanja Laktašić** (Croatia): Is It Possible to Change the Natural Course of Cerebral Palsy?

09:00–10:30 Plenary Session

Chair: **Vera Levchenkova** (Russia)

- **Tatjana Dolenc Veličković** (Slovenia): Development and Neurodevelopmental Treatment
- **Cécile Holenweg-Gross, Leonor Antonietti-Barujel** (Switzerland): Independent Driving in an Electrical Wheelchair For Children Level IV (GMFCS) with Significant Asymmetry in Hands Activity
- **Cécile Holenweg-Gross, Leonor Antonietti-Barujel** (Switzerland): Cycling in Children Level IV/V (GMFCS) in Specialized School Context

10:30–11:00 Break

11:00–12:30 Plenary Session

Chair: **Rajul Vasa** (India)

- **Gabriella Czifra** (United Kingdom): Conductive Education: a Neuro-Rehabilitation System for People with Cerebral Palsy
- **Doris Ossberg, Thorsten Gegenwarth, Thomas Reinelt** (Austria): Life Long Conductive Sports Education for People with Cerebral Palsy – a Key Element for Successful Rehabilitation (The Adapted Skibob – Wintersports for People with Special Needs)
- **Liu Zhen-Huan, Q Yan-Chao, Pan Pei-Guang, Ma Mei-Mei, Qian Xu-Guang, Fu Wen-Jie** (China): Brain Nervous Development and Neuro-Restoration of Children with Cerebral Palsy by Acupuncture

12:30–14:00 General Assembly of Slovene NDT Association

Chair: **Silva Bajde** (Slovenia), **Darja Nagode** (Slovenia), **Tatjana Dolenc Veličković** (Slovenia)

- **Milivoj Veličković Perat** (Slovenia): History of Slovene NDT Association
- Guests greetings
- Election of a New Board

14:00–16:00 Plenary Session

Chair: **Taisiya Serganova** (Russia), **Jože Primožič** (Slovenia)

- **Liu Zhen-Huan, Wan Ruiping** (China): Measurements of Quality of Life for Children with Cerebral Palsy
- **Liliana Padure, Veronica Morcov, Luminita Preduca** (Rumania): The Quality of Life and Coping Mechanisms of Families with Children with Cerebral Palsy
- **Belsem Zmantar-Boussetta** (Tunisia): How to Develop Home Accompaniment of Persons with Cerebral Palsy to Improve Their Quality of Life

16:30 Closing Remarks

18:00 Farewell at the Bled Castle

Ajda Anžič¹, David Neubauer², Maja Jekovec - Vrhovšek³

Correlation between Muscle Tone and Motor Developmental Impairment with Biochemical Levels of Carbohydrates in Urine

ABSTRACT

KEY WORDS: muscle tone, motor development, carbohydrates

AIMS. The aim of investigation is to establish the link between biomarkers of ten different carbohydrates in urine of children, their developmental motor delay and/or disorders of muscle tone. **METHODS.** Ninety-one children aged 0–5 years took a part in the study. They were admitted to the Department of Child, Adolescent and Developmental Neurology at the University Children's Hospital in Ljubljana because of a disorder of muscle tone (hypotonic syndrome, hypertonic syndrome, hemisyndrome) and/or a motor developmental delay, measured as developmental quotient below 80 (DQ < 80). All children have had undergone clinical diagnostics and electrochemical detection of sugars in the urine (fucose, sucrose, arbinose, galactose, glucose, xylose, fructose, ribose, lactose and mannose) using ion chromatography combined with electrochemical detection and tandem mass spectrometry was done. **RESULTS.** Out of 91 participants 52.63% of children had simultaneously a delayed motor development and a disorder of muscle tone; 6.58% had delayed motor development without any disorders of muscle tone; 21.05% had decreased muscle tone with no variations in motor development. In 31.58% of children at least one sugar in urine had an elevated level. The absolute value of each sugar in the urine cannot be used as a predictable factor of children's motor developmental delay or muscle tone disorders. However, there is a correlation between the relative values of all ten sugars in the urine with the clinical picture of a child's tone and motor development. **CONCLUSIONS.** Relative values of ten sugars in urine can be taken as one of the factors which can help us to determine child's developmental delay and/or muscle tone disorders. Just absolute values are not sufficient for assuming child's neurodevelopment status.

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Marija Avsenik¹

Outcomes of Children with Developmental Delay Referred to the Department for Developmental Disorders, after a 20 Month Period

ABSTRACT

KEY WORDS: developmental disorder, neurodevelopmental treatment, long-term outcome

The aim of the study was to assess the outcomes after 20 months, of children who had been referred to the Department for Developmental Disorders during the years 2008–2010 for reasons of developmental delay. The Denver developmental screening test and clinical neurologic examination was used to assess outcomes. In Slovenia, Bobath's neurodevelopmental treatment is generally used. This is based on influencing muscle tone and improving postural alignment by specific handling techniques and attempts to facilitate improved active participation. Neurodevelopmental treatment also includes improving a child's cognitive development, working for better active participation and the practice of specific skills. Essential to this, is parental education to enable parents to manage their child's difficulties appropriately and to facilitate the parent-child relationship. On average, during the years 2008–2010, every fifth child from my part of the outpatient unit was referred to the Department for Developmental Disorders. For most of them, early neurodevelopmental treatment was introduced, and results after 6 months of treatment were good – most of the children improved and even, in some cases, normalisation of development was achieved. After 20 months, 6 of those children are no longer patients in my part of outpatient unit, and 39 out of the 70 children are still under supervision of a developmental paediatrician. Some continue to need neurophysiotherapy, occupational therapy and speech therapy. Emotional support and encouragement are important elements of the therapy.

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Dolors Segarra⁵, Leire Zubiaurre-Elorza⁶, Pilar Póo⁷, Alfons Macaya⁸, Mar Meléndez⁹,
Teresa Castelló-Verdú¹⁰, Violeta Tenorio¹¹, Elida Vázquez¹², Ignacio Delgado¹³,
Maria Eugenia Russi¹⁴, Roser Pueyo¹⁵

Executive Function Influences Quality of Life in Adolescents and Adults with Cerebral Palsy

ABSTRACT

KEY WORDS: quality of life, adolescents, adults

BACKGROUND. Functional motor status and intelligence have been associated with quality of life (QOL) in cerebral palsy (CP). However, mainly children with CP have been investigated while adolescents and adults are less studied. Recent works on populations without CP focus on the influence of executive function in QOL measures. This relationship has not been studied in CP, although a deficit in the executive system has been described in this population. The aim of this study is to analyze if executive function as well as functional motor status and intelligence measures are related to QOL in adolescents and adults with CP. **METHODS.** QOL of 16 subjects diagnosed as dyskinetic CP secondary to hypoxic-ischemic encephalopathy (age range: 13–50, mean: 25.37, standard deviation: 12.31) was assessed by means of the parent-proxy CP QOL-Teen questionnaire. A QOL total score was calculated. Executive function was assessed by the widely used Wisconsin Card Sorting Test (WCST). Standardized measures were used in order to control for age effects. The Gross Motor Function Classification System and the Bimanual Fine Motor Function were used to categorize functional motor status. Intelligence was assessed using the Raven's Progressive Matrices and the Peabody Picture Vocabulary Test. **RESULTS.** Correlation analysis showed no relationship between QOL and either level of motor functioning or intelligence scores. However, there was a significant positive correlation between QOL and WCST measures (categories completed: $r = 0.501$, $p = 0.024$; total errors: $r = 0.584$, $p = 0.009$), indicating that better performance in the

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WCST is associated with higher scores of QOL. CONCLUSIONS. In this preliminary study, QOL of adolescents and adults with CP was related with a specific cognitive domain: executive function. Therefore, we suggest that executive dysfunction may be considered a risk factor for poor QOL in CP and should be taken into account in the interventions to improve QOL of people with CP.

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The Peabody Picture Vocabulary Test-III Is a Good Indicator of the Volume of White Matter in Cerebral Palsy

ABSTRACT

KEY WORDS: white matter volume, cerebral palsy

BACKGROUND. Cognitive impairments often accompany motor disorders in cerebral palsy (CP). But it is difficult to use the classical scales of general cognitive performance due to the alterations in communication and handling objects seen in these patients. The aim of this study is to compare three tests of general cognitive performance suitable for people with CP (two commonly used tests and a new one). Specifically we compared the scores of these tests and we analyzed their relationship to grey matter, white matter and total intracranial volume. **METHODS.** Eleven subjects (mean age: 17.64; standard deviation: 6.74) diagnosed as dyskinetic CP secondary to hypoxic-ischemic encephalopathy performed the following tests: Raven's colored progressive matrices (RCPM), Peabody picture vocabulary test-3rd (PPVT-III) and Wechsler non-verbal scale of ability (WNV). Intelligence quotient (IQ) scores were used in the analysis. Seven subjects also underwent a magnetic resonance imaging to obtain T1-weighted images which were analyzed using voxel-based morphometry (VBM). **RESULTS.** Repeated measures analysis revealed that the PPVT-III scored significantly lower than the other tests. Pearson correlation analysis showed that only the IQ obtained with the PPVT-III showed a strong positive correlation with white matter volume ($r = 0.928$; $p = 0.008$). Further analysis using VBM technique showed that those areas that correlated with the PPVT-III might correspond bilaterally to tracts previously described as altered in dyskinetic CP: superior longitudinal fasciculus, thalamic radiation and corticospinal tract. **CONCLUSIONS.** We observed that the PPVT-III as a measure of general cognitive performance in CP provides a different IQ score than RCPM and WNV. This test may be sensitive to the state of brain structure; specifically to white matter volume. We conclude that the PPVT-III could be a good indicator of white matter injury in CP.

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How to Develop Home Accompaniment of Persons with Cerebral Palsy to Improve Their Quality of Life

ABSTRACT

KEY WORDS: accompaniment, life quality, cerebral palsy

Meeting the needs and demands of people with cerebral palsy is not simply a matter of financial means but it is more a matter of professional competence and motivation to provide the appropriate home support by Life care takers. The basic role the home care taker addresses the persons suffering from fragility, dependency or temporary difficulties due to disability or social difficulties. Because of family state, young age, cerebral palsy, state of dependency, the need for assistance in the family daily lives, home maintenance, preservation and restoration or enhancement of their autonomy, social inclusion and the fight against exclusion are a must. Home help is characterized by a professional intervention with these people in their homes. Therefore, this support should be given in accordance with the lifestyle choices of the individual concerned. The home intervention is an accompaniment and support of people with cerebral palsy in their daily lives notably including basic documents, daily and social activities communication, entertainment and counselling. The objectives of the intervention of the ADV are: reducing preventable disability, improving the life quality of the person with cerebral palsy in need of help, preventing complications of disability, bed rest, isolation, improving the conditions and quality of life of family caretakers, keeping the persons in their natural environment and family.

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Conductive Education: a Neuro-Rehabilitation System for People with Cerebral Palsy

ABSTRACT

KEY WORDS: conductive education, neuro-rehabilitation, cerebral palsy

AIMS. Conductive Education is an educational system that has been specifically developed for children and adults who have motor disorders of neurological origin such as cerebral palsy. The aims of Conductive Education are: to teach a normal life style, to encourage personality development, to reconstruct functioning which requires different organisational strategies, to nurture a positive outlook and an ability to solve problems and overcome challenges. **METHODS.** Conductive Education views education, treatment and rehabilitation as a homogeneous and indivisible unit. It brings together and combines all those components that are separated and disconnected in learning, in development and in the lives of children with disabilities and their families: movement, motivation and emotion; skills and understanding; ability and potential; teaching and learning; body and soul. Conductive Education recognised that learning is not dependent upon inherent abilities, but that new abilities are created as a result of learning. Thus the goal is to mediate between the world and the child by creating within him/her new abilities and potentials rather than merely utilizing existing potential. Fundamental features of Conductive Education are: the Conductor – specialist educators, the Group – plays very important part in the development of individual/s personality and social skills, the Programme – a planned learning programme, the Task Series – are a structured part of the daily programme (they are not a set of exercises but a teaching tool), Rhythmical Intention – the use of language to plan, imagine, intend and implement a movement. **RESULTS.** As Conductive Education is not a therapy but continuous learning process it is quite challenging to find or establish a comprehensive evaluation system. Participants and their families are reporting positive changes and improvement in their quality of life, their independence and ability to interact with the world around them. The first Conductive Education Centre was opened by Professor Andras Peto (the founder of the method) in 1952 in Budapest and since then the method have been widely accepted and used in many countries from Brazil to China. **CONCLUSIONS.** Conductive Education's innovation is the recognition that the disability, in and of itself, causes learning difficulties for children with disabilities and offers education and teaching that will enable them to overcome these difficulties at home, at school and in society. Professor Andras Peto recognised (a way ahead of his time) the significant importance of brain plasticity and one's ability to override wrongly established motor patterns and seek for new pathways and solutions whilst improving independence.

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The Re-Education of Walking – General Functional Objective by Physical Therapy of Children with Extrapyramidal Syndrome

ABSTRACT

KEY WORDS: physical therapy, extrapyramidal syndrome, walking, personal autonomy

BACKGROUNDS. The extrapyramidal syndrome is a functional concept in the way that a group of systems spread at different level of the brain and with own neurophysiologic mechanism interconnects through multiple neural circuits in an ample system which casts itself both on the motor cortex and on the neuron of the peripheral nervous system. The present work proposes the study of the ways which prevent the unwished secondary effects of a walking, incorrectly learned and help the children with this extrapyramidal syndrome to walk independently. The facilitation of movement control at every stage: mobility, stability, controlled mobility, ability. The aim of the work is to present the intermediary specific objectives: coordination – balance – sensitivity, range of motion of the lower limb articulations, endurance/strenght of the involved muscularity. **METHODS.** Forty-seven children with a diagnosis of extrapyramidal syndrome were analysed, with ages between 1–10 years old. The analysis achieved within the present work concerning the importance of pelvis correct alignment and the acquirement of a normal tonus of the low limbs and pelvis muscles allows the issue of some final conclusions, which may be synthesized, such as: effective decontracturation of spastical muscles which should allow the hypotonic involved muscles in effecting the anatomical movements, the improvement of motion control performance, the diminution/rebutment of involuntary movement, the moderation and changing the deficient attitudes of the parts of the locomotor system, ortostatism acquiring and education or re-education of walking, respecting the same alignment principles, thus, avoiding an incorrect walking. **RESULTS.** A good learning of walking and its correction was noted in 40% of 47 children. The improvement of muscular control by forming/perfecting the correct image of movement was also observed. **CONCLUSIONS.** Every child has a moment when his little brain realise that it is ready to move on into the next stage of developing normally from the psychomotoric point of view. Until that moment the kineto, the mother and the team have to prepare him correctly.

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»Feeding With Love«: the Severe Anemias and Neurodisabilities in Bolivian Population

ABSTRACT

KEY WORDS: feeding, anemias, neurodisabilities, nutrition deficit

BACKGROUND. This study investigates the causes and effects of a chronic and severe deficit of nutrition observed by operators of Caritas (2002–2012). Bolivian population count 10,227,299 habitants, mostly quechua aymará (56%) and the other (38%) without definite origin. 60% of people live in poverty with child malnutrition (46%), use of drugs cocaine-marihuana (1.4–5.2% among students) and alcohol (41%); these last interfere with the absorption of nutrients. The country has woods (38%), grazing land (52%) with a productive area of 6.5 million hectares of earth but 54% is not cultivated and 33% of population does not have access to health clinics. **METHODS.** Resorting to the Data of National Investigation of Demography and Health, and Surveillance Epidemiological and Nutritional System we intend to verify the percentages of underfed children (33%) and women (27%). The anemia is the principle cause of morbidity and these data are one of higher in Andean countries. Natural foods like vegetables or meats are rich of vitamins and iron but they are not common in their base alimentation with high consumption of carbohydrates and low supply of proteins (14.4% calories by animal origin with a food deficit of more than 400 calories per day). **RESULTS.** Malnutrition is correlated with sideropenic anemia for iron and vitamins deficiency, in fact more of half children with anemia 70% under 5 years of age require »flour of supplementation«. While 50% of pregnant women have a sideropenic anemia or megaloblastic anemia by folate deficiency. These phenomena induce 55% rate of miscarriage, 12% low birth weight for delay of intrauterine growth and premature birth or neuronal tube defects. The rate of mortality is 75/1,000 live births and 105 under 5 years of age. So the 80% of children under 2 years of age have deficiency anemia, although the breastfeeding is prolonged. Children with endocrinological and autoimmune diseases, such as diabetes or thyroid diseases, may have an increased risk of developing a pernicious anemia caused by lack of vitamin B12 in their daily diet. **CONCLUSIONS.** This preliminary study suggests the need to integrate food flour with iron, folate and vitamins B not only of the underfed children but also for the fertile women. This project wants to prevent, at an early age, anemias by nutritional deficiency affect cerebral palsy with physical and mental disabilities specifically in preterm. Other symptoms are irritability, mental confusion, instability in the movements and numbness or tingling in the hands and feet in child. It is also found that in the case of severe sideropenic anemia for a deficiency of vitamin C, children must be supplemented with iron and multivitamins tablets to reduce the risk of mortality by frequent respiratory infections; in addition to treat the fatigue, muscle weakness, restless leg syndrome, poor attention, concentration, disorders of learning and behaviour.

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Development and Neurodevelopmental Treatment

ABSTRACT

KEY WORDS: brain, cerebral palsy, neurodevelopmental treatment, outcome

BACKGROUND. Advanced perinatal care has resulted in a decrease in perinatal mortality and an increase in the number of surviving neonates being at high risk for the developmental disability. Brain damage can be detected by advanced assessment techniques but it cannot predict the developmental outcome. The most important and powerful tool for early detection of brain dysfunction in young infants is longitudinal clinical observation of the infant in close intervals. Characteristic syndromes of cerebral palsy (CP) appear gradually much later in the child's development, usually not before six to twelve months of age or even later. After the birth we can assess the quality of the persisting and continuing spontaneously generated movement repertoire. We have to observe the longitudinal developmental trajectory of general movements to the last transformation state into fidgety. Persistently abnormal general movements and abnormal or absent of fidgety characteristics at three months of corrected age indicate a serious risk for abnormal development. The growing dominance of abnormal movement patterns three months of age is an absolute indication to start Neurodevelopmental Treatment (NDT) (adapted for babies). **METHODS.** The cohort 491 of at risk children born in years 1978–2006 was longitudinally followed by the same medical doctor and treated by the same NDT physiotherapist. There were 343 term newborns, 148 preterm newborns; 36 (7%) of them <30 week of gestation, 30 (6%) were with signs of intrauterine growth retardation. **RESULTS.** Two hundred and sixty-four (54%) of babies who were detected and treated at corrected age 0–3 months, 29 (11%) of them developed CP. Those 118 (24%) who were detected and treated at corrected age 4–6 months 17 (14%) developed CP; 58 (12%) who were detected and treated at corrected age 7–9 months 12 (21%) developed CP; 16 (3%) who were detected and treated at corrected age 10–12 months 2 (13%) developed CP, and of 35 (7%) babies who were detected and treated at corrected age over 12 months 14 (40%) developed CP. In the second study we compared the differences between early treatment to late treatment on the development of contractures and deformities and the need for surgery in children with CP. In the cohort of CP children born in years 1967–1971 (a late beginning of NDT treatment) 28.6% undergone surgical procedures and in the cohort of 74 CP children born in years 1978–2006 only 12.3% have undergone orthopaedic surgery and 8% were treated with botulinum toxin injections. **CONCLUSIONS.** NDT is in practice a successful approach but we should not think that we can cure a brain lesion or cerebral palsy, or that we can change all cases to only »minimal«. If treatment is started before abnormal patterns of movement have become established we can help the child to organise his potential abilities in what for him is the most normal way.

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Life Long Conductive Sports Education – a Key Element for Successful Rehabilitation: the Adapted Skibob – Wintersports for People with Special Needs (Especially People with Cerebral Palsy)

ABSTRACT

KEY WORDS: conductive sports education, special needs

BACKGROUNDS. In Vienna we have 40 years of experience in offering sports education conductively. From kindergarden age conductive sports activities and education plays – beside plinth programs and other conductive elements – an important role in the daily routine of our clients. We offer both summer and winter activities. About 10% of the population of an industrialised country have a disability or chronic disease. Besides that an ageing population challenges us in developing adequate wintersport equipment. For these two growing target groups and their sometimes highly individual needs a consortium of partners initiated a project to develop wintersport equipment that offers possibilities to actively participate in wintersport activities irrespective of age, disability or special need. **METHODS.** As skiing is a national sport in Austria we developed the so-called »Adapted Skibob« in a children and adult version. The skibob is not only a vehicle with which those who would never be able to ski could experience the thrill of snow sport and the wonderful winter landscape of the Alps, it can also be used as an excellent sports and training aid. In some cases the »Adapted Skibob« is utilised for rehabilitation issues. **RESULTS.** Besides focusing on sport and leisure activities and rehabilitation issues the project has another very important area of focus. Although more and more children with special needs could go to mainstream schools there are still a huge number of hurdles concerning sports education. There are several specifically designed sports aids available worldwide to allow children with special needs to learn skiing and so to participate in winter sport education with their classmates. But the techniques to use and availability of those aids are still limited and not widely shared. Therefore it was the aim of the project to develop a sports aid in cooperation with several partners, that is first of all easy to use and to transport and secondly affordable not only for institutions but also for families. Besides that we plan to establish training courses for interested teachers, families and professionals. **CONCLUSIONS.** This presentation gives an overview about the available winter sports aids, theoretical concepts, practical examples and the development process of the so-called Adapted Ski-Bike. Besides drawing conclusions we will present the benefits for people with special needs of all ages being able to join their classmates, friends or families in winter sport activities. Besides drawing conclusions we will present the benefits for people with special needs being able to join their classmates in winter sport education from a conductive as well as inclusive perspective.

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Families and People with Aging Cerebral Palsy: Supports and Services

ABSTRACT

KEY WORDS: cerebral palsy, aging, supports, services

BACKGROUND. The demographic changes imply challenges and opportunities in the population and in people with cerebral palsy (CP). Active aging is the right to quality care and according to the needs. The bio-psycho-social analysis appoints protective factors and risk for the family. Our aims were to identify the supports and services for families and people with aging CP. **METHODS.** CP is not a progressive disorder but when the people are 45 years old, sometimes organic functional impairment starts. People with CP may be understood as a heterogeneous group so their needs and the intensity of these are different. The needs of families are different and we must join both situations and propose solutions together. Participants were 20 relatives of people with CP older than 45 years old, (13 fathers/mothers and 7 brothers). We show services and activities valued highly specialized by the Confederation ASPACE. We interviewed them, organised association meetings and meetings with families. **RESULTS.** We collected these data: 100% Guidance and Support to families, 60% Rehabilitation, 60% Center the Day, 50% Residence, 25% Activities Leisure. The support needs of the aging process in people with CP are: 60% full assistance and 40% important physical assistance. All of them had great difficulties in communication, walking (all use wheelchairs) and difficulties to eat. The families have high satisfaction in the services (6 = a lot of satisfaction): Rehabilitation (5.4), Center the Day (4.5) and Residence (5.2). **CONCLUSIONS.** The quality of life in the family depends on the supports and services received. The Centers attempt to provide services and support to care for people with CP in aging process and to offer new opportunities to improve the quality of life of families.

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Implementation of the ICF (International Classification of Functioning, Disability and Health) in the Entities ASPACE

ABSTRACT

KEY WORDS: International Classification of Functioning, Disability and Health, multidisciplinary network, cerebral palsy

BACKGROUNDS. For institutions of care for people with cerebral palsy, the current interest is in helping to identify collective based on functional profiles, rather than diagnostic levels. Accordingly, individuation then becomes a central aspect in the design and development of intervention plans for people with cerebral palsy. **AIMS.** Apply International Classification of Functioning, Disability and Health (ICF), to speak in the same language standardized and endorsed by World Health Organization (WHO). Thereby promoting the development of therapeutic programs and specific treatments according to profiles obtained from the ICF valuations and analyse the evolution of users to certain treatments. **METHODS.** In order to achieve a multidisciplinary networking, there is the development of a software tool for accessing the Internet that will house all of the items in full ICF. This tool will therefore make evaluations through ICF and get functional profiles of the users of the centers, and thereby generate information on the group of people with cerebral palsy treated in ASPACE centers so that they can develop scientific and statistical studies on this information. This research will develop in different areas: epidemiological investigation, social research and clinical research. **RESULTS.** The proposed application of the ICF in ASPACE entities is justified based on several aspects, first the scientific interest of the project and the social interest. The scientific interest of the project is based on three factors: ICF itself, the sample, because of its size and nature, because we have 73 confederations and serves 18,000 people with cerebral palsy, networking and training. **CONCLUSIONS.** The ICF provides a unified, standardized language and conceptual framework for describing health and health-related states. This character can be used as: statistical tools, research tool, clinical tool, tool for social policy and educational tool.

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Maria Guseva¹

Colour Therapy and Medical Drugs as Components of Neuroprotection

ABSTRACT

KEY WORDS: colour therapy, reflex therapy, medical drugs, neuroprotection

Lately, in neurology the most relevant question was to find neuroprotective methods of treatment that would not have any side effects but be effective. We answer this question by using neuroprotectors (Cortexin®) and colour therapy. Nowadays, in Russian medicine a new peptide bioregulator of cerebral functions – neuroprotector Cortexin® (Geropharm, Russia) is widely used. Adult drug administered intramuscularly in a dose of 10 mg 1 time per day for 10 days; or for 10 days twice per day in the same dose (morning/afternoon – following the theory of peptide cascade; scheme used by V. Skvortsova, et al.). Cortexin® actions: on a cellular level – locally in the damaged neuron area; on a regulative level – in the exchanging process of neuromediators. Decreasing of the ATP usage is one of the most important elements in treatment disorders with ischemic conditions; Cortexin® increases processes of ATP recovery in neuron's mitochondrions. At the same time, Cortexin® slows the development of calcium dysfunction of glutamate, decreases autoimmune processes, and empowers recovery of damaged neurons. Colour therapy as a part of reflex-therapy was formed only in the last century, but had attracted the researcher's attention for a long time before. This issue was the object of interest of Cennino Cennini, Leon Battista Alberti, Leonardo da Vinci, Isaac Newton, Helmholtz, Lomonosov and others. E. I. Roerich, A. M. Behterev, R. Steiner, K. Flammarion and others worked at this question as well. Primary (blue, red and yellow) and secondary colours (green, purple and orange) are related to the body organs and tissues. Wave vibrations of the basic have a regenerating effect on the organism. The effect of different colours on the eyes affects organs through their projection in the iris. The field of colour perception is still discussed by neurophysiologists: it is not clear what is the exact part which is responsible for perception (cells, visual pathways or visual cortical parts) because trichomates have the ability to distinguish colour nuances and shades, that can vary tenfold. After a detailed survey, which was developed by Maria Guseva, and a medical examination, we create person's detailed colour «portrait». It contains the individual reaction to pure and mixed colours, personal colour scheme, which should be used under different circumstances. The next step, after colour «portrait» creation, is to choose the optimal form in which these colours are going to be concluded, usually, they are abstract, irregular in shape and size colour spots, plants elements or landscapes. The colour composition size is determined by the size of a room and screen or workplace on which person has to focus eyes more often. Method of active colour therapy could be used additionally. Method includes colours selections, appropriate for each patient, the painting of certain forms and specific colour combinations, analysis of colour choices, work with an awareness of what exactly the patient meant and wanted to express by act of creation. Usage in the treatment of the following conditions and disorders: ischemic, brain injuries, acute and chronic encephalitis and encephalomyelitis, cognitive disorders, epilepsy, suprasegmental autonomic dysfunction, delay of children's' psychomotor and speech skills development and various forms of cerebral palsy.

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Cycling in Children Level IV/V (GMFCS) in Specialized School Context

ABSTRACT

KEY WORDS: Gross Motor Function Classification System, cycling, dystonic-dyskinetic cerebral palsy

BACKGROUND. Case study of six children with video presentations and follow-up through childhood based on neuro-developmental treatment (NDT) – Bobath Concept analysis in International Classification of Functioning, Disability and Health (ICF) words to explain aims. **METHODS.** Problem solving approach cerebral palsy (CP) dyskinetic children most of them with an important dystonic component, hand activity (Bimanual Fine Motor Function (BFMF) 4/5, Gross Motor Function Classification System (GMFCS) level V) will push them backwards in sitting position. This will provoke less opportunity to develop focusing reinforcing the risk of contractures and deformities. Description of the context: this experience is the result of a team work including parents and child in a specialized school in Lausanne Intervention. We based our theoretical frame on the Bobath concept analyzes of the child problem solving situation. The main goal setting for the whole team, including the child, was to participate in cycling activity. The adult's team intervention, including parents, was to keep the engagement of the child in riding avoiding pathological patterns to be used. **RESULTS.** Activity and participation: the six children could achieve different degrees of participation in cycling. Body function and structures: improvement of alignment, focusing and breathing patterns. **CONCLUSIONS.** What did we learn? We learned the importance of team interaction to achieve a goal; need of specific motivation for each child engagement; need of repetition in daily life to integrate new programs; how the sensory-motor experience of their postural control in a pleasant activity (as cycling) could be profitable to achieve other daily life activities; How to combine different tools to get specific results, e.g. taping, lycra suit, etc. ICF terminology matches together with NDT Bobath concept and it helps to point out at which level each aim is addressed.

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Independent Driving in an Electrical Wheelchair for Children Level IV (GMFCS) with Significant Asymmetry in Hands Activity

ABSTRACT

KEY WORDS: cerebral palsy, wheelchair, hands, Gross Motor Function Classification System

BACKGROUND. Case study of four children with video presentations and follow-up through childhood based on neuro-developmental treatment (NDT) – Bobath Concept analysis in International Classification of Functioning, Disability and Health (ICF) words to explain aims. **METHODS.** Problem solving approach cerebral palsy (CP) children with significant asymmetry in hands activity (Bimanual Fine Motor Function (BFMF) 3b, Gross Motor Function Classification System (GMFCS) level IV/V) will spontaneously learn to drive with the less affected hand. This will provoke associated reactions in the more affected side reinforcing the risk of contractures and deformities. Furthermore the child would not be able to do bimanual activity; they cannot drive and do other thing. Description of the context: this experience is the result of a team work including parents and child in a specialized school in Lausanne. Intervention: we based our theoretical frame on the Bobath concept analyzes of the child problem solving situation. The main goal setting for the whole team, including the child, was to get autonomy. The adult's team intervention, including parents, was to keep the engagement of the child to drive independently avoiding pathological patterns to be used. **RESULTS.** Activity and participation: all the children could learn to drive in daily life with the more affected hand. They gain more independency while driving. Enhance use of the most affected hand. Body function and structures: improvement of alignment on body axis, better weight bearing on the more affected side and elongation of the more affected arm. Lesser associated reactions. **CONCLUSIONS.** What did we learn? We learned about the importance of team interaction to achieve a goal; need of specific motivation for each child engagement; need of repetition in daily life to integrate new programs; positives consequences in body image and self-estimate, e.g. »the worst hand« becomes »the hand to drive«; how to combine different tools to get specific results, e.g. taping, lycra suit, etc. ICF terminology matches together with NDT Bobath concept and it helps to point out at which level each aim is addressed.

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The Relationship between Mobility and Self-Care Activity in Children with Cerebral Palsy

ABSTRACT

KEY WORDS: Manual Ability Classification System, Gross Motor Function Classification System, Pediatric Evaluation of Disability Inventory, cerebral palsy

BACKGROUNDS. In a developmental perspective, children acquire the independence of daily-living based on gross motor capacity adding to manual, intellectual, and communicative functioning. Gross motor performance in a daily environment is close to the concept »mobility«. Dependence of mobility may lead to dependence of self-care activity. For instance, caregiver/parents help their mobility and cannot avoid to help self-care activity which is unrelated mobility in a daily environment such as hand wash, hair brushing, toilet task, tooth brush etc. The object of the present study was to investigate influencing factors for self-care activity development and relationship between mobility and self-care activity in children with cerebral palsy (CP). **METHODS.** This study was done with retrospective review in a rehabilitation center. Eligible criteria were: children with a confirmed diagnosed of CP, children over 4 years old. Exclusion criteria were: the Manual Ability Classification System (MACS) level V, Gross Motor Function Classification System (GMFCS) level V, intellectual disability (Korean Wechsler Intelligence Scale for Children-III <54) and behavioral problem. The Pediatric Evaluation of Disability Inventory (PEDI) self-care and mobility functional skill scales, the MACS, the GMFCS were collected from 20 children with CP (10 females, 10 males; range 4–11 years old). **RESULTS.** The relationship between GMFCS, MACS level and PEDI-self-care score was not significant. Simple regression test showed that age, PEDI-mobility and PEDI-social function are significant factor for explain PEDI-self-care. After dividing by 7 years old, PEDI-mobility was only significant factor to explain PEDI-self-care in more than 7 years old ($R^2 = 0.88$, $p = 0.03$). **CONCLUSIONS.** Because children with CP are developing, it is important that physician have insight to therapeutic strategy for different domains of daily activities. This result impose that mobility is important basis for acquisition of self-care activities.

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First Slovenian Data within European Cerebral Palsy Register

ABSTRACT

KEY WORDS: cerebral palsy, register, quality of life

BACKGROUND. Cerebral palsy (CP) registers are a useful tool to estimate the prevalence and characteristics of this common childhood disability. We have established Slovene CP register, which is part of Surveillance of Cerebral palsy in Europe Network (SCPE). This was possible by pooling data from multiple sources which required collaboration of paediatricians, obstetricians and epidemiologists. We here present first epidemiological data collected in Slovene CP register. **METHODS.** We reviewed 267 medical records of children that were born before or in the year 2004, that were sent to the register by 19 Slovenian developmental paediatricians working in regional developmental outpatient clinics. This represents roughly 80–90% of the population of CP children born before or in 2004 in Slovenia. **RESULTS.** There were 154 males (57.7%) and 113 females (42.3%). Their age ranged from 6 to 13 years. In more than half cases risk factors for CP have been identified during pregnancy. Post neonatal cause of CP was identified in only 11%. Brain imaging was done in 75.3%. In 18% magnetic resonance imaging was performed. CP was classified as spastic in majority of cases (84.9%), dystonic in 5.6%, choreo-athetotic in 3.4%, ataxic in 1.5%. It could not be classified in about 5%. The involvement was bilateral in 67.8%. Gross motor function classification (GMFCS) was assessed to be score 4 or 5 in 33.4%. Walking (without or with aids) was possible in about 60%. The most frequent bimanual fine motor function classification (BMFM) score was 1. Visual impairment was diagnosed in more than 43%, hearing impairment only in 7% of cases. Epilepsy was diagnosed in 33.3% of children. Fifteen per cent of seizures had their onset in neonatal period. Only 4 out of 267 children (1.5%) have suffered from osteoporotic bone fractures. The majority (93.3%) received neurodevelopmental treatment during the first year of life; 42.4% of them started between the third and the sixth month of life. **CONCLUSIONS.** The data collected within the register will contribute to improved quality of life of children with CP. The Slovene CP register will potentially also help to identify groups of children needing more specific diagnostic or therapeutic procedures and to provide more information to the parents.

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Potential of Cell-Based Therapies for Treatment of Cerebral Palsy

ABSTRACT

KEY WORDS: neural stem cells, mouse model, cell therapy, cerebral palsy

BACKGROUND. Stem cells of various kinds have been suggested to have the potential to benefit children with cerebral palsy (CP), either as agents to stimulate repair of neuronal or white matter injury in the neonatal period or in older children with established CP. **METHODS.** Embryonic stem cells (ESC's) are the most primitive type and have the greatest capacity to cause tumors. Somatic stem cells (SSC's) are more differentiated and can be prepared from tissues such as bone marrow (hematopoietic stem cells, HSC's), spinal cord (glial restricted precursor cells, GRP's) or human umbilical cord blood (HUCB). Stem cells can be derived from the patient's own body (autologous) or from someone else (allogeneic). **RESULTS.** In mouse models of neonatal brain injury, neural stem cells (NSC's) injected into the injured brain at two days after an hypoxic-ischemic insult can produce substantial protection although most of the stem cells do not survive. This is one of the longest therapeutic windows after the insult ever reported for a neuroprotective treatment, but the benefit is counter-balanced by the appearance of tumors in some of the injected animals. GRP's and human oligodendrocyte progenitor cells can replace myelin when injected into the shiverer mutant mouse that is deficient in myelin basic protein. At this time there are six clinical trials of stem cells listed in the United States at clinicaltrials.gov, including one in which human allogeneic NSC's are being injected into the frontal white matter of infants with Pelizaeus-Merzbacher disease, and others that are examining the potential benefits of autologous infusion of HUCB cells for neonatal encephalopathy or in older children for CP. **CONCLUSIONS.** Cell based therapies for perinatal brain injuries or CP are in the early stages of exploration and evaluation. They have not been established to provide benefit, and the risk remains to be defined.

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Follow-Up and Neurodevelopment of Children with Perinatal Risk Factors at the Age of One Year as Paediatric Outpatients in Bosnia and Herzegovina

ABSTRACT

KEY WORDS: risk newborns, risk factors, early habilitation treatments, neurodevelopment outcome, Risk and Impaired Children Registry

AIMS. We want to present registering and monitoring of risk children in pediatric practice project, their early inclusion into habilitation and neurodevelopment outcome at the age of 12 months. **METHODS.** Modeled by »Risk and Impaired Children Registry«, protocol on records, monitoring and therapy for neurorisk newborns in pediatric practice has been established whereby pediatrician is the main carrier of all activities. Well-educated pediatrician is primarily diagnostician (clinical examination, brain ultrasonography), consultant and educator (for parents), team-work coordinator (physiologist, ophthalmologist, radiologist, neuropsychiatrician) and therapist (handling, Bobath etc.). Psycho-motor development has been evaluated by Munich Functional Scale up to age of 12 months. Out of 274 newborns included in study, 203 were with one or more perinatal risk factors (RF): 96 low-risk (0–2 RF) and 107 high-risk (3 or more RF). **RESULTS.** In study group at age of 1 month (by protocol) developmental deviation were in 66/203 (32.51%); up to 12 months: slowed neurodevelopment was present in 11/203 and pathological in 5/203. In study group of 12 months of age, neurodevelopment was slower in 10/65 (15.38%) children, while pathological was slower in 13/65 (20%) children. Statistical significance in neurodevelopment outcome was in children with three or more RF and in those with higher total number of present RF. **CONCLUSIONS.** Protocol guided children had better neurodevelopment. Children with fewer neurorisk factors had normal neurodevelopment while those with certain neurodevelopment variations had three or more RF in both groups. Pediatrician's monitoring of neurorisk child was proven as significant.

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Cortexin[®] in Additional Therapy of Cerebral Palsy Associated with Epilepsy

ABSTRACT

KEY WORDS: Cortexin[®], epilepsy, cerebral palsy

BACKGROUND. Non-rare cerebral palsy is accompanied by epilepsy. The problem is the possibility of brain stimulators application in patient with epilepsy due to risk of seizure aggravation. The aim of the study was to analyse the experience of using of Cortexin[®] as additional therapy of epilepsy in children with cerebral palsy. **METHODS.** At Department of Psychoneurology N2 of Russian Children Clinical Hospital (RCCH) and Department of Neurology, Neurosurgery and Medical Genetics of Russian National Research Medical University (RNRMU) for the period of 2007–2012 were analyzed effect of additional therapy with Cortexin[®] of cerebral palsy associated with epilepsy in 84 pediatric cases (45 boys, 39 girls) at the age of 1–10 years. Doses of Cortexin[®] vary from 5 to 10 mg at courses of 10 or 20 injections. All the patients were investigated by video-EEG monitoring including sleep state. **RESULTS.** Significant positive effect for motor function and epileptic seizures was observed in 31 (36.9%) of patients. Positive effect on motor function without significant decreasing of epileptic seizures was seen in 15 (17.8%) of patients. Positive effect on epileptic seizures without significant effect on motor function was seen in 14 (16.7%) of patients. No significant effect on motor function, seizures and epileptiform discharges was seen in 23 (27.4%) of patients. Effect of seizure aggravation after the course of Cortexin[®] injections was seen in one girl with West syndrome (1.2%). Pharmacologic-induced aggravation of epilepsy by antiepileptic drugs (AEDs) in the same population of patients was observed in 7 patients (9.2%). **CONCLUSIONS.** Cortexin[®] is a highly effective drug in additional therapy of cerebral palsy associated with epilepsies. Aggravation risk of Cortexin[®] is low (1.2%, n = 1) in comparison with AEDs (9.5%, n = 8) in the same patients population.

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Forms of Epilepsy in Children with Cerebral Palsy

ABSTRACT

KEY WORDS: epilepsy, cerebral palsy

BACKGROUND. Non-rare cerebral palsy is accompanied by epilepsy. The aim of the study was to analyse the forms of epilepsy in children with cerebral palsy. **METHODS.** At Department of Psychoneurology N2 of Russian Children Clinical Hospital (RCCH) and Department of Neurology, Neurosurgery and Medical Genetics of Russian National Research Medical University (RNRMU) for the period of 2007–2012 231 cases of cerebral palsy were analyzed, of which in 84 cases (45 boys, 39 girls) different forms of epilepsy were revealed. All of the patients were investigated by video-EEG monitoring including sleep state. **RESULTS.** In the total of 84 cases of combination of cerebral palsy and epilepsy were fixed the following forms of epilepsy: symptomatic focal frontal lobe epilepsy: 25 patients (29.7%), temporal lobe epilepsy: 15 patients (17.9%), parietal lobe epilepsy: 3 patients (3.6%), occipital lobe epilepsy: 8 patients (9.5%), West syndrome: 5 patients (6.0%), severe epilepsy – multifocal independent spike foci or Markand-Blume-Ohtahara syndrome (SE-MISF): 7 patients (8.3%), partial epilepsy – multifocal independent spike foci (PE-MISF): 4 patients (4.8%), focal epilepsy of childhood with structural brain changes and benign epileptiform discharges in EEG (FECSBC-BEDC): 10 patients (11.9%), cognitive epileptiform disintegration (CED) with electrical status epilepticus at slow-wave sleep (ESES): 7 patients (8.3%). **CONCLUSIONS.** Association of epilepsy and cerebral palsy in present investigation was seen in 36.4% pediatric cases of cerebral palsy. The most frequent form was symptomatic frontal lobe epilepsy: 29.7% (n = 25). Epilepsies associated with dominative EEG patterns of brain immature – BEDC (FECSBC-BEDC + CED with ESES) were observed in 20.2% cases of epilepsy in cerebral palsy.

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Improvement of Gross Motor Functions Depending on the Number of Therapeutic Units of Robotic Assisted Treadmill Training (RATT) in Patients with Cerebral Palsy

ABSTRACT

KEY WORDS: robotic assisted treadmill training, Gross Motor Function Classification System

BACKGROUND. The aim of the study was to assess the impact of number of Robotic Assisted Treadmill Training (RATT) sessions on improvement of motor functions in patients with cerebral palsy (CP). **METHODS.** Twenty-two children (8 males) with bilateral spastic CP, aged 4–25 years underwent 40 therapeutic units (TU) of RATT using driven gait orthosis Lokomat with a frequency of 3 to 5 times a week. Outcome measures were dimension A (lying, rolling), B (sitting), C (crawling, kneeling), D (standing) and E (walking, running, jumping) of the Gross Motor Function Measure (GMFM-88), 6-minute walking test, 10-metre walk test and Functional Ambulation Categories (FAC). **RESULTS.** After completing 20 and then the 40 sessions, patients demonstrated highly statistically significant improvement ($p < 0.001$) in all dimensions of the GMFM. We also observed a highly statistically significant increase ($p < 0.001$) in walking speed and endurance when walking. Comparing the average improvement (%) in outcome parameters after 20 TU and after 40 TU, we documented a statistically highly significant difference ($p < 0.001$) in the dimension of A, B, C, D and overall improvement in the GMFM and a statistically significant difference ($p < 0.05$) in GMFM dimension E test, 6-minute walking test, 10-metre walk test. **CONCLUSIONS.** After completion of 40 sessions, patients have improved more significantly than after 20 completed sessions. Our study indicates that the number of therapeutic units of RATT affects the amount of the achieved improvement.

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The Main Principles of High Risk Infants and Cerebral Palsy Children Management

ABSTRACT

KEY WORDS: high risk infants, cerebral palsy

BACKGROUND. Cerebral palsy (CP) patients constitute considerable amount of handicapped children. The main reasons of poor outcomes are late diagnostics and the lack of effective medical technologies. The aims of our study were to present the advantages of special program for high-risk baby infants and CP children management developed by authors. **METHODS.** One thousand and fourteen patients (aged from some days to 18 years) with different CP types were managed during 35 years. Minding patients' reflex sphere dysontogenesis, the treatment effect was aimed at peripheral afferentation stimulation and impaired motor and mental development restoration. The program started beginning with the first days of life. The main methods were: special massage, passive vestibular training, original kinesiatric devices-assisted exercises therapy, hydro-kinesiatrics, individual orthopedic regime. The program also included different physiotherapeutic methods and specific study with speech therapist, psychologist and educator. Medical treatment was mainly aimed at brain metabolism and hemodynamic improvement. Homeopathic remedies were successfully used. Not less than 4 or 5 admissions for treatment (the duration of each 1–1.5 month) should be done per year. Patients' parents mustered the main methods of exercises therapy, massage and correct use of orthopedic devices while staying in hospital with their children. Out of hospital they continued this work every day. At the age of 3 it was possible to use the dynamic proprioceptive correction method for motor abilities improvement by means of special suits »Adeli« and »Gravistat«. **RESULTS.** Totally, improvement was seen in 832 (82%) patients. It was proved that the earliest possible start of a comprehensive integrated consecutive rehabilitation will improve the long-term results and limit the duration of necessary treatment and thus lessen the costs. **CONCLUSIONS.** CP patients' management is more effective when it is timely started, adequate, comprehensive and continuous.

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Efficiency of Air-Neuro-Orthopedic Rehabilitation Method in Children with Cerebral Palsy

ABSTRACT

KEY WORDS: kinesiotherapy, EVA device, cerebral palsy

BACKGROUND. One of the most efficient methods to help patient with cerebral palsy is kinesiotherapy. But each new method needs to be assessed through the principles of evidence based medicine and objective criteria such as neurological scales. The aim of the study was to evaluate author's created device EVA for children with severe cerebral palsy to compare with traditional physiotherapy complex with help of neurological scales. **METHODS.** We examined 86 children with severe cerebral palsy between the age of 1 and 12 years old. They were divided in 2 groups: children in 1st group (n = 44, the average age 4.2 years old) were prescribed to use traditional physiotherapy complex and in the 2nd (n = 42, the average age 3.7 years old) – spiral kinesiotherapy in author's created device EVA (air-neuro-orthopedic costume). For efficiency assessment we applied Modified Ashworth scale (MSA), Denver Scale and motor quotient rate (MQ) and measured them before the treatment and three months later. **RESULTS.** We identified MQ in 1st and 2nd groups as: 0.395 versus 0.308 before and 0.407 versus 0.335 after treatment. And the most significant dynamics were in 2nd group (p < 0.05). Denver Scale showed 31.4 to 31.9 months in 1st group and 8.8 to 12.7 months in 2nd group when we assessed their motor skills. We observed a trend to reduce a number of patients with severe spasticity according to MSA in both groups. **CONCLUSIONS.** We assume different kind of kinesiotherapy to be the main rehabilitation method in early life cerebral palsy's debut. New author's methods must be evaluated through the valid scales. Our air-neuro-orthopedic device – costume EVA can be considered to be perspective to improve motor skills and mental level, to decrease muscle spasticity in children with cerebral palsy.

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Delayed Development of Motor Skills – Stimulation by Games and Toys

ABSTRACT

KEY WORDS: motor skills, games, toys, parents

BACKGROUND. Games are a component of the child's spontaneous activity – an irreplaceable tool for getting to know the child and are used as a therapeutic stimulation of motor development. They are used for means of achieving the first contact with the child, motivation, stimulation and relaxation. The way of the children's play is changed in accordance with age. Frequently toys used in the first year of life are rattles, balls and various rubber toys. The aim of this case report is to show the importance of games and toys in the stimulation of motor development in children which development is on a lower level. **METHODS.** We monitored motor development of a baby from 7 to 14 months. The baby was sent for the first time on an examination by physical medicine and rehabilitation specialist for children. This child was diagnosed by paediatrician as torticollis on the right side, and, muscle hypotonia. We found out mild delay of motor development and included baby in program of motor stimulation by games and toys. **RESULTS.** At the first examination functional status of this child was: head tilted to the right, incomplete rotation of the head to the right, facial asymmetry, poor head control, decreased muscle tonus, in the supinated position captured objects with both hands, did not exceed to the prone position on his own. Also baby held hands widespread in the setting the position, with protests and rebels. In the sitting position baby's posture was kyphotic and baby was not able to take sitting position by his own. After that we started exercise program three times a day with a maximum help and work of the mother, at home. Before beginning of the program mother was trained by licenced physical therapists how to perform planned program for stimulation of motor development of the child. This program was created by physical medicine and rehabilitation specialist for children, and it consisted of sets of active exercises with help of sound stimulation toys, actively supported by fitness balls and rollers. After seven months of such program performed by mother, and controlled by specialist, child's motor development attained its peers. **CONCLUSIONS.** The games and toys are used as an integral part of a major role in the development of every child. The child playing activity leads toward improvement of his motor skills. If the parents are part of the team, and if they help with exercises repeating at home success is sure. In milder forms of delayed motor development it is necessary to apply playing with toys as a way to strengthen muscles and to stimulate the development of motor actions.

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The Life Quality and Coping Mechanisms of Families with Children Diagnosed with Cerebral Palsy

ABSTRACT

KEY WORDS: life quality, family, cerebral palsy

AIMS. The paper proposes to present the quality of life of the families with disabled children and their mechanisms of coping trying to find the best therapeutically programs to improve the life of children and their families. Our aims are to evaluate the life quality of families with children with cerebral palsy, to assess the mechanisms of coping of these families. **METHODS.** We studied 40 families whose children have cerebral palsy, admitted between 2011–2012 to our center. Our methods were: clinical interview with children and parents, FQOLS 2006 and COPE Inventory. **RESULTS.** Thirty families have a child with cerebral palsy and another health problems, 35 of them needing support for many of life aspects. Twelve families include also the grandparents, 24 are bi-parental families and 4 mono-parental families. The most involved members of the family are parents (especially mothers). For most of the families the major obstacles in treatment are delayed time before admission, insufficient care services especially in the area where they live. Regarding the financial income most of the families have a medium one and the financial wellbeing is important to them. COPE Inventory revealed that the most frequent mechanisms of coping were the use of emotional social support and use of instrumental social support followed by religious coping. **CONCLUSIONS.** The mechanisms of coping, psychological support and other therapeutic interventions (physical therapy, occupational therapy, electrotherapy) play an important role in improving the life quality of families with disabled children.

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The Choreiform Syndrome – a Forgotten Cerebral Palsy Disorder

ABSTRACT

KEY WORDS: choreiform syndrome, attention deficit hyperactivity disorder, cerebral palsy

There are school boys who run into troubles at school and at home because their writing is bad. Their reading is strange, they jump from one line into another line; they can hardly sit still and have a short attention span. In addition they are often quickly tired. A short but specific neurological examination reveals the presence of choreiform twitches in all muscles. This phenomenon is mostly overlooked although it has already been described in the 1960s in several papers. It is high time to stress again this condition: very often such patients are wrongly diagnosed as attention deficit hyperactivity disorder (ADHD) or only as behavioural disorders and are thus deprived of an adequate intervention.

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Cerebral Palsy and Genetics

ABSTRACT

KEY WORDS: cerebral palsy, genetics, neuroprotection

The last decade has witnessed an unprecedented advancement in genetic testing and a better understanding of the genetic basis of complex traits. Previously, cerebral palsy (CP) has been considered by some to be a condition primarily associated with mismanaged perinatal events. An undeniable large body of evidence has now emerged that identifies CP as being a predominantly neurogenetic condition. A carefully planned diagnostic evaluation can identify the cause of CP in 75% or more of the cases. CP and related developmental disorders are more common in males than in females, but the reasons for this disparity are uncertain. Males born very preterm also appear to be more vulnerable to white matter injury and intraventricular hemorrhage than females. Spontaneous preterm labour and preterm births are still the leading cause of perinatal morbidity and mortality in the developed world. Gene polymorphisms regulating the maternal immunologic response during pregnancy, potentially causing an inadequate immunologic response to an infectious stimulus, have been of particular interest. A number of genes are thought to be associated with preterm birth, including the adrenergic β receptor, genes related to thrombophilia and others related to immune processes. The presented studies underline the central role of infection and inflammatory response in the fetal as well as in the maternal context. A genetic component is a part of the current conception of the pathogenesis of preterm birth. New information indicates that there are important neurobiological differences between males and females with respect to their response to brain injuries. This information is relevant to understanding the pathogenesis of CP as well as to the design of future clinical trials of potential neuroprotective strategies.

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Human Allogeneic AB0/Rh-Identical Umbilical Cord Blood Cells in the Treatment of Patients with Cerebral Palsy

ABSTRACT

KEY WORDS: umbilical cord blood, cerebral palsy

BACKGROUND. In the course of post-registration clinical investigation the safety and efficacy of intravenous infusion of allogeneic HLA-unmatched umbilical cord blood (UCB) cells was studied in children with cerebral palsy and associated neurological complications. The «cell therapy» group was composed of 32 patients (1–11 years old, 23 male, 9 female) with confirmed clinical diagnosis «cerebral palsy» including 9 with spastic diplegia, 5 with hemi- and 12 with quadriplegia. In the majority of patients cerebral palsy was associated with other pathological conditions such as epilepsy (n = 9), hydrocephalus (n = 3), and optic nerve degeneration (n = 6). Almost all children had a delay of physical and mental development. Control group included 16 patients with similar manifestations of disease undergoing conservative treatment. **METHODS.** UCB was collected after informed consent during full-term normal deliveries from healthy women at the National Center of Obstetrics, Gynecology and Perinatology. Red blood cell-depleted/plasma-reduced nucleated cells were aseptically isolated by sedimentation, aliquoted in cryovials and cryopreserved. All samples were tested for HIV-1/2, hepatitis B and C, HTLV-1/2, HSV-1 and -2, CMV, syphilis (sero- and/or PCR-positive samples were discarded), characterized by AB0/Rh, CD34/CD45-positive cells content and sterility. Units approved for clinical application were consequently transferred into liquid nitrogen and stored until use. For therapeutic application, UCB cells were thawed, washed from cryoprotectant and used within 1–2 hours. Cells were introduced via peripheral vein; the time of procedure typically did not exceed 30 minutes. According to treatment plan, patients received 2–4 intravenous infusions of AB0/Rh-identical UCB cells at the average dose of 250×10^6 viable cells per infusion with 2–3 week interval. **RESULTS.** Patients' follow-up for 3–12 months demonstrated that multiple UCB cell infusions did not cause any adverse effects. On the contrary, in 80% of cases we observed positive dynamics related to statistically significant improvement of neurological status, motor functions and intellectual development. The decrease of pathological muscular tone, reduction of epileptic paroxysm frequency and amelioration in mental state were detected in 42%, 33% and 57%, respectively. The most significant clinical changes were noticed in patients received three and more cell infusions. **CONCLUSIONS.** Obtained results suggest that intravenous infusion of allogeneic HLA-mismatched AB0/Rh-iden-

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tical UCB cells may be considered as safe and effective procedure and could be included in programs of treatment and rehabilitation of juvenile patients with cerebral palsy. Furthermore, comparing to the use of autologous UCB cells, this approach allows to significantly expand the recruitment of infantile as well as adult patients suffering from various neurological conditions in which cure cell therapy could be applied.

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The Observance of Biomechanical Effects on the Estimation of Common Ankle Foot Orthoses in Cerebral Palsy

ABSTRACT

KEY WORDS: ankle foot orthose, cerebral palsy

BACKGROUNDS. The goal of an orthotic treatment in cerebral palsy (CP) is approaching physiological gait. An ankle foot orthosis (AFO) prepares the foot for initial contact, enables stability and supports the ankle's push off. It should perform a positive effect on therapy and must not lock residual physiological motion. A detailed consideration of existing AFO types shall indicate whether requirements can be met. **METHODS.** The effect of common AFO is evaluated. Considering criteria of adjustable alignment, pivot point, range of motion and spring force, solid AFO (SAFO), dynamic AFO (DAFO), floor reaction AFO (FRAFO), posterior leaf spring AFO (PLS AFO) and hinged AFO (HAFO) are compared. **RESULTS.** The alignment of most AFO cannot be adjusted. In HAFO this is possible depending on the joint type used. In PLS AFO, FRAFO and DAFO a defined pivot point is missing, while in HAFO it can be placed on the ankle joint. Nevertheless, all orthoses lock plantar flexion. Range of motion is not possible, except for certain joint types (HAFO). In PLS AFO, FRAFO and DAFO the spring force can only be regulated during producing. Elastomer springs or coil springs (HAFO) have too low spring forces. **CONCLUSIONS.** Due to an appropriate orthosis, approaching physiological gait and improving energy consumption of CP patients are possible. Common AFO do not fulfil all necessary requirements because basic adjustment possibilities are missing. The required spring force depends on gait type and on anthropometric data of the patient. The correct alignment of the orthosis using biomechanical principles is essential. Therefore, the resulting demand is: both dynamic and static AFO should be produced with an adjustable ankle joint. The optimal ankle joint enables three adjustments that can be changed separately and do not influence each other: spring force, alignment of the orthosis and range of motion.

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Is it Possible to Change the Natural Course of Cerebral Palsy? Stojčević Polovina Approach

ABSTRACT

KEY WORDS: brain lesion, rehabilitation, intensity of treatment

There are different therapeutic approaches to the treatment of cerebral palsy, but the best-known are neurodevelopmental therapy and Vojta therapy. The intensity of different treatments varies; from once a week, to a treatment on daily basis. The scientific literature states that regardless of the type of therapeutic intervention, the course of the disease cannot be changed. This means that the course of the disease is mostly predetermined by the injury of the central nervous system and is characterized by stability of Gross Motor Function Classification System (GMFCS) curves. Rehabilitation method according to Stojčević Polovina is an intensive method of treatment of children at risk of developing, or with cerebral palsy. It has been developing since 1970s, but recently its definite form and technique has evolved. The theoretical background was found in the Neuronal Group Selection Theory. Its main characteristics are intensity of treatment and process of following normal development. The efficacy of method was tested in the study which lasted five years included 24 children with cerebral palsy. The study showed improvement in Gross Motor Function Measure (GMFM) in 95% of the children, where in 50% of the children the improvement was big enough to reclassify the children into a better GMFCS level when compared to initial status. The results show that intensive rehabilitation method according to Stojčević Polovina has a significant influence on the natural course of cerebral palsy. The possibility of sustaining high intensity of treatment for a longer period of time was tested on 15 children who performed therapy between 2 and 7 years. Intensity of treatment was over three hours per day, and improvement in GMFM score ranged from 12.8% to 79%. We concluded that intensive rehabilitation is in some families possible on long run. Some children stay on the curve after sixth birthday, while some continue to improve.

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A Preliminary Study on SPECT Regional Cerebral Blood Flow Imaging and Clinical Significance of Dyskinesia in Children with Cerebral Palsy

ABSTRACT

KEY WORDS: cerebral palsy, dyskinesia, regional cerebral blood flow, single-photon emission computer cerebral blood flow (SPECT)

AIMS. To understand whether there was abnormality of regional cerebral blood flow (rCBF) and to research the correlation between clinical status, lesion location and rCBF. **METHODS.** 30 children with cerebral palsy (CP) were tested by single-photon emission computer cerebral blood flow (SPECT). In correlation with clinical analysis, we can study on the relativity between abnormality of rCBF and lesion location. **RESULTS.** Abnormality of rCBF in children with CP was found in this experiment. The most impaired brain areas were in parietal lobe, some of them were in frontal lobe and temporal lobe. **CONCLUSIONS.** In the experiments, we found that there really exists abnormality of rCBF in children with CP. In correlation with clinical analysis, we found out that some relationships between the abnormality of rCBF and lesion location were very distinctive.

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Rajul Vasa¹

»Negative Contribution« of Automatic Postural Control on Development of Child with Brain Lesion

ABSTRACT

KEY WORDS: automatic postural control, brain lesion

Baby with brain lesion initially reflects hypotonia, weakness with delayed milestone. With passage of time muscles get contracted, get wasted and remain underdeveloped. Safety of Centre of Mass (COM) is a priority for all living beings. This makes self-organizing brain with lesion, and body with hypotonia to take special measures for its safety from falling against the invariant force gravity. Immediate solution for the brain for its safety from falling is to delay the milestones to prevent COM from rising above the floor for indirect safety against the gravity when muscles are hypotonic. Vicious circle begins when COM do not rise above the ground from poor head, neck and trunk control. Limbs get deprived of loading and raising COM and in turn get deprived to develop muscle strength, length, tension-wisdom; critical for automatic postural control. As the muscles do not act to raise COM and support COM, it hugely deprives brain from proprioceptive and other sensory input that would drive postural motor system and muscles to generate force for automatic safety of COM. Brain continues to endorse not to raise COM for its safety when muscles remain hypotonic weak with increased degrees of freedom in linked segments. Self-organizing brain senses threat to its safety from internal interactive forces generated in linked segments with increased degrees of freedom capable to dis-equilibrate body COM from external forces. Brain being a solution finder makes a resolution to restrict degrees of freedom in linked segments with contracture with morphological changes in connective tissue that connects entire body and all multi links with one another and also covers muscles inside out. Contracture restricts degrees of freedom, restricts change in posture and fluid change in movement of COM. Body and brain gets deprived of experiencing disequilibrium and re-equilibrium from within when baby does not bring about change in posture by himself. Contracture and passive external support further delay milestone and delay functional connectivity of brain and body with gravity when child does not experience repeated disequilibrium and re-equilibrium from within. It is very likely that anticipatory postural circuits critical for feed-forward control for automatic safety of COM gets delayed in getting inlayed among postural centers when child does not experience disequilibrium and re-equilibrium from within. It is also very likely that inlaying of anticipatory proactive circuits promotes defensive response with freezing of COM movement with contracture around lumbo-sacral-pelvis junction to begin with, rather than promoting controlling and restoring response; inferred from clinical experience. Vicious cycle of negative contribution for automatic safety continues making child with brain lesion develop multiple complex symptoms rather than normal growth and development. Contracture in connective tissue not only restricts movements but connects multi-linked hypotonic body with one another to functionally integrate individual parts into one whole. »One whole is bigger than sum total of individual parts«. Contracture in body makes controller – »the brain« get controlled by the body for safety of COM as its priority. We need three pronged approaches. First, prevent »negative contribution of automatic postural control«, second, exploit brain's priority –

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»safety of COM«, third, promote disequilibrium and re-equilibrium from within to inlay anticipatory proactive postural circuits that promote fluid movements of COM automatically rather than promoting freezing of COM. Child develops physical independence, perceptual, cognitive speech and intellectual abilities automatically as a »by-product« with ability to control and restore COM safety from within automatically.

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The Impact of EEG Biofeedback for Voluntary and Involuntary Movement Disorders of Children Compared to Classical Rehabilitation

ABSTRACT

KEY WORDS: EEG biofeedback, voluntary and involuntary movement disorders

BACKGROUNDS. We assumed that applying EEG biofeedback therapy will strengthen the control of impulsivity and attention and among other manifestation of treatment will include improvement in motor and coordination skills. **METHODS.** Subjects consists of 60 children with cerebral palsy of mild form, associated with hypotonic syndrome and axial hypotonia, symptoms and signs involving the nervous and musculoskeletal systems, lack of coordination with combination attention deficit hyperactivity disorder (ADHD). Whole material was divided into two groups 1st group – 30 children, mean age 8.9 years old, underwent 30 EEG biofeedback procedures; 2nd group – 30 children, mean age 8.5 years old, underwent classical rehabilitation 2–3 times a week. The length of one procedure was 30–45 minutes in both groups. All children were tested using PANESS test before and after procedures and test for assessment of impulsivity and attention. Achieved total time in repetitive and pattern movements was also evaluated. **RESULTS.** Total score of all variables of PANESS test: before ($M=58.57$) and after ($M=25.87$). Significant improvement after biofeedback rehabilitation was documented ($p=0.000$). Sum of achieved time of repetitive and pattern movements was ($Mdn=101.60$) versus ($Mdn=88.95$, $p=0.000$) after procedures. In the 2nd group (classical rehabilitation) improvement in motor skills was also found out but these changes did not reach statistical significance. Achieved time: ($Mdn=137.06$) vs ($Mdn=107.85$, $p=0.000$) was significantly shorter but less marked. We have compared the differences in input and output score of PANESS test and attention and found statistically significant correlation, where the correlation coefficient is $r_s=0.511$, ($p<0.01$) – improvement in motor skill correlated with improvement of attention. **CONCLUSIONS.** Comparing results of both groups showed significantly better results in motor skills in the 1st group and similar significant results in total time of repetitive and pattern movements in the 2nd group. Supported by EU grant ITMS2622022009.

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Thalamic Involvement in Early Brain Injuries: Its Role in Determining Status Epilepticus in Sleep

ABSTRACT

KEY WORDS: early thalamic injuries, status epilepticus

There is evidence that activation of epileptiform activity during sleep may happen in patients with early thalamic injuries. This finding occurs also in brain injured children but with higher frequency when thalamus is involved. So, early thalamic injuries seem to play a role in determining age-related sleep EEG activation of paroxysmal activities. Our study consists of an analysis of 60 patients with sleep-potentiating paroxysmal activities in early thalamic injuries followed-up to the age of regression of sleep activation, in order to define their evolution profile. Our sample includes 26 children with electrical status epilepticus in sleep (ESES), 24 with sleep overactivation (S/SW discharges in more than 50% of non REM sleep), and ten with a sleep activation of paroxysmal activities concerning less than 50% of non REM sleep. Thalamic injuries were mainly early vascular in origin (early strokes, perinatal intraventricular haemorrhages, pre/perinatal periventricular leukomalacia, and perinatal hypoxo-ischemic encephalopathies). Initial development was normal in 14 cases and more or less impaired in the remaining ones. There was an age of epileptic disorder onset earlier (mean: 2 years and 19 months) than that reported in other aetiological groups, whereas the onset of epileptiform activity in sleep was in the range reported in literature. As usually observed in syndromes with continuous spikes and waves during slow sleep (CSWS), severity of clinical manifestations (epileptic, behavioural and cognitive regression) in the acute stage was evidently high, in particular in patients with ESES more than in those with overactivation. Twenty seven patients were studied after the regression of paroxysmal activation. Among them, we observed an improvement of cognitive competences in 11 cases and a reduction of behavioural disorders in 12 patients. Peculiarities of single neuropathological groups were found: namely, patients with early neonatal strokes generally presented typical ESES, later control of seizure, but a better improvement of behaviour and cognitive competence at outcome; an earlier onset of seizures and ESES was observed in post-infectious cases. Possible explanation of these differences and, in general, of mechanisms of the epileptic disorder in early thalamic injuries will be discussed.

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