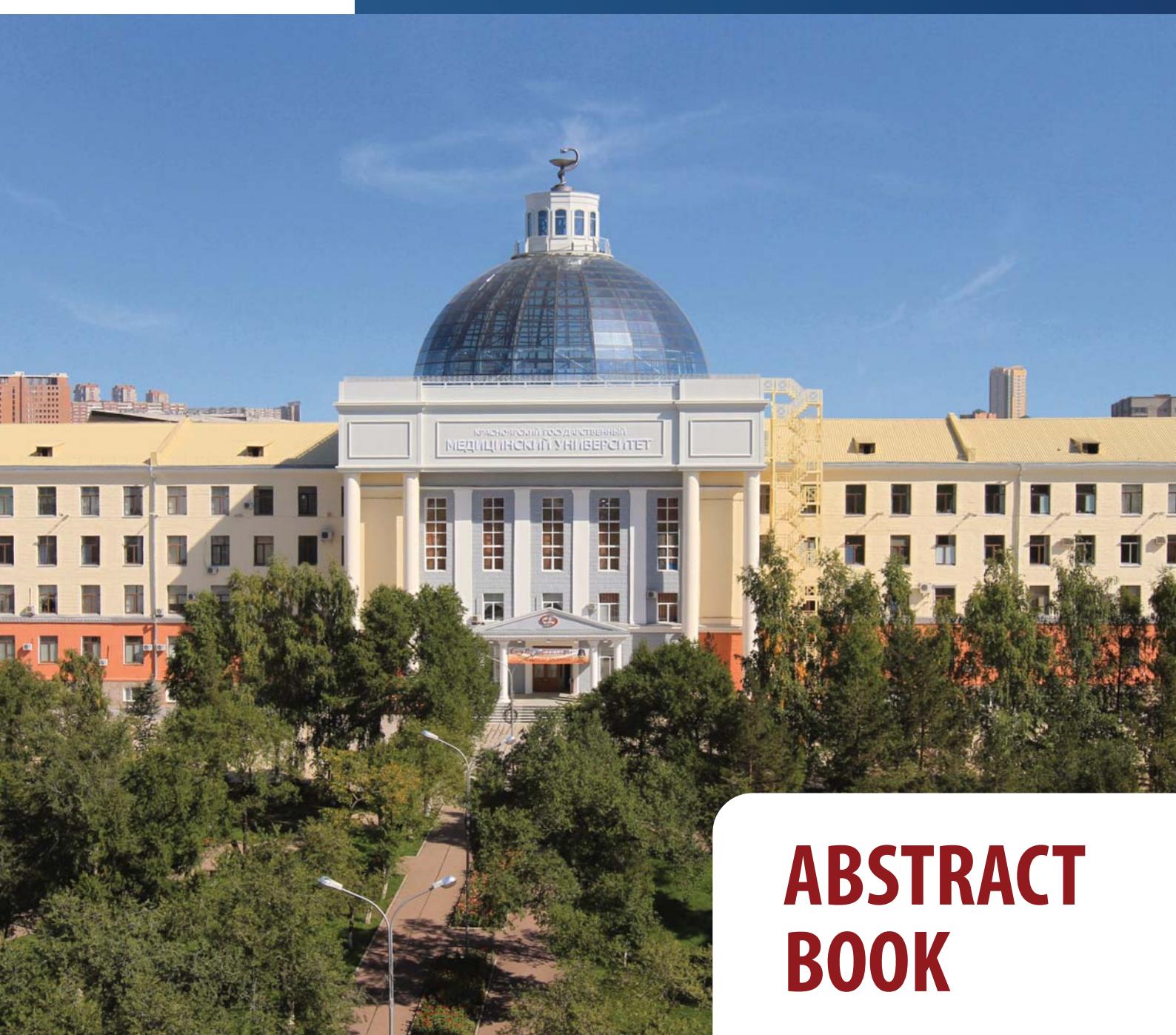




Krasnoyarsk
State Medical
University

named after Professor
V.F. Voyno-Yasenetsky

INTERNATIONAL CONGRESS ON NEUROSCIENCE



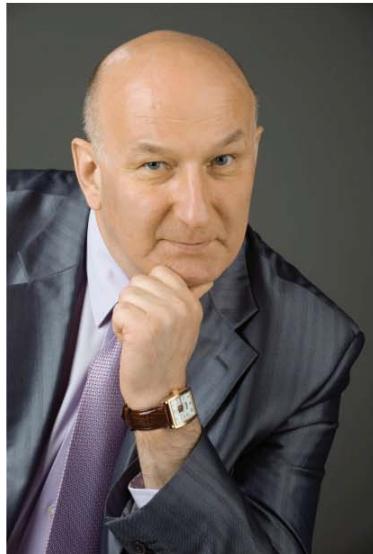
**ABSTRACT
BOOK**

KRASNOYARSK
JUNE 19–21
2014

INTERNATIONAL CONGRESS ON NEUROSCIENCE

Russia Krasnoyarsk 2014

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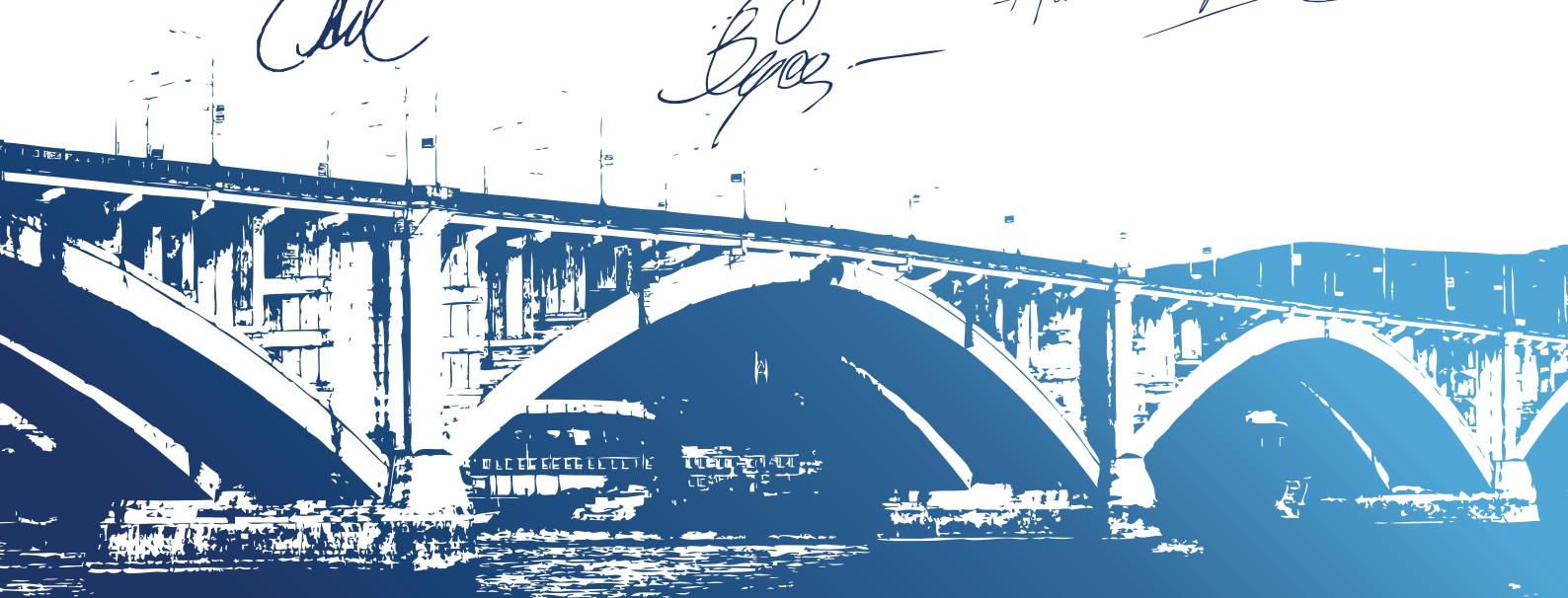
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Professor H.Higashida
Director of Kanazawa University Research
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(Kanazawa, Japan)



Dear guests and colleagues!

On behalf of the Administration of the Krasnoyarsk State Medical University named after Professor V.F. Voino-Yasenetsky I would like to congratulate you with the important event in our research, educational and clinical activity – International Congress on Neuroscience in Krasnoyarsk!

The main idea of the Congress is very close to the mission of the Krasnoyarsk State Medical University: "We want to preserve the health and to develop medical culture of our society through education and growing up of highly-qualified specialists working on the basis of recent achievements of Science and principles of Ethics and Humanism". Our University is open for partner relations aimed to development and application of innovative biomedical technologies into the clinical practice along with the idea of Translational Medicine.

We support all the opportunities to develop and strengthen the collaboration focused on the improvement of medical care through academic exchange, training of young specialists, development of joint research projects, sharing the experience in the area of Education and Research.

I wish you successful work and new achievements in understanding the mechanisms of brain functioning, development of diagnostic and treatment technologies, implementation of cutting-edge and interdisciplinary research of the world-class level aimed to improve the health of our communities!

Professor I.P.Artyukhov
Rector of Krasnoyarsk State Medical University
named after Professor V.F.Voino-Yasenetsky
(Krasnoyarsk, Russia)

A handwritten signature in black ink, appearing to read "I.P. Artyukhov".

Dear guests and colleagues!

Dear Excellencies, distinguished guests outside Russia, dear colleagues, ladies and gentlemen, it is a true pleasure for me to welcome you to the 2014 INTERNATIONAL CONGRESS ON NEUROSCIENCES in Krasnoyarsk. It is also my honor for us to welcome scientists, researchers and doctors from our partner, Krasnoyarsk State Medical University named after Prof. V.F. Voino-Yasenetsky, Ministry of Public Health, Russian Federation today. And I would like to greet the members of organizing and program committees for their arrangement for this exciting meeting. I am especially honored to welcome you here to the Krasnoyarsk State Medical University, the birthplace of the Japan-Russia Medical Cooperation and Exchange started about 20 years ago. The activity was initiated by Dr. Taro Nakayama, Minister for Foreign Affairs of Japan and brought a great progress in higher medical technologies in the Far East area of Russia. Unhappily, it was ended about 10 years ago in the same place, Krasnoyarsk. However, we continued to this kind of cooperation in the form of bilateral friendship in the very special fields, neuroscience, neurosurgery, and neurology. All the time we had a great achievement.

It is no wonder indeed that we will have wonderful outcome, because this time we have many new members from Europe and American continents. Now, in 2014, we are proud to host the INTERNATIONAL CONGRESS ON NEUROSCIENCES in Krasnoyarsk for the first time. In my opinion the time is now right to reflect or discuss on a number of basic questions in brain activities, nerve excitation, brain cell responses, memory, social behaviors, neurotransmission, physical movement, as well as their impairments in neurological disorders, neurosurgery disorders, psychiatric disorders. Undoubtedly, we can find many answers for such questions, which may push us to proceed for benefit in the welfare and health of the people in all countries.

Professor H.Higashida
Director of Kanazawa University Research Center
for Child Mental Development
(Kanazawa, Japan)

A handwritten signature in black ink, appearing to read "Hiroshi Higashida".

Dear guests and colleagues!

I am very happy to salute the participants of the International Congress on Neuroscience in Krasnoyarsk!

This area of basic and clinical science is developing rapidly, thus suggesting novel approaches to effective diagnostics and therapy of brain disorders. Establishment of long-lasting partner relations between the Russian and foreign research and educational centers is very important not only for technology transfer, but also for direct contacts between the researchers.

I am absolutely sure that new generation of young scientists would get a success in deciphering molecular mechanisms of brain pathology. Therefore, I would like to welcome the participants of the Young Scientists Awards competitions named after two prominent persons greatly contributed to Basic and Clinical Neuroscience – Professor Alexander A. Boldyrev (Moscow, Russia) and Professor Jun-Ichiro Hamada (Kanazawa, Japan)!

I do hope the Congress would provide a friendly atmosphere for interesting discussions, sharing the experience and development of plans for future collaborative activity.

Academician of the Russian Academy of Medical Science

Z.A.Suslina

Director of Research Center of Neurology

Russian Academy of Medical Sciences

(Moscow, Russia)

A handwritten signature in black ink, appearing to read "Z.A. Suslina", followed by a short horizontal line.

KRASNOYARSK STATE MEDICAL UNIVERSITY
NAMED AFTER PROFESSOR V.F. VOINO-YASENETSKY
MINISTRY OF PUBLIC HEALTH, RUSSIAN FEDERATION

RESEARCH CENTER OF NEUROLOGY OF
THE RUSSIAN ACADEMY OF MEDICAL SCIENCES, RUSSIAN FEDERATION

KANAZAWA UNIVERSITY RESEARCH CENTER
FOR CHILD MENTAL DEVELOPMENT, JAPAN

ABSTRACT BOOK

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Abstract of reports presented at the International Congress on Neuroscience, Krasnoyarsk, June 19-21, 2014, on Neurodegeneration, Neuropharmacology, Neurosurgery, Neurooncology, Neurovisualization and Neuromonitoring, Brain Protection, Diagnostics and Restoration of Brain Functions.

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INTEGRATIVE NEUROSCIENCE PROGRAM AT THE KRASNOYARSK STATE MEDICAL UNIVERSITY NAMED AFTER PROFESSOR V.F.VOINO-YASENETSKY (KRASNOYARSK, RUSSIA)

Krasnoyarsk State Medical University (www.krasgmu.ru) was founded in 1942 in Krasnoyarsk (one of the biggest Siberian cities located at the Enissey river). At present its structure includes Medical Faculty, Faculty of Pediatrics, Faculty of Basic Medical Education, Pharmaceutical Faculty, Institute of Dentistry, Faculty of Nursing, Institute of Post-Diploma Education, Faculty of Pre-University Education. There are more than 60 basic and clinical departments. More than 4,000 undergraduate and postgraduate students are currently enrolled. The staff of the University is more than 500 persons, including 135 Professors (Dr. Med. Sci.) and 325 tutors with Ph.D. degree.

Integrative Neuroscience is prioritized area of Research at the Krasnoyarsk State Medical University since 2005. There are following scientific directions within this area of research:

- 1. Basic Neurosciences** with following facilities: Research Institute of Molecular Medicine and Pathobiochemistry, Department of Biochemistry, Medical, Pharmaceutical and Toxicological Chemistry, Central Research Laboratory which are well-equipped for experimental activity on Cell biology (Cell culture, Light, Phase-contrast, Luminescent Microscopy, Biochemistry (Spectrophotometry, Fluorimetry, Immunoblotting), Analytical Chemistry (Chromatography, IR-spectroscopy), Immunohistochemistry, ELISA, Molecular Genetics (PCR, DNA sequencing), modeling pathological processes in CNS (focal and total brain ischemia, perinatal hypoxic-ischemic brain damage, Parkinson's disease, Alzheimer's disease), monitoring of brain functions in laboratory animals (laser fluorescent spectroscopy), testing of neurological and psychological functions in laboratory animals. There are long-lasting (since 1993) partner relations with the Kanazawa University Graduate School of Medicine (Japan) within the International Program "Innovative Brain Research" (incl. Neurochemistry and Neurogenetics of Autism Spectrum Disorders, NAD+ metabolism and cADPR in excitable cells, Regulation of ion channels activity in excitable cells). Strategic partner in this direction is Research Center of Neurology (Russian Academy of Sciences, Moscow). Novel partner relations in the area of Neuroscience have been developing rapidly with the researchers from the Gunma University School of Medicine (Japan), Kyushu University Faculty of Pharmacy (Japan), Niigata University Brain Research Institute (Japan), Porto Alegre Federal University (Brazil), Manchester University (UK), Nijni Novgorod State University (Russia).
- 2. Neurology & Neurorehabilitation** with following facilities: Department of Neurology, Siberian Clinical Center of Neurology and Neurorehabilitation (with modern equipment for research and clinical activity). Research activity includes development of modern technologies for rehabilitation of patients with stroke, neurodegenerative diseases (Alzheimer's disease, Parkinson's disease). This part of the Programs is characterized by the close collaborative activity with foreign centers (Japan, Germany) working in the area of rehabilitation of patients with neurological diseases, development of original methods of rehabilitation that are recognized and widely used in the Russian Federation.

3. Neurosurgery with following facilities: University Department of Neurosurgery located at the Regional and City Clinical Hospitals (well-equipped for neurosurgical operations). Experience in clinical and research activity with Japanese neurosurgeons. Main areas of research are Brain Tumors, Cerebrovascular Pathology and Abnormalities of Cerebral Vessels.

4. Psychiatry with following facilities: University Department of Psychiatry and Narcology located at the Regional and City Clinical Hospitals. Partner relations with Japanese psychiatrists have been established since 2006. Research and clinical activity on Autism Spectrum Disorders, Schizophrenia.

Research projects on Basic and Clinical Neurosciences carried out at the Krasnoyarsk State Medical University have been supported by University grants and by grants given by the Russian Foundation for Basic Research, Federal Agency for Science and Innovations, Japanese Society for the Promotion of Science, International Foundation S.M. Charity, Japanese Ministry of Education and Science etc.

Results were published in leading Russian and international journals (Neurosci. Res., 1997, 2007; FEBS Letts., 2006; Curr. Med. Chem., 2006; Neurochem. Intl., 2007; Nature, 2007; Neurochemical J., 2009, 2010, 2014; Bull. Exp. Biol. Med., 2008-2010; Clin. Medicine, 2007; General Reumatology, 2007-2010; Annals Clin. Exp. Neurology, 2008, 2012, 2014; J. Alzheimer's Disease, 2009-2010; J. Neuroendocrinology, 2010-2011; Herald of RAS, 2012-2013; Problems of Modern Pediatrics, 2012, 2013; J. Neurology Psychiatry named after S.S. Korsakov, 2013, Frontiers in Neurosci., 2013; Nature Communications, 2013; Neuromolecular Medicine, 2013; Current Topics in Medicinal Chemistry, 2013; Neuroscience & Biobehavioral Reviews, 2014, Reviews in the Neuroscience, 2014; Frontiers in Behavioral Neurosciences, 2014, Cell Death & Disease, 2014 etc.).

Several researchers of the Krasnoyarsk State Medical University have completed long-term and short-term training courses on Basic and Clinical Neurosciences in Russia and abroad (Moscow, Japan (Kanazawa, Gunma, Niigata), Finland, Germany, Italy etc.). Young researchers have been repeatedly supported to participate in International Workshops and Schools on Neurobiology and Neurochemistry.

Organization of the Congress in Krasnoyarsk is a next step in the development of more than 20-years history of the partnership of the Krasnoyarsk State Medical University named after Prof. V.F. Voino-Yasenetsky with the leading Russian and foreign Research Centers and Universities in the area of Integrative Neurosciences.

For the period from 2006 to 2012, Krasnoyarsk State Medical University named after Professor V.F. Voino-Yasenetsky hosted the Annual Japan-Russia Workshops "Integrative Neurosciences. Translational Medicine" as well as many other forums on Neurology, Neurorehabilitation. Neurosurgery, Clinical Psychology and related fields of Basic and Clinical Medicine.

Balance reactivation for patients with atactic disorder during recovery stroke period by technique of postural synergies activation

M.V. Abroskina, S.V. Prokopenko, V.S. Ondar

Krasnoyarsk State Medical University named after

Prof. V.F. Voino-Yasenetsky, Krasnoyarsk, Russia

Stroke is the most common life-threatening neurological disease and the main cause of long-term disability in adults. Presently, therapeutic physical trainings as well as apparatus trainings with biofeedback are used to recover the balance. It is still actual to create an effective balance control technique that could be acceptable for both multi-field hospitals and outpatient therapy. The aim of our research is to create and evaluate an effectiveness of balance recovery methodology based on postural synergies activation for the patients during recovery post-stroke period.

80 patient with atactic syndrome during recovery post-stroke period were included into our investigation. The I group ($n=41$) contained the patients whose comprehensive treatment included standard drug therapy and the suggested technique of balance correction. The task of balance correction exercises was to create the dosed stress mode in the postural system while standing and walking. The mode was generating through keeping balance as a patient was doing easy statolocomotor exercises accompanied by the simultaneous provocative center-of-gravity shift as a result of patient's holding a pole with distal loading. Each patient had from 10 to 12 sessions of exercises. The II group ($n=39$) patients received moto-rehabilitation, bio-feedback balance exercises with the use of stabilometry and posturography computer equipment. For assessment these methods we used the neurological status, objective evaluation of balance by Computer Stabilometry (CS), objective evaluation of gait by author's method of laser analyzer (LA-1), Berg Balance Scale, Dynamic Gait Index. The statistical significance of differences between samplings were analyzed by criteria of Wilcoxon and Mann-Whitney.

As a result of exercises in group I, according to CS, statistically significant ($p<0.05$) decrease of stabilogram average area, its general length, average speed of general center-of-mass-shift for a patient were registered. In the I group patients had significant improvement by the LA-1, BBS and DGI too. In the II group patients had significant improvement ($p<0.05$) by the CS, LA-1 and scales too. Statistically significant differences between the I and II groups have't been identified (by criteria of Mann-Whitney).

The suggested technique, to our mind, lets enhance patient's stability while standing and walking, decrease the risk of falls during walking with vestibular loads, help create a new movement stereotype. Although its efficiency is comparable with high-tech modern methods of balance correction and may be used for outpatient treatment.

Relationship of recurrence with volume embolization rate after endovascular treatment of intracranial aneurysms

Yasuhiro Aida, Kouichi Misaki, Masanao Mohri, Naoyuki Uchiyama, Yasuhiko Hayashi,
Yutaka Hayashi, Jun-ichiro Hamada

Department of Neurosurgery, Kanazawa University, Kanazawa, Japan

Subarachnoid hemorrhage (SAH) due to ruptured intracranial aneurysms is still critical neuropathological sequel, and treatment for the intracranial aneurysms in order to prevent rerupture has been progressed by numerous neurosurgeons. Representative treatment for the intracranial aneurysms for both ruptured and unruptured are neck clipping and endovascular coil embolization. Although many authors have reported the efficacy and prognosis compared neck clipping and coil embolization, this debate has not been led to the final conclusion. This has been because the strategy for the treatment for intracranial aneurysms is different among neurosurgeons and institutes.

Endovascular coil embolization had been mainly indicated for the patients with higher age, poor general condition, poor-grade SAH, aneurysms located in the posterior circulation et al. However, recent advancement of endovascular techniques and instruments has progressively expanded the choices of treatment. Prevalence of endovascular techniques as one of the less invasive standard treatments has been observed among many institutes and countries. The effectiveness of coil embolization for the patients with higher ages has been widely accepted.

On the other hand, the long-term follow-up of the patients after coil embolization presents newly evoked problems. Intracranial aneurysms after coil embolization occasionally developed recanalization due to coil compaction and subsequent regrowth of aneurysms, which requires re-treatment with endovascular management. In many of such cases, re-treatment usually should be performed within six months after the first treatment. The contributing factors to develop the recurrence of aneurysms after coil embolization were considered as wide neck, large and giant size, posterior circulation, and smoking, and so on.

In Kanazawa University Hospital, we encountered more than 200 cases of endovascular coiling embolization including 112 ruptured aneurysms and 88 unruptured aneurysms from 2006 to 2014, and we investigated the relationship of recurrence with volume embolization rate after endovascular treatment of intracranial aneurysms, and discuss the contributing factors to the recurrence of coil-embolized aneurysms.

Comparison of the protective effects of diosgenin on behavioral and biochemical deficits in rats with hereditary defined or d-galactose-induced accelerated senescence

TG Amstislavskaya ¹, MA Tikhonova ¹, AV Yudina ², YJ Ho ³.

¹ Institute of Cytology and Genetics SB RAS, Novosibirsk, Russia; ² Novosibirsk State Medical University, Novosibirsk, Russia; ³ School of Psychology, Chung Shan Medical University, Taichung City, Taiwan

Oxidative stress and reactive oxygen species (ROS) have been proposed as major causes of aging and are involved in age-related neurodegeneration and cognitive decline (Olanow, 1993; Valko et al., 2007). Such age-related disturbances can be ameliorated by antioxidants. Diosgenin is an important bioactive ingredient of dioscorea that is widely used in Chinese medicine, shows anti-oxidant activity and improves some aging-related deficits in senescent and menopausal animals. Aim: 1) to compare alterations in behavior, biochemical parameters, and sperm motility in D-galactose-induced aging Wistar male rats with that in OXYS male rats; 2) to examine the protective effects of the natural-derived antioxidant diosgenin on these aging models.

Methods: We compared alterations in behavior, biochemical parameters, and sperm motility in two models of accelerated senescence (D-galactose-induced (150 mg/kg/d, i.p., 57 days) aging in Wistar rats vs. genetically defined in OXYS rats) and examined the protective effects of diosgenin (10 or 50 mg/kg/d, p.o., 57 days).

Results: Both models had augmented levels of ALT activity indicating hepatopathology. Compared to D-galactose-treated animals, OXYS rats are a superior aging model since they demonstrated profound biochemical alterations (hypocalcemia, hypophosphatemia, and hypocholesterolemia) and behavioral deficits (impaired object recognition, decreased sexual motivation and locomotor activity, retarded learning) typically seen in old individuals. We first showed diminished sperm motility in males of both models of accelerated senescence studied.

Conclusion: Chronic diosgenin treatment at doses used failed to improve biochemical and behavioral disturbances and had some undesirable side effects on body weight and working memory in OXYS rats. However, diosgenin restored moderately decreased sperm motility in D-galactose-treated Wistar males and might be recommended for treatment of mild age-related reproductive dysfunctions. We suggest that this effect may be attributed to diosgenin effects on hormonal systems; diosgenin has a similar chemical structure to sex hormones and has long been used as a precursor in the manufacture of steroid hormones, such as estrogen, progesterone, testosterone, and cortisol (Djerassi, 1992).

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Dedicated Multi Photon Objectives	NA	W.D. (mm)	Immersion Index
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Мультифотонная система Olympus оптимизирована для работы с живыми объектами за счет применения гибридной сканирующей системы, позволяющей получать изображения с высоким разрешением, и использовать новейший резонансный сканер RS для сверхбыстрого имиджинга. Использование GaAsP детекторов с высокой чувствительностью и системой четырехосевой самонастройки, наряду с уникальным режимом (Глубокий фокус), позволяет получать изображения с высоким разрешением без искажений на рекордно большой глубине до 8мм. Микроскоп с эксклюзивным моторизованным Кеплеровским телескопом для оптимального использования N. A. объективов и для максимального проникновения в образец. Так же использование дополнительного независимого сканера и новейшей оптики последнего поколения гарантирует доставку возбуждения для стимуляции и имиджинга на максимальную глубину.

Fatigue level assessment and rehabilitation models review among boys and girls diagnosed with autism

J. Andrejeva¹, R. Ivonyte¹, R. Vaicekauskaite¹, N. Puteikiene²

¹ Klaipeda University, ² Klaipeda Delphinarium

Introduction. Autism spectrum disorder (ASD) is a pervasive developmental disorder characterized by deficits in social skills, communication and repetitive or restricted interests. For school-aged children with ASD programs and services are focused on core impairments, which are part of the diagnostic criteria, deficits in social communication skills, and often packaged as a "social skills" program. Social communicative deficits for children with autism range in nature, however more generally these children experience difficulties in reciprocal social communication, initiating social interactions and verbal (i.e., language) and nonverbal communication (i.e., eye contact and gestures).

The term "fatigue" can be defined as an overwhelming sense of tiredness, lack of energy and, often, feeling of total exhaustion. While burnout has stronger psychological background, prolonged fatigue is more related to physical problem. DAT is a type of animal-assisted therapy that claims to help those who are physically and mentally ill and disabled as well as adults and children with various psychopathologies. Therapy generally involves the patient swimming and playing with dolphins in captivity over several sessions while working on tasks such as hand-eye coordination or various verbal response targets. It is a highly attractive form of therapy due to the dolphins being well-liked, exotic animals.

More than 2000 research papers have reported beneficial effects of qigong on physiological systems. A review of Western manual and massage interventions indicated that there is no single therapy that reliably diminishes the sensory impairments for children with autism. The Cignolini methodology is a Medical Qigong massage methodology based on the theory of Chinese medicine deriving from an understanding of pathology and treatment in terms of energy flow, channels, organs and the transmission of information internally and externally with the environment. According to this model, treatment aims at removing the impairment to the flow of Qi in and out of the orifices by Qigong massage of channels involved in clearing the brain and senses.

Aim of the research. The aim of this work is to assess fatigue level among school age children diagnosed with autism.

The tasks of the research. Among the major tasks are as follows: to review literature sources concerning children diagnosed with autism dolphin therapy effectiveness; to analyze work effectiveness for children with autism, the level of adaptability, psychological stability level. One of the tasks is to reveal a Qigong massage ability as rehabilitation methods for children's diagnosed with autism.

Methods of the research. Research was performed in 2014 March at Klaipeda school for children with disabilities 'SVETLIACHOK'. Research group consisted of 8 children. 4 boys, age (13±2.31) and 4 girls (17±1.63) diagnosed with middle severity level of autism.

Fatigue level among research group was assessed by Schulte Table.

Results of the research. Fatigue level for girls was higher than the boys. Work effectiveness measured in seconds was better for boys than for girls. Level of adaptability for boys was more stable than the girls' one; thus psychological stability level for boys was higher than the girls'.

Conclusions. The performed research in the field of autism and the given research results have showed the prevalence of fatigue difference in the gender point of view. Since the fatigue has physical and psychological components, its level can be decreased by choosing a multidimensional rehabilitation model. Its physical aspect can be decreased by choosing individual such as dolphin's therapy and physical aspect by applying corresponding qigong massage therapy sessions.

Features of Speech Competence of Families with the Identified Psychotic Patient.

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Hypothesis. In such families Relatives of the psychotic patient have some similar nonverbal features. They were revealed and generalized during sessions of family psychotherapy within system approach.

Methods. Psychotherapeutic sessions were carried out with patients at two bases: medical center «ARKUM» in the study for hypnotism of the Krasnoyarsk Regional Psychoneurological Clinic Day Hospital. More than 200 hours of conversations videos were studied.

Results. Here are some often reproduced objective features of communication in these families:

- 1) Women from the families with the psychotic patient have loud, high on tonalities and well modulated voice. They are assertive, their speech is fast, emotionally painted, with long sentences. Often in their speech there are directive forms of the address, instructions, a moral, the venomous remarks, devaluating phrases. This behavior reveals a high level of alarm, an extraversion and a role-playing game "rescuer" - "persecutor".
- 2) Men from such families, as contrasted to wives, have the silent low and a little modulated voice. They come into active speech contact less often, speak shortly and in their speech often you can meet abstract turns, the speech is slow and abounds with pauses. In behavior elements of autism and infantility are observed: decrease of vital needs, speech blockings, dispassionateness, introversiveness – as in a role-playing game "I am not present here"
- 3) At supervision over the patient during sessions of family psychotherapy the following features (out of gender distinctions) came to light: it is exaggerated introversive option of speech communication with prevalence of nonverbal forms over the verbal (facial expression and pantomimicry) in the ratio 3-1 and even 4-1. This behavior is shown in the presence of close relatives.

Conclusion. In these families men use female speech components more often, and more often women use man's speech components (role inversion). For the sake of such relatives the patient have to assume a role of "whipping boy": to show disadaptive (psychotic) behavior by means of which he manages to unite all the family.

Protective role of ubidecarenone in experimental ischemia-reperfusion brain injury

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O. Medvedev.

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The goal of the present study was to estimate the influence of brain ischemia on the tissue coenzyme Q₁₀ concentration and to evaluate the neuroprotective efficacy of single intravenous dose of solubilized ubidecarenon (coenzyme Q₁₀, CoQ₁₀) solution. Methods: the study was performed on 56 male Wistar rats weighted 300 to 370 g. Cerebral ischemia was modeled by intraluminal occlusion of left middle cerebral artery (MCAO) for 60 min as described by Longa E.Z. et al., 1989. Rats were anesthetized by chloral hydrate (400 mg/kg, i.p.). 45 minutes after the onset of occlusion animals were treated with intravenous dose of CoQ₁₀ (30 mg/kg) or Vehicle (2 ml/kg). At the endpoint of the experiment rats were euthanized, brains were collected. Infarction volume was measured by TTC staining. The infarct percentage was calculated as: 100 x infarct volume/ipsilateral hemisphere volume. Necrotic zone was removed; brain was partitioned to ipsilateral (i/l) and contralateral (c/l) hemisphere. CoQ₁₀ tissue concentration was measured by HPLC with electrochemical detection. Data are shown as mean ± SD. A difference with p<0.05 was considered statistically significant.

Results: We performed 2 independent experiments. In the first experiment rats were euthanized 24 hours postsurgery, in the second one – 7 days postsurgery. All the animals in each experiment were randomly divided into 3 groups: 1 – sham-operated (n=6); 2 – MCAO+Vehicle (n=11); 3 – MCAO+CoQ₁₀ (n=11). In the first experiment CoQ₁₀ tissue levels in MCAO+Vehicle group appeared to be lower compared with sham-operated group (24,9±1,3 mkg/g) in both i/l (21,1±2,2 mkg/g) and c/l (23,7±2,8 mkg/g) hemisphere, p<0,05. CoQ₁₀ injection leaded to an increase of its tissue level in MCAO+CoQ₁₀ group compared with sham-operated and MCAO+Vehicle group in both i/l (28,3±2,7 mkg/g) and c/l (29,9±2,7 mkg/g) hemisphere, p<0,05. Increase of CoQ₁₀ brain levels was accompanied by limiting of infarct zone by 67% in MCAO+CoQ₁₀ group compared with MCAO+Vehicle group, p<0,05. In the second experiment tissue CoQ₁₀ levels also was lower in MCAO+Vehicle in both hemisphere, p<0,05. In MCAO+CoQ₁₀ group CoQ₁₀ tissue levels were low in i/l hemisphere (22,6±1,6 mkg/g) and rose to a sham-operated level (24,5±1,1 mkg/g) in c/l hemisphere (24,9±1,6 mkg/g). The infarct volume in MCAO+CoQ₁₀ group was reduced by 36%, compared to MCAO+Vehicle, p<0,05.

Conclusion: ischemia-reperfusion brain injury leads to a decrease of tissue CoQ₁₀ level. Single intravenous dose of ubidecarenon leads to the increase of its brain levels that may result in significantly reduction of brain infarct volume.

The effectiveness of computer cognitive training comparing with using entertaining computer games for rehabilitation of patients with post-stroke cognitive impairments.

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Objectives: The aim of the present study is comparing an effectiveness of using original neuropsychological computer programs for cognitive correction with effects of using entertaining computer games for rehabilitation of patients with post stroke cognitive impairments.

Methods: Patients after hemispheric stroke in recovery period (up to 1 year) with cognitive impairments (N=47, age 40-65) were randomized into three groups. All patients received physiotherapy. Patients in the intervention group had 10 everyday training sessions with neuropsychological computer programs of 40 min duration. Participants in the active control group played entertaining games keeping the identical regimen. The passive control group patients received standard treatment. We assessed cognitive, neurological, affective and functional state before and after training period.

Results: In the intervention group after training course we observed significant improvements on every cognitive and functional scales. In the active control group changes on FAB, Moca, Shulte's test, MMSE were also statistically significant. We found no significant changes on cognitive scales in the Passive control group after treatment. Significant improvements were observed in the intervention group comparing with the passive control group (MoCA, CDT, FAB, Shulte's test). Differences between groups where patients played neuropsychological and entertaining games were statistically insignificant. At the same time there were no significant differences between the active control and the passive control groups.

Conclusions: Additional using of the complex of neuropsychological computer programs is an effective and simple method of the correction cognitive impairments in post stroke patients (up to 1 year) comparing with the standard rehabilitation without special cognitive training.

It is still necessary to clarify whether there is a difference between effectiveness of neuropsychological computer training and entertaining computer games. Further studies are required.

Dopplerographic evaluation of cerebral blood flow in patients with paranoid schizophrenia

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Objective: to investigate blood flow velocity in the main arteries of the brain by color duplex sonography in patients with paranoid schizophrenia in hallucinatory and delusional variants.

Methods: Clinico-psychopathological, statistical, transcranial dopplerographic study of cerebral hemodynamics by color duplex sonography.

Peak systolic, end-diastolic linear blood flow velocity and peripheral vascular resistance index in the anterior, middle and posterior cerebral arteries were recorded. Control data were taken from V.P. Kulikov's work devoted to the results of color duplex sonography in the diagnosis of vascular disease. Statistical data processing was performed using the computer program SPSS, version 19.0.

Results: In all studied cases slowing of peak systolic and end-diastolic blood flow velocity was bilateral and symmetrical. In patients with hallucinatory variant of paranoid schizophrenia all investigated parameters were significantly changed, whereas in patients with delusional variant velocity characteristics of cerebral blood flow in the anterior, middle and posterior brain arteries were notably decelerated, and although indices of peripheral vascular resistance slightly increased, but these differences were not statistically significant. Meanwhile differences between the peak systolic blood flow velocity (the most significant parameter) and peripheral vascular resistance index in the middle cerebral artery in patients with hallucinatory and delusional variants of paranoid schizophrenia proved to be statistically significant.

Conclusion: Disorders of cerebral hemodynamic parameters, in particular, slowing of the blood flow velocity in the anterior, middle and posterior cerebral arteries, and increased peripheral vascular resistance index in these vessels are characteristic for patients with paranoid schizophrenia. These changes are more significant in hallucinatory variant of the endogenous disease, compared with the delusional one. In this case, in combination therapy the usage of methods aimed at normalizing blood flow velocity in the brain vessels may be reasonable in the development of treatment and rehabilitation for patients with paranoid schizophrenia.

Experimental transection of spinal cord and its bioengineering reconstruction

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Proposed in this paper approaches to the reconstruction of the spinal cord in experimental total mechanical spinal cord transection are based on use of modern biodegradable polysaccharide matrices containing the necessary microenvironment, including the products of growth and differentiation of stem cells and neuronal cells, neuronal precursor cells for reconstruction motor and sensory functions of spinal cord.

The methods. It was used base polyion complex consisting of nano-microstructured ascorbate chitosan, serum growth factors "adgelon", to the base of the polyion complex added conditioned culture medium obtained after culturing embryonic neuronal cells of the brain tissue of mice.

The steps of examination:

1. Getting the conditioned medium of cultured embryonic neuronal cells.
2. Cultivation and differentiation of mouse embryonic stem cells on the collagen-chitosan substrate. For the differentiation of embryonic cells in neuronal direction of their seeded into vials on wednesday with all supplements, except bFGF, with the addition of retinoic acid and N2 supplement.
3. Murine embryonic stem cells, marker analysis of the expression of markers - oct4, TRA-1-60, SSEA4, cd30.
4. Immunocytochemical control neuronal differentiation of stem cells.
5. Experimental spinal cord injury in rats (complete rupture of the spinal cord) and the transplanted matrices composition.
6. Dynamic neurological monitoring - complete transection (BBB scale) for 1-4 weeks of the postoperative period and 20 weeks.
7. Histology sections of the spinal cord with the direct implantation of neuronal cell matrices in the dislocation of spinal injury.
8. Immunofluorescence sections of the spinal cord with the direct implantation of neuronal cell matrices in the dislocation of spinal injury (search transplanted cells expressing green fluorescent protein, GFP), the presence of neurotransmitters in the graft adjacent to the upper and lower zones of the spinal cord, as well as collagen-chitosan graft: acetylcholine, serotonin and GABA.

The results. The results obtained in the course of studies suggest that collagen-chitosan matrix containing in its composition factors and neurogenic differentiation of neural progenitor cells suitable for implantation to restore the functions of the damaged spinal cord provided cell culturing mass progenitor neuronal cells in the artificial three-dimensional environment.

Transplantation of collagen-chitosan matrix containing 100,000 progenitor neuronal cells followed for 20 weeks of the maintenance of their viability, formation of numerous neurons forming between sinoptic communication, in addition to expressing neuronal markers mediators of transmission of nerve signals. Transplanted cell mass shows broadcast their axons in the maternal side of the central segment of spinal cord, beyond the graft. The transplantation of a matrix containing precursors of neurons, resulting in significant recovery of lost motor and sensory functions of the spinal cord, reaching the level of reduction neurolack equal to 19.5 on a scale BBB scale.

Focal dysplasias in the cerebral cortex of individuals with autism spectrum disorders

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Aim: Previous reports indicate the presence of histological abnormalities in the brains of individuals with autism spectrum disorders (ASD) suggestive of a dysplastic process. In this study we identified areas of abnormal cortical thinning within the cerebral cortex of ASD individuals and examined the same for neuronal morphometric abnormalities by using computerized image analysis.

Methods: The study analyzed celloidin-embedded and Nissl-stained serial full coronal brain sections of 7 autistic (ADI-R diagnosed) and 7 age/sex-matched neurotypicals. Sections were scanned and manually segmented before implementing an algorithm using Laplace's equation to measure cortical width. Identified areas were then subjected to analysis for neuronal morphometry.

Results: Results of our study indicate the presence within our ASD population of circumscribed foci of diminished cortical width that varied among affected individuals both in terms of location and overall size with the frontal lobes being particularly involved. Spatial statistic indicated a reduction in size of neurons within affected areas. Granulometry confirmed the presence of smaller pyramidal cells and suggested a concomitant reduction in the total number of interneurons.

Conclusions: The neuropathology is consistent with a diagnosis of focal cortical dysplasia (FCD). Results from the medical literature (e.g., heterotopias) and our own study suggest that the genesis of this cortical malformation seemingly resides in the heterochronic divisions of periventricular germinal cells. The end result is that during corticogenesis radially migrating neuroblasts (future pyramidal cells) are desynchronized in their development from those that follow a tangential route (interneurons). The possible presence of a pathological mechanism in common among different conditions expressing an autism-like phenotype argue in favor of considering ASD a "sequence" rather than a syndrome. Focal cortical dysplasias in ASD may serve to explain the high prevalence of seizures and sensory abnormalities in this patient population.

Gamma knife radiosurgery

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The idea of stereotactic radiosurgery as precise delivery of a single fraction of high-dose ionizing radiation to an imaging-defined target was originally developed by the Swedish neurosurgeon professor Lars Leksell. In 1951 he performed the first radiosurgical procedure to treat a patient with trigeminal neuralgia. At present Gamma Knife radiosurgery has evolved into multidisciplinary field and utilized in the management of various intracranial lesions, including benign and malignant brain tumors, vascular malformations, as well as functional disorders. Around 50.000 patients undergo Gamma Knife radiosurgery each year worldwide. Modern devices provide 0.1 mm precision of radiation delivery, which allows for a radiosurgeon to perform very precise management of the lesion, and to avoid irradiation of the adjacent cerebral structures.

The experience of the Tokyo Women's Medical University shows that from 64% to 82% of benign intracranial tumors shrunk after Gamma Knife radiosurgery. In many cases it is accompanied by definite regress of the neurological symptoms, especially by improvement of the cranial nerves' functions. The treatment is very effective in management of brain metastases, particularly multiple ones. In cases of AVM radiosurgical treatment strategy and results strongly depend on lesion volume, and complete obliteration rates varies in the majority of series from 60% to 80%. Management of trigeminal neuralgia with Gamma Knife radiosurgery results in pain relief in more than 90% of patients, and approximately half of them are continued to be pain free at 5 years after irradiation. Beside, Gamma Knife radiosurgery may be effectively applied for management of cerebral cavernomas, movement disorders, mesial temporal lobe epilepsy, chronic pain syndromes, psychiatric disorders, and variety of ocular diseases.

In conclusion, Gamma Knife Radiosurgery may be beneficial for patients with various brain diseases providing high effectiveness and low morbidity.

Proton mrs in brain visualization

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In vivo proton magnetic resonance spectroscopy (^1H -MRS) is a valuable neuroimaging tool for non-invasive investigation of the metabolic parameters within selected volume of tissue. The main investigated metabolites in the brain include N-acetylaspartate, choline-containing compounds, creatine, lactate, and mobile lipids. The method is successfully used in neurooncology for differential diagnosis, typing and grading of intracranial tumors, spectroscopy-supported biopsy and resection of parenchymal brain lesions, prediction and evaluation of their response to therapy, and differentiation of the treatment-induced changes from recurrence of the neoplasm. Beside ^1H -MRS may be effective for evaluation of patients with stroke, epilepsy, and psychiatric disorders.

Experience of the Tokyo Women's Medical University with ^1H -MRS revealed metabolic heterogeneity of the brain neoplasms, which spectroscopic characteristics are associated with type, grade, size, type of contrast enhancement, and magnitude of the peritumoral edema. Pattern analysis of ^1H -MR spectra using originally developed classification permitted for us to differentiate various types of tumors. The method provided 72% diagnostic accuracy in differentiation of high-grade and low-grade gliomas. Spectroscopy-supported biopsy of parenchymal brain lesions provided 100% diagnostic yield. In meningiomas ^1H -MRS-detected characteristics may be helpful for detection of neoplasms with high proliferative activity. Spectroscopic imaging may be particularly helpful for monitoring of the treatment response with a potential of early detection of recurrence and its differentiation with the therapy-induced changes. In patients with mesial temporal lobe epilepsy ^1H -MRS may serve as additional diagnostic clue for lateralization of the epileptogenic zone and permits to predict results of the surgical treatment.

In conclusion, clear recognition of advantages and limitations of ^1H -MRS constitutes the basis of its effective use in clinical practice.

Psychological problems and life quality in patients with COPD

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Functional tests are not completely informative in the assessment of a patient's status, particularly, in the evaluation of psychological problems, depression. Therefore, special questionnaires have been increasingly applied for monitoring of pharmacotherapy efficacy.

The objective of our study was to evaluate the life quality in patients with COPD subjected to adequate basic therapy for 6 months.

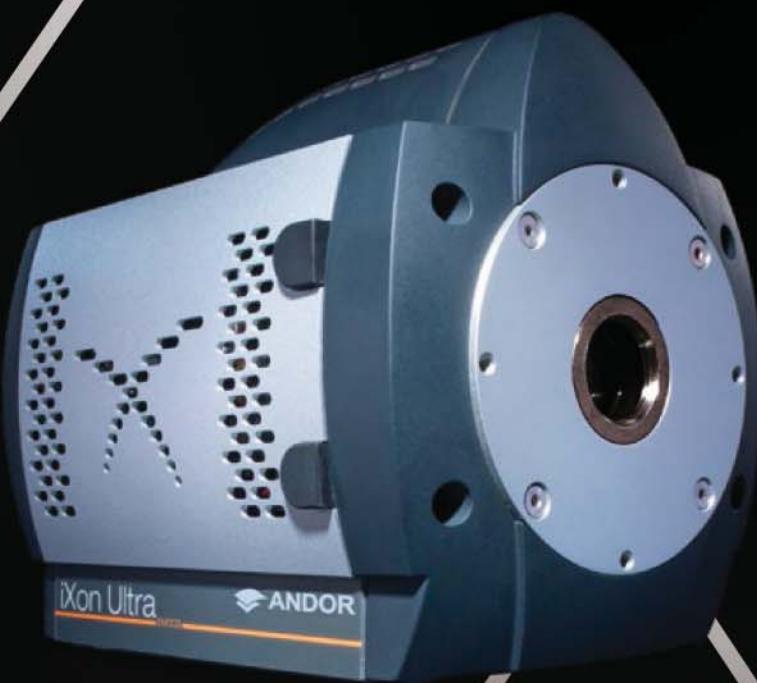
Materials and methods: 86 patients with COPD have been examined with the validated international questionnaires CAT™-test and SGRQ.

Results: Before starting treatment, Me of symptoms in the whole sampling was 78.5(70.3; 87.1), activity – 73.5 (41.7; 86.0), presence of psychological problems was estimated to be 64.1 (45.9; 73.6). In 6 months, if the basic therapy has been recognized as adequate, we found positive dynamics on all the quality parameters. Me of symptoms has reduced to 46.6 (23.5; 66.0) ($p<0.05$), physical activity – to 53.6 (33.9; 61.9) ($p<0.05$), psychological interference – to 30.1(21.9; 37.2), and the sum of the parameters – to 41.4 (29.5; 49.8) ($p<0.05$).

Summarized parameter of life quality as it was expected revealed strong correlation with the severity of COPD ($r=0.702$ и $r=0.802$; $p<0.001$, respectively). The same parameter demonstrated strong relationship with the FEV₁ ($r=-0.863$; $p<0.001$). We have found significant correlation of integral parameter in SGRQ and final value in CAT test that corresponded to strong relationship before starting the treatment ($r=0.823$; $p<0.001$) and in 6 months after the treatment ($r=0.724$; $p<0.001$). It well corresponds to known literature data and confirms validity of CAT regarding the SGRQ, thus providing the basis for their interchangeability.

Conclusion: SGRQ and CAT-test are reliable tools for assessing the life quality and efficacy of therapy in patients with COPD of various severity. In the routine practice, it is easier to use CAT-test that has high specificity, simplicity and reliability.

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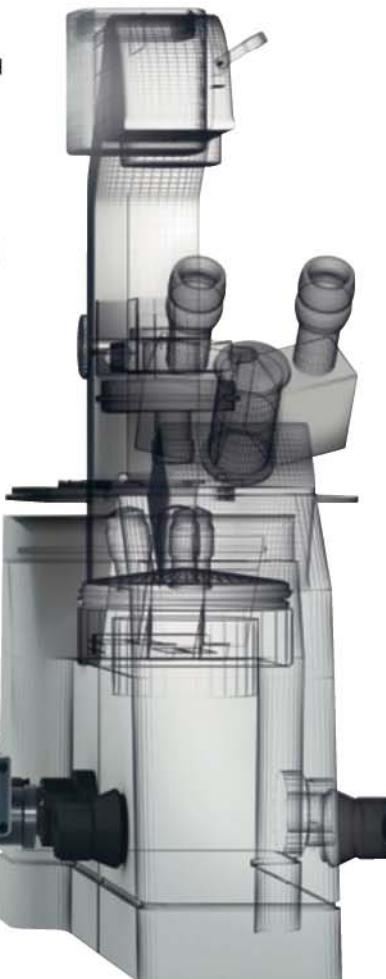
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Smoking status, psychological characteristics and life quality in patients with COPD

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Goal: to study impact of smoking on life quality in patients with COPD.

Materials and methods: we have examined 116 patients with COPD undergoing therapy for smoking cessation. Questionnaires QL SF-36 and SGRQ were used.

Results: We found that 11-20 years of smoking significantly worsen the following parameters: viability, social activity, the role of emotional problems in the life activity limitation. 21-30 years of smoking significantly elevate the role of physical problems in the life activity limitation (58.3 ± 2.2), and psychosocial characteristics are worsen more profoundly: viability (38.8 ± 2.4), the role of emotional problems in the life activity limitation (53.3 ± 3.1), mental health (43.4 ± 3.1). More than 30 years of smoking anamnesis resulted in significant reduction of all the parameters evaluated with the QL SF-36, particularly, physical activity and general health. When the smoking index has increased, the observed difference in smokers and ex-smokers has disappeared, but not for the parameter "pain" ($p < 0.05$). Our findings indicate that long-lasting and intensive smoking in past years stopped at the present time, does not lead to fast improvement of physical status in patients with COPD, and the number of subjective pain manifestations is even increased.

SGRQ questionnaire revealed that in patients with COPD that have never smoked, quality life parameters are better than in ex-smokers. We have demonstrated that smoking affects not only objective patient's status, but also subjective health indicators recognized as life quality parameters.

Conclusion: smoking negatively affects physical and social activity, psychical and emotional status in patients with COPD. Smoking cessation should be recognized as a most important requirement in managing the patients with COPD for achieving the improvement of their life quality.

SNPs of folate cycle genes as risk factor of congenital defects of fetus in childbearing-age women with epilepsy

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The childbearing-age women with epilepsy which taking antiepileptic drugs (AEDs), both old and new generation, during pregnancy have an increased risk of congenital defects of fetus (CDFs) - a physical defects present in a baby at birth that can involve many different parts of the body, including the brain, heart, lungs, liver, bones, and intestinal tract [Fetisova I.N. et al., 2007; Dmitrenko D.V. et al., 2012]. Mechanisms of development of anticonvulsant-induced CDFs are actual and far from being resolved [Coppola G. et al., 2012]. One of the possible mechanisms of AEDs-induced teratogenesis is secondary metabolic disorder of folic acid (FA), but the cumulative risk of having a primary (gene-determined) and secondary (AEDs-induced) disorders of folate metabolism has not been studied previously, which prompted us to conduct this study of valproic acid (VPA) drugs, are first-line choice in treatment of idiopathic epilepsy.

The purpose is study the frequency of gene-determined disorders of folate metabolism as risk factor of AEDs-induced teratogenesis.

Materials and methods. We observed 42 women with epilepsy. Age of the patients ranged from 15 to 49 ye.o., mean age 28.3 ± 7.1 ye.o. We used PCR real-time testing of SNPs of folate cycle genes including *MTHFR* s.677 C>T (Ala222Val), *MTRR* p.66 A>G (Ile22Met), *MTR* s.2756 A>G (Asp919Gly); and biochemical study of folic acid and homocysteine levels in the blood serum.

Results. The frequency of heterozygous and homozygous carriage of the mutant SNPs of *MTHFR* was 45.2%, *MTRR* – 57.2%, *MTR* – 45.3%. Thus, the level of folate in serum ranged from 1.51 to 24.0 ng/ml, Me [Q₂₅; Q₇₅] - 5.2 [3.9; 8.0] ng/ml (the reference level 3 - 17 n / ml). Hypofolatemia detected in 3 (7.1%) women. Homocysteine levels ranged from 6.1 to 23.1 mmol/L, Me [Q25; Q75] - 9.94 [7.76; 19.1] mmol/L (the reference level 0-15 mmol/L). Hyperhomocysteinemia was found in 6 (14.5%) cases.

Conclusions. Teratogenesis is a prenatal toxicity characterized by structural or functional defects in the developing embryo or fetus. It also includes intrauterine growth retardation, death of the embryo or fetus. Overall, about a quarter of the childbearing-age women of are genetically determined disorders of folate cycle that must be considered when assigning AEDs affecting the folate cycle during pregnancy (for example, VPA, CMZ, PHT etc.). This personalized approach to the treatment of epilepsy in childbearing-age women is way of risk reduce of teratogenesis and CDFs.

The experience in organizing of specialized health care for pregnant women with epilepsy at the university clinic

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Purpose: The organization of specialized health care with personalized approach for pregnant women with epilepsy in the University Clinic.

Methods: The study included 352 women of childbearing age with epilepsy, aged 16 to 47 years old; Me [Q₂₅; Q₇₅] - 27 [23; 33] ye.o. We used a personalized selection of daily dose VPA considering of SNPs of gene CYP2C9 and personalized selection of folic acid (FA) dosage considering of SNPs gene of folate cycle.

Results: There are an increase in the number of pregnancies in women with epilepsy in 2011 compared to 2010 is 5 times in Krasnoyarsk region. A mean age at the time of pregnancy 26.9 ± 4.57 ye.o. We observed 121 cases of pregnancy in 101/352 (28.7 ± 2.4%) women, including 20 repeat pregnancies. On the etiology of epilepsy, idiopathic forms predominated – 47,1% ($p < 0.01$). GTCS during gestation were absent in 65.4 % of cases. Better control over the GTCS observed in idiopathic (69.6%) and symptomatic forms epilepsy (68.6%). Doses of AEDs exceeded the teratogenic level at the time of conception in 54.7% of cases. We reduced the daily dose of VPA by 10.0-20.8% in women with individual genetically determined VPA/FA metabolism. We excluded serious adverse events of VPA on the CNS, endocrine system and blood. With the worst control of epileptic seizures was associated reception benzobarbital (66.7%) and lamotrigine (50.0%). Congenital disorders occurrence rate in women receiving AEDs according to our study was 3.3% and congenital disorders caused by VPA was 5.4% that correlates with EURAP data and lower than North-American registry data. Congenital disorders were registered on VPA in dose higher than 1000 mg/d, that correlates with other authors data about risk increasing on doses higher than 700 mg daily. Congenital disorders risk was increasing in case of hereditary loading, which also correlates with EURAP. Congenital disorders occurrence rate on barbiturates was 16.7% which is slightly higher than both European and North-American registries data (5.4-13.7% and 5.5%), which probably can be explained with small sampling – 6 clinical cases. In common, congenital disorders occurrence rate on AEDs that we registered (3.3%) was consistent with Krasnoyarsk regional data (3.5%).

Conclusion: An organization of specialized health care with personalized approach for pregnant women with epilepsy in the Neurological Center of Epileptology, Neurogenetics and Brain Research of the University Clinic improved the efficiency and safety of antiepileptic therapy.

Neuropsychologic rehabilitation of the patients with acute cerebrovascular disorder in acute period

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Purpose of neuropsychological rehabilitation: cognitive function recovery and compensation, teaching the compensatory cognitive and behavioral strategies and enhancement of emotional and personality sphere of patients.

The contents of neuropsychological rehabilitation program:

1 Unit – regulation, stabilization and activation of organism energetic potential. Enhancement of depth cerebrum formations and bases for formation of cortical and subcortical and interhemispheric interactions. It contains complexes of kinesiological, respiratory, oculogyric exercises, relaxation and visualization techniques.

2 unit – cognitive training: enhancement and sustention of cognitive abilities of the patients, correction and compensation of functional division of right and left cerebrum hemispheres and their interconnection.

3 unit – emotional training: reduction of emotional tension, anxiety, work with negative feelings, teaching the self-direction skills in everyday life and stressful situations.

Methods: cognitive training with visual material and computer technologies, audiovisual methods (for the patients with phatic speech disturbance), recovery of neglect disturbances (neglect syndrom). Psychotherapeutical methods of treatment: art-therapy, music therapy, Ericson hypnosis (resource trances), relaxation methods, visualization and respiration techniques. Cognitive and behavioral therapy.

Therapy results: 1. Compensation of disturbed psychical functions – the enhancement of psychical activity, memory span, attention, amplification of visual perception, voluntary regulation, programming and mental activity control.

2. stabilization of psychoemotional state: reduction of anxiety, emotional tension, development of reaction skills in stressful situations.

3. enhancement of psychological adaptation to a disease and life-sustaining activity (self-service, everyday life activity, communication).

Lumos: 3d visualization of fluorescent markers in thick samples of nervous tissue

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A new optical clearing solution for 3D fluorescent imaging has been developed to enhance efforts to map neuronal brain circuitry in health and disease. Microscopic visualization of neuronal networks in entire brain specimens requires their optical transparency and preservation of their three-dimensional structure and fine morphology. A number of approaches have been recently developed to obtain optically transparent biological samples, including 3DISCO, Scale, CLARITY, ClearT, SeeDB and others. However, each of these techniques has certain limitations. To address these problems, we developed a new clearing agent termed LUMOS (LUMinocity Maintaining Opticlearing Solution). LUMOS enables fast three-dimensional optical imaging of genetically encoded fluorescent proteins in fixed entire mouse brain. The water-based LUMOS does not cause distortion of the tissue and retains its native three-dimensional information. LUMOS preserves fluorescent signals of various reporter proteins in the intact structures. Two-step low-cost LUMOS clearing procedure requires less than two days and renders samples uniformly transparent, allowing their subsequent 3D microscopy with cellular resolution and automatic counting of fluorescently labeled targets. We have shown that this approach enables imaging of the entire brain of an adult Thy1-EGFP mice, fast mapping of experience-induced expression of c-Fos-GFP and Zif/268-GFP after fear conditioning in transgenic mice and localization of GFP-encoding viral vector transduced into the mouse brain. LUMOS pretreatment instead of methanol and freeze-80C/thaw traditional steps allows fast three-dimensional direct immunohistochemistry of adult mouse hemispheres. Thus LUMOS enables high-throughput 3D fluorescent analysis of mouse brain at microscopic resolution which may shed light on the structure and functions of large neuronal circuits.

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Estimation of carnosine efficiency in the nanocomplex composition by using model multifactorial oxidative stress in vitro and in vivo

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Research objectivities. To investigate the antioxidative, antihypoxic and neuroprotective properties of the first obtained nanostructures on the basis of *carnosine* included in the *phospholipid nanostructures (FNC)* and *nanocomplexes with micellar properties (NMC)*, by using in vitro and in vivo models of oxidative stress (OS).

Methods. Methods of cell cultivation, flowcytometry, Western blot, chemiluminescence, modeling of acute hypobaric hypoxia (AHH), methods of elaboration of conditioned reflexes were used.

Results. *In vitro* using the method of chemiluminescence was established that FNC and NMC have a higher the antioxidant activity compared with carnosine. In cell culture PC12 it was shown that in the conditions of induction OS by biogenic amines (spermin, spermidine and putrescine) FNC effectively protect cells, causing a significant reduction of the level of generated reactive oxygen species and the proportion of dead cells. The protective effect of FNC on cultured cerebellar granule cells of 10-12 days old mice of rapidly aging line SAMP1 under OS induced by chemical agents was also shown.

In vivo on mice model AHH been shown that prophylactic administration of FNC provides higher resistance to hypoxia, and increases total antioxidant activity of brain tissues more expressed in mice with normal aging rate - SAMR1. On the rats model AHH been found that NMC more effectively protect the animals from hypoxia compared with free carnosine, as well as positively affect the production of the conditioned reflex passive avoidance.

Conclusion. Carnosine containing nanocomplexes are superior in comparison with the free carnosine antioxidative and antihypoxic activity at the cellular level and at the level of the whole organism, and also have a more pronounced effect on the training of animals. Identified properties open the prospect of further study of carnosine containing nanocomplexes as a possible neuroprotective agents.

Creating a means of communication in children with autism spectrum disorders

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At present the problems to help children with autism spectrum disorders vary widely: from timely accurate diagnosis to choose an adequate effective approach to correction. Usually paramount for parents request it serves. It is one of the most important human mental functions, the index level of thinking and development in general. But, we are primarily a complex mental function, it does not appear immediately. In the case of speech disorders in the autistic child will not help probe massage, articulation exercises, watching movies or logoritmik many other classic speech therapy techniques.

Some children have speech, and quite a good vocabulary, but they do not use speech as a medium of communication. Communication skills, the ability to tell about themselves, their desires, to accept or reject anything - basic human need. Any by which this can be done, such as speech, gestures or images pantomime. However, we noticed that many parents do not knowingly permit the child to communicate using pictures or gestures, for fear that the child get used to it, can not or do not want to talk.

The report examines the work undertaken with a particular child for two years with the use of alternative communication. Describes and analyzes the persevering and unhurried work with my mother's fears, finding the most productive ways of working with a particular child, which led to the use of verbal communication child to date.

It is impossible to say with complete confidence that all the problems are gone forever. Periodically, the need for sensory stimulation, there are days and days of bad mood when activity takes place "in the same breath." But in general, the situation has improved - gradually established academic skills - sit at the table, waiting changing jobs, to comply with requests, to imitate the actions, to perform the task from start to finish, ask for help.

Ultrastructural reorganization of neurons and interneuronal connections in rat brain cortex after parenteral injection of cell-free dna

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Purpose. Cell-free DNA (cfDNA) circulates throughout the bloodstream of both healthy people and patients with various diseases including cerebral pathologies and acts upon the cells. In our study we performed an electron microscopic investigation of the effect of parenteral cfDNA injection on ultrastructure of rat cortical neurons and synapses.

Methods. One day after intraperitoneal or intravenous injection of cfDNA, ultrathin slices of parietotemporal rat neocortex were investigated using electron microscope "Hitachi" (Japan).

Results. In normochrome neurons, after intraperitoneal administration of cfDNA hypertrophy and excentric localization of nucleoli as well as numerous nuclear pores and invaginations of the nuclear envelope are observed. Moreover, the cytoplasm contains preassembled polyribosomes, energized mitochondria with their hyperplasia, numerous cisterns of rough endoplasmic reticulum (RER) contacting with nucleus. These features of neuronal plastic rearrangements suggest the activation of protein synthesis and strengthening of metabolic interrelation between nucleus and cytoplasm. In neuropil, the plastic synaptic rearrangements are well pronounced. The extension of synaptic active zone is increased and numerous complicated contacts such as divergent, convergent, perforated and invaginated synapses are appeared. Intravenous cfDNA injection is accompanied by more intensive ultrastructural reorganization of neurons and neuropil. In cytoplasm, new RER cisterns shaping from outer membrane of nuclear envelope are observed. Mitochondrial hyperplasia is more pronounced. Along with complicated forms of synaptic connections mentioned above, symmetric axodendritic synapses, dendrodendritic tight contacts, punctuation and desmosome-like junctions, as well as symmetrical and asymmetrical axoglial and axoaxonal contacts are arised. More pronounced plastic rearrangements in response to cfDNA intravenous injection in comparison with its intraperitoneal administration appear to be conditioned by easy accessibility of brain tissue to cfDNA immediately from the bloodstream.

Conclusion. Our data show for the first time that parenteral cfDNA treatment could induce profound plastic reorganization of brain tissue directed on activation of its metabolic and functional properties.

The experience of non-drug treatment of children with charcot-marie-tooth disease in university clinic

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Purpose: The experience of new conceptual directions (methodical and methodological innovations) in multiform, differentiated use of non-drug methods of treatment CMT as affiliate component of complex habilitation of the patients.

Methods: We observed 50 patients with CMT (age from 5 to 65 years), Me [Q₂₅; Q₇₅] - 29 [19; 41] ye.o., including children (15%) in University Clinic. Objectives of physical habilitation of children with CMT were ensuring the possibility of independent movement, improving support functions, prevention of deformations stop and trauma of the ankle joints, mild pain syndrome, improvement of neuromuscular conduction, stimulation of axonal growth, improving the trophic functions of the nervous system, the correction of the status of the autonomic nervous system, the correction of the status of the autonomic nervous system. We have developed and used the author's complex non-drug treatment of CMT based on axonal and/or demyelinating disease type.

Results: Median age of the children with CMT was 12.4 [14; 11] ye.o. Pain reduction (cramps) achieved in 72% children vs 70% adults, increase conduction velocity according EMG shown in 32% children vs 15% adults, including M-response amplitude increase in 50% patients younger 14 ye.o. and 30% of patients older 14 ye.o.; SPE-motor has increased in 50% children vs 30% adults. Positive change of vibration thresholds was noted in a wide range of frequencies vibration (8, 16, 32, 64, 128, 250 and 500 Hz) in 45% children vs 38% teenagers (older 14 ye.o.). We showed improvement of tactile and pain sensitivity in 15% children and 8.3% teenagers.

Conclusions: Habilitation of children with CMT should be given to all children, including those without disabilities. Habilitation of children with CMT should have a personalized approach to each child based on the type and severity of the disease. Compared with adult patients effect of non-medical treatment of the children was more pronounced and it is possible to fully restore lost functions (sensitivity disorders, light paresis, increase muscle tone). The author's complex non-drug habilitation program with personalized approach for children with CMT is pathogenically grounded in and requires further studying.

Therapeutic hypothermia as the method of neuroprotection in critical care

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The aim of study: to approve a therapeutic hypothermia (TH) as the method of neuroprotection of neuron critical care patients.

Materials and methods: we included 8 patients. Main diagnosis: rupture of aneurism of the cerebral vessels, complicated by subarachnoid haemorrhage, cerebral angiospasm (CA), brain oedema. All patients were operated (craniotomy and clipping of aneurisms). We used a therapeutic hypothermia (TH) method, with achievement of the target temperature 33C, the device "Arctic Sun 5000", the Bard Medical, the USA. We initiated TH from the first hours after operation, duration was 39 ± 8 hours. We controlled: (1) level of the intracranial pressure (ICP), the Spiegelberg monitor, Germany, we used intraventricular (at 6 patients) and parenchymal (at 2 patients) ICP sensors; (2) indicators of the linear blood velocity (LBV), the device for a transcranial dopplerography (TCD) was "Angiodin Universal", BIOSS, Russia; (3) rest energy exchange (REE) level by «Triton of MPR 6-03» monitor, Triton, Russia. Data are submitted as Me (25; 75th percentile).

Results. Patients were operated with the LBV initial level no more than 2 (according to Lindegard's index). In the next few hours after operation we observed the increase of LBV to 4 (2; 5) that was accompanied by increase in ICP from initial 12 (10; 16) to 25 (20; 29) mm Hg. On this background we observed the increase of ICP level from initial 1201 (1001; 1302) to 3180 (3104; 3244) kcal that explained with development of a catabolic syndrome. TH allowed to reduce the ICP, REE and LBV levels to normal and to stabilize up to the warming moment. At 5 patients in 36 hours of TH we observed gradual improvement of the neurologic status with normalization of REE, LBV and ICP. The assessment of Glasgow outcome scale showed the level near 3,4 (3,2; 4,1) point. Lethal outcome was observed in 2 patients at whom TH allowed to lower the ICP and LBV level, to reduce the REE, however after warming the ICP level was increased. We didn't record any side effects of TH.

Conclusion. The TH method in critical care patients (on clinical model of non traumatic subarachnoid haemorrhage) allows to provide effective protection of a brain.



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Diagnosis of ventilator-associated pneumonia in patients with stroke

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Objective: to investigate the dynamics of change on a scale CPIS (Clinical Pulmonary Infection Score) in patients with stroke who have artificial ventilation, with the development of ventilator-associated pneumonia (VAP).

Methods. VAP diagnosis was performed according to the criteria proposed in the Russian recommendations parallel and evaluated on a scale CPIS. Investigation of the dynamics on a scale CPIS was conducted in the diagnosis of VAP , 3, 7 and 10 days from the time of VAP on the background of antibacterial therapy.

Results. We examined 55 patients with stroke who developed early VAP and 43 patients with stroke who developed late VAP. With the development of VAP in both groups showed an increase in total score CPIS compared with the original estimate (translation by artificial ventilation) ($p <0,05$). On a background of effective antibiotic therapy was a decrease in scores on the CPIS at 3, 7 day from the time of VAP in both groups , although remained statistically significant difference compared with the assessment scale CPIS when translated into the ventilator ($p <0,05$). 10 day from the time of VAP conducted against the background of effective antimicrobial therapy statistically significant difference in the CPIS scale compared with the assessment in the translation was not ventilated.

Conclusion. Rating on a scale CPIS in patients with stroke who are undergoing mechanical ventilation is a useful diagnostic tool for the diagnosis of VAP. Noted a statistically significant increase in scores on the CPIS in the development of VAP compared with primary when translated into ventilator. Rating on a scale CPIS dynamics may be useful for evaluating the effectiveness of antibacterial therapy. So on a scale reduction in the CPIS dynamics at 3, 7 day on the background of antibacterial therapy indicates its effectiveness. With an effective antibiotic therapy on day 10 total score CPIS did not differ from the original (when translated into artificial ventilation).

Decompression craniotomy as an element of intensive care patients with massive ischemic stroke

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Introduction: Cerebrovascular pathology remains one of the most significant in modern health care. The most dangerous variant of acute cerebrovascular accident (CVA) ischemic type is the so-called massive ischemic stroke - more than 50% loss of blood supply to the basin of the middle cerebral artery.

Objective: To evaluate the results of decompression craniotomy (DCT) as a method of correcting critical brain edema in patients with ischemic stroke.

Materials and Methods : A retrospective analysis of 16 cases (7 men and 9 women in the middle age 47,8) (25 - 64) years) DCT at patients with ischemic stroke who are treated at the Department of Anesthesiology and Intensive Care № 5 of Regional clinical hospital of Krasnoyarsk during 2011 - 2012 is carried out. All patient carried out the standardized complex of set of tests and therapy, according to recommendations of ESO (European Stroke Organization) in 2008. Indications for DCT were: age 18 - 60 years; heart attack in the middle cerebral artery (MCA) more than 50% area of blood supply ; neurological status scale NIHSS> 15 points; disease duration of 48 hours (ESO 2008). Contraindications: inhibition of wakefulness level below 8 points on the Glasgow coma scale (GCS) and concomitant somatic pathology decompensation. Diameter section of bone was resected 10 - 12cm.

Results: DCT conducted on average 5 hours after the onset of signs of critical brain edema and allowed to reduce expressiveness of a dislocation of median structures on the average with 8 to 5 mm., Which was a leading factor in the rest of the studied parameters, the most important are: survival - 53.7%.

Conclusion: 1) In patients with ischemic stroke DCT helps reduce the severity of dislocation syndrome, ensuring survival in 57.3% of cases at the level of the final neurological deficit equal to 6.4 points.

2) DCT, subject described the recommendations is an effective treatment for critical brain edema on the background of a massive ischemic stroke.

Application of flexible endoscope for minimal invasive neurosurgery

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Endoscopic methods in neurosurgery is the way to minimize the trauma of surrounded nervous tissue alongside the surgical target and on course of the approach. The limitation of rigid endoscope caused by impossibility to inspect the objects out of the straight trajectory (even with the angled optic 0-90°).

Method. We apply flexible endoscope 40 to 70 cm. long with manipulators, instrument and irrigation channels for fenestration of cranial and spinal arachnoid cysts, cystic tumors and adhesive spinal arachnoiditis (thecaloscopy) since 2009. The flexible endoscope provide the movements inside the liquor spaces without trajectory limitation through lateral then third ventriculostomy so middle and posterior fossa cystic lesions could be punctured and aspirated. Surgical treatment for cystic and adhesive processes in spinal canal included thecaloscopic adhesiotomy, fenestration of cyst walls and subarachnoid space, and exploration in a caudal and cranial directions.

Result. 52 patients (12 cranial & 40 spinal pathology) we operated. Neurological improvement (average score 1.4 on the Modified Frankel Scale, 1.8 on the Ashworth Scale) was seen in 87% of patients operated for a spinal arachnopathy. Transient disturbances of deep sensitivity were seen in 9% of patients with cranial and spinal lesions. Post op MRI revealed reduction cranial cysts, hydrocephaly and syringomyelia signs. Postoperative complications included 1 CSF leakage and 1 transient intercostal neuralgia. There were no serious intraoperative complications reported.

Conclusion. Neuroendoscopy in cranial and spinal neurosurgery presents as the main condition for minimal invasive impact on the nervous structure during surgery.

Endoscopic endonasal transsphenoidal surgery for Suprasellar Tumors

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Surgical Anatomy and Procedures of EETS. The advancement of endoscopic endonasal approaches provide an excellent and wide vision for the transsphenoidal approach, and recently contribute to the extension for the management of the lesions located in the suprasellar area. The reduced brain retraction and neurovascular manipulation with less morbidity are potential advantage. For the simulation of these EETS procedures, neuroimaging evaluation, such as MRI and 3D-CT(A), are useful to perform theses procedures accurately. Major concerns about EETS are avoidance of vascular injury, such as internal carotid artery (ICA) and its branches, and reconstruction the skull base defect, and they still remain challenging.

Extended Endoscopic Endonasal Transsphenoidal Surgery. More recently, some authors have reported the successful removal of suprasellar lesion with the extended endoscopic endonasal transsphenoidal surgery (eEETS). The access to the suprasellar area can be obtained after resection of the tuberculum sellae and the posterior portion of the planum sphenoidale. This eEETS approach allows wide exposure of inferior aspect of the neurovascular structure of the suprasellar region without any brain retraction. This route minimizes the risk of postoperative visual disturbance, because most of the blood supply to the optic system coming from the branches of ACAs and A. Com. A can be avoided to manipulate during the procedures. In addition, superior hypophyseal artery is also preserved unless the arachnoid membrane surrounding at the suprasellar region would be damaged. The second problem of this approach concerns the higher risk of postoperative CSF leakage. The accurate reconstruction with a multilayer strategy has to be performed.

Craniopharyngioma arises from the pituitary stalk and the hypothalamus. The biggest difficulty of the several transcranial routes is to recognize the origin of the tumor. On the other hand, this eTTTS approach provides a direct view of the suprasellar lesion at the pituitary stalk and the hypothalamus. Especially, the craniopharyngioma located at the anterior portion of the pituitary stalk and the optic chiasm, which consist of about 70% cases of this tumor, usually lift up the optic nerves and through the sufficient removal of the bony structure of the tuberculum sellae, wide exposure, detailed observation, and precise dissection of these tumor surroundings at this area.

CD38, CD157, oxytocin, behavior and autism.

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Mammalian paternal parents play a role in infant care. Parental males of non-monogamous laboratory mice induce a parental retrieval behavior via olfactory and auditory signals from the maternal mate isolated together in a new environment (1). This behavior is rapidly lost when such signals disappear when the mice are singly isolated. The neural circuitry and hormones that control paternal parental behavior are not well-understood. To investigate this phenomenon, we studied the role of oxytocin (OT) and CD38 in the nucleus accumbens (NAcc) using *CD38* knockout (*CD38^{-/-}*) mice of the ICR strain, which has previously demonstrated an impairment of social behavior by reducing oxytocin secretion in the hypothalamus and a recovery by a subcutaneous injection of OT. *CD38^{-/-}* sires failed to retrieve their pups when they were reunited after cohabituated separation in a new cage for 10 min. *CD38^{-/-}* sires treated with a single subcutaneous injection of OT partially rescued the retrieval events when co-housed with *CD38^{-/-}* sires treated with OT. Next, we examined the effect of local expression of human CD38 in the NAcc in males via lentiviral infection. Pairs of knockout dams treated with OT and sires expressing CD38 in the NAcc displayed more retrieval (83% of wild type sire levels). A complete recovery was obtained by sires with the expression of CD38 in the NAcc and with OT administration. OT and CD38 in the NAcc are critical in paternal parental behaviour (2). Unexpectedly, we found that CD158 has a neuronal function, and when CD157 was deleted, mice showed neuronal phenotypes, such as anxiety-related behaviors, which seem to resemble those in integrin-knockout mice. These emotional phenotypes were rescued by OT. I will present these results found in *CD38* and *CD157* knockout mice (3) and discuss them in relation to psychiatric diseases, such as autism spectrum disorders, schizophrenia, and Parkinson's disease.

(1) Liu et al., *Nature Commun.*, 4: 1346, 2013. (2) Akther et al., *Mol. Brain* 6: 41, 2013. (3) Lopatina et al., *Front. Behav. Neurosci.*, 8, 133, 2014.

Molecular mechanisms and potential therapies of the spinocerebellar ataxia and the future perspective of the clinical application

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Aim: Spinocerebellar ataxia type 1 (SCA1) is a progressive neurodegenerative disorder caused by the expansion of a polyglutamine tract in the ataxin-1 protein. To date, no fundamental treatments for SCA1 have been elucidated. However, some studies have shown that mesenchymal stem cells (MSCs) are partially effective in other genetic mouse models of cerebellar ataxia. In this study, we tested the efficacy of the intrathecal injection of MSCs in the treatment of SCA1 in transgenic (SCA1-Tg) mice.

Methods: Deeply anesthetized SCA1-Tg mice at 5 weeks of age received intrathecal injection of 3×10^3 MSCs suspended in 10 μ l of the culture medium over 1 min using a Hamilton syringe. Motor coordination of the injected and non-injected SCA-Tg mice was repeatedly examined with the rotarod test from 5 weeks to 15 weeks after the MSC transplant. Then, the neuronal architecture of the cerebellum and, in particular, the Purkinje cells (PCs) was assessed by immunohistochemistry.

Results: Intrathecal injection of MSCs greatly mitigated the cerebellar neuronal disorganization observed in SCA1-Tg mice. Although the PCs of 24-week-old non-treated SCA1-Tg mice displayed a multi-layer arrangement, SCA1-Tg mice at a similar age injected with MSCs displayed mono-layer PCs. Furthermore, the injection of MSCs suppressed the atrophy of PC dendrites in SCA1-Tg mice. Behavioral tests demonstrated that MSCs normalized deficits in motor coordination in SCA1-Tg mice.

Conclusion: Intrathecal injection of MSCs may be an effective therapy for SCA1 patients. Future studies should be performed to develop optimal protocols for intrathecal transplantation of MSCs in SCA1 model primates with the aim of developing applications for SCA1 patients.

Potential for the use of induced pluripotent stem cells in neurodegenerative disorders

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Background. A revolutionary technology of genetic reprogramming allows obtaining induced pluripotent stem cells (iPSCs) from fibroblasts and other differentiated somatic cells. These iPSCs can grow in culture and differentiate into any cell types, including neurons, necessary for studies of molecular mechanisms of neurodegenerative diseases and replacement therapy. For instance, transplantation of fully functional dopaminergic neurons into the brain is a promising therapeutic option in Parkinson's disease, and similar approaches may be used in other neurodegenerative disorders.

Methods. We prepared induced pluripotent stem cells (IPSCs) by reprogramming them from fibroblasts that were obtained from a skin biopsy of three patients with genetic forms of Parkinson's disease (mutations in the LRRK2 and PRKN genes), three patients with Huntington's disease (CAG expansion in the HTT gene), and two patients with autosomal dominant amyotrophic lateral sclerosis (mutations in the SOD1 gene).

Results. The pluripotency of cells reprogrammed from fibroblasts was verified by expression of the respective transcription factors, including OCT4 and SOX2, and their ability to differentiate in ecto-, meso-, and endodermal derivatives. Using IPSCs from patients, we created dopaminergic neurons that expressed tyrosine hydroxylase (TH) and exhibited spontaneous bioelectrical activity when they were grown on a multielectrode array. In rats with a model of parkinsonism induced by direct injection of the neurotoxin 6-OHDA into the substantia nigra, transplantation of these dopaminergic neurons into the striatum substantially improved motor function and reduced parkinsonian symptoms. Postmortem studies showed the presence of human cells (confirmed with the specific nuclear antigen staining) transformed into the dopaminergic neurons (positive TH staining) in the striatum of the operated animals. Similarly, neurons successfully generated from fibroblasts obtained from patients with Huntington's disease and amyotrophic lateral sclerosis are currently in use in our lab as unique platforms for studies of these neurodegenerative disorders.

Conclusion. IPSC-derived neuronal cell lines can be used for experimental neurotransplantation and for establishing the screening systems aimed at discoveries of disease mechanisms and high-throughput search for novel neuroprotective drugs.

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Art therapy as a means of rehabilitation of children with autism spectrum disorders: experience

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Art therapy - a powerful tool of social and cultural rehabilitation, because of the very nature of art are psychotherapeutic and educational opportunities. "Art therapy not only brings art into the lives of people experiencing problems, it also meets their unmet need for self-expression. {...} Tasks art therapy go beyond the recovery of mental health or learning the fine arts." (Edith Kramer).

The report gives a brief overview of the variety of art-therapeutic agents (drawing, modeling, working with sand, movement and dance, poetry, skazkoterapiya, testr) to work with children with autism spectrum disorders.

Emphasis is placed on the analysis of the theater studio "Ladoshki" with children with autism spectrum disorders (ASD). The significance of each part of the process of preparation for the theatrical production of behavioral problems of the child with ASD: familiarity with the product for staging works reflected in the figure and sculpting, writing the script and roles, games, improvisation, role of parents, brothers and sisters of the studio, production of scenery and costumes, rehearsals, holidays and tea, the traditional elements of a busy time for self-organization and communication without an adult, work on productions, product selection.

Describes the positive experience of development work with a child with ASD within the staging of "The Little Prince" by Antoine de Saint-Exupery.

Analyzes the exchange of experience with colleagues Elena, Maria and Fyodor Makarov, Richard Heyhau Natalia Datsenko, Julia Rempel.

Particular attention is paid to the analysis of own tests, describes some moments in the work, be counter-productive, as well as suggestions of strategies and prospects for further development studio.

Minimal invasive methods in the treatment of neuropathic pain

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Introduction: The aim of this retrospective observational study is to evaluate the efficacy of Periferal nerve and continuous subcutaneous stimulation for patients with neuropathic pain (NP) syndromes.

Materials and Methods: Twenty nine patients (12 male, 17 female, aged 32-71 years) underwent a trial of subcutaneous stimulation with temporary bipolar or quadripolar percutaneous leads. From the trial, 4 of 29 patients were quantified that a poor results and were excluded from the study. 25 patients, who had pain relief >50% were undergo permanent implantation of the stimulator. 4 – postthoracotomy syndrome, 7 - post herptic neuralgia (5 in the chest wall and two in the perineum), 15 – peripheral neuropathy (5 of them – different branches of trigeminal nerve) "ITRELL III" or "SYNERGY" systems were implanted. Patient pain score, drugs consumption, sleeping and working time and another parameters that influence on the quality of life was assessed by VAS and verbal-color test. These result were compared before implant, after trial and in follow up from 6 to 36 months (average 18 months).

Results: Good results was obtained in almost all cases with positive trial. Absolute recovery was marked in 5 patients (21,5%), good recovery in 19 patients (71%) and in 5 cases results were considered as fluent. In fife cases with fluent result, patient hade very hi score psychogenic component of the pain (measured by verbal-color test). No serious or unanticipated adverse events have occurred. The one type of complication which happened during this study was a migration lead in four patients, The effect of stimulation has been completely restored after electrode replacement.

Discussion: (Conclusion): Although we can conclude, that in the right selected patients suffering from chronic neuropathic pain, peripheral nerve and peripheral nerve field have been shown hi effectiveness. That Efficiency like an efficiency of SCS, essentially depends on expressiveness of a psychogenic component of a severe chronic pain.

The impact of comorbid somatic diseases on cerebral hemodynamics in women suffering from paranoid schizophrenia

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The aim of the study: To study the impact of comorbid somatic diseases on cerebral hemodynamics in women suffering from paranoid schizophrenia.

Research methods: Clinico-psychopathological, clinical and catamnesis, statistical, somatic-neurological, transcranial dopplerography examination of encephalic haemodynamics using the method of color duplex scanning.

Cerebral blood flow velocity parameters (peak systolic and end-diastolic linear velocity of blood flow and the peripheral vascular resistance index in the anterior, middle and posterior cerebral arteries) in patients suffering from paranoid schizophrenia with comorbid somatic diseases and somatically healthy patients were compared.

Results of the study. In patients with concomitant cardiovascular disease the peripheral vascular resistance index of the anterior cerebral artery was significantly statistically different from that in somatically healthy patients

Statistically significant changes in peripheral vascular resistance index in the anterior cerebral artery and end-diastolic flow velocity in the posterior cerebral artery were in patients with concomitant diseases of the digestive organs.

In the presence of concomitant renal pathology final velocity of blood flow in the middle cerebral artery and peripheral vascular resistance index in the anterior cerebral artery were significantly different from those in somatically healthy patients. Statistically significant changes in end-diastolic velocity of blood flow and vascular resistance index in the middle cerebral artery were in patients with pulmonary comorbidity.

Conclusion: The presence of concomitant somatic pathology affects the performance of cerebral hemodynamics in patients with paranoid schizophrenia and is a risk factor for cerebral vascular dystonia.



BCM

БИОХИММАК

БиоХимМак был создан в 1989 году как один из первых технологических стартапов Московского университета. Основатели компании построили БиоХимМак на четком видении, что инновационные технологии должны изменить практику диагностических и научных лабораторий. Сегодня, со спектром своей собственной продукции и продукции компаний-партнеров, состоящим из более 25 тысяч наименований, БиоХимМак обслуживает более 5 тысяч диагностических и исследовательских лабораторий в России и странах СНГ. В своей работе компания следует международным стандартам управления бизнесом; ее система качества сертифицирована по стандарту ISO 9001.

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Our experience of the microsurgery of anterior scull base meningiomas

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The tuberculum sellae meningiomas and diaphragma sellae meningiomas are one of the most difficult tumors of the anterior scull base, partly because of their intimate association with the optic nerves and chiasm, hypothalamus, and internal carotid arteries. Complete tumor resection with preservation or improvement of visual function is the goal of the surgery of these tumors.

Aim: The aim of this study is to analyze the results of the microsurgical removal of tuberculum and diaphragma sellae meningiomas at the Krasnoyarsk Regional Hospital.

Material and methods: We retrospectively reviewed 28 patients treated surgically for tuberculum sellae and 4 for diaphragma sellae meningiomas between 2009 and 2014. There were 4 male and 28 female patients; mean age at the time of surgery was 52,16 years. Mean preoperative performance status (Karnofsky scale) was 56,68 (range 40-80). All patients had any visual dysfunction before surgery. The mean tumor size was 2,8 cm. All patients were operated via the lateral subfrontal approach. Optic canal involvement was observed in 4 patients.

Results: Gross total tumor resection was achieved in 93,75%. There were no deaths in this series. Improvement of visual acuity and visual field were achieved in 78,1%. Mean postoperative performance status (Karnofsky scale) was 72,6% (range 40-100). Postoperative neurological complications included meningitis, anterior pituitary insufficiency, transient diabetes insipidus and postoperative seizures.

Conclusions: Tuberculum sellae and diaphragma sellae meningiomas can be safely operated on through the lateral subfrontal approach with using microsurgical techniques. A high percentage of total tumor resection and superior visual outcomes are achieved.

Rehabilitation with physical factors in early period with CVA

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Early rehabilitation of stroke patients, as needed prevention of complications and for more rapid and complete functional recovery of the patient. To date approaches to the provision of physical therapy (PT) in the acute care of patients period slant stroke in symptomatic purpose and wore recommendatory nature.

The purpose of this work: to introduce the assignment algorithm PT treatment on patients with CVA in acute period.

Materials and methods. According to our observations for the period 2010 to 2013 year treatment with (FT) 3364 patients with stroke has been received . The distribution of patients depending on the Physical factors include transcranial microplazia(TCMP)-950, kvanterapiya-1671, mioneyrostimulyatsiya (MNS) -922, magneto-I082, cryotherapy-112. Each of the second patient, physiotherapy consisted of two low-intensity physical sparing factors, and one was a central pathogenetic action, second appointed as symptomatic.

Results. In our clinic, on the basis of lessons learned from the management of patients with CVA , developed an algorithm based on physiotherapy pathogenetic directivity factor and the time from the start of cerebral accident.

Besides the physical factors of the central pathogenetic action in acute period with CVA can assign symptomatic treatments. In terms of neuroreanimation conducted stimulationrespiratory muscles , intestines , bladder and larynx .

After application of physical therapy on the proposed algorithm for the period since 2010 to 2013 year 2635patients has received clinical improvement (78%) had evidence of the effectiveness of 729- physiotherapy during hospital stay were observed (22%) , in our opinion , this is due to appeared contraindications for physiotherapy effects After a further examination .

Conclusion. So introduction of modern physiotherapy treatment of patients with CVA will allow more differentiated and grounded approach to the selection of patients for early rehabilitation, as well as improve the social importance developed rehabilitation programs in improving the quality of life patients with stroke.

Rehabilitation on patients with CVA in acute period

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Purpose of the work. Evaluate efficiency of up-to-date methods in Therapeutic physical training (TPT) and optimize approaches for physical rehabilitation in early period.

Materials and methods. 587 patients suffered from insult in acute period were included in research during 2013 year. Criteria are following: hemiparesis, stable hemodynamic without severe hypertension and resistant hypotension.

For optimization of approaches to therapeutic training since 2011 year,in our department an algorithm of therapeutic training on patients with CVA in early period was created.

All patients were selected on two groups: 1st group - 340 people (58%), were treated with standard methods; 2nd group - 247 people (42%) treated with hardware rehabilitation.

Results. At the end of the course on certain algorithm muscular strength in paretic lower extremity has increased: 1st group - 1.3 times, 2nd group - 1.8 times. Muscular strength in paretic upper extremity has increased: 1st group - 1.4 times, 2nd group - 1.5 times. Also the reduction of stroke severity was remarked on NIHSS scale: 1st group - 1.1 times, 2nd group - 2 times. There was a significant decrease on scale of Rankin: 1st group - 1.3 times, 2nd group - 1.6 times. The mobility index of Rivermid increased: 1st group - 1.5times, 2nd group - 2 times.

During rehabilitation on patient all hemodynamic parameters has normalized: blood pressure and heart rate are decreased on 12% on the average.

Conclusion. Thanks to implementation of algorithm with methods of TPT on patients with CVA in acute period resulted in recovery of locomotion, stabilization of hemodynamic and motivating on patients for current rehabilitation

Etiologic mechanisms of emotional imbalance

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Objective: to study the mechanisms of emotional imbalance.

Method: applied kinesiology.

Results: during the examination of 1023 people the following mechanisms of development of emotional disorders were identified:

1. Structural. Etiology: injury, violation of fusilately-inhibition balance. The most significant structural disorders are: the sphenobasilar junction compression, wearing brackets on the upper jaw, the imbalance of receptors, the memory of the trauma, copula-muscle imbalance and functional blocks of the cervical spine and skull. Diagnosis and treatment are carried out according to the methods by L.D. Potekhin, M. Alena, D. Liwa, H. Palomara, and CR. Smith.

2. Biochemical. Etiology: deficiency and toxicity. Major deficits are of vitamins, minerals, amino acids, intracellular water shortages. Some deficits are very specific. For example, vitamin B12 deficiency generates the main response from positions of anger, and anger increases vitamin B12 deficiency. There are also deficits that have a genetic predisposition (chromosomal polymorphism). Intoxication occurs due to infectious and non-infectious factors, as well as intolerance to certain foods, such as gluten. Diagnostics and selection of treatment are carried out using nosodes supplied by "Metabolic" company (England).

3. Emotional subconscious imbalance. Etiology: the imbalance of subconscious fear and love. The heart of any emotional disturbances is fear and lack of love. Testing helps the patient to realize an incorrect entry in the subconscious mind, which itself has a healing effect. Diagnosis and treatment are carried out by J. Diamond technology using special muscle testing, and using Kr. Smith's techniques.

4. Neurological imbalance of cerebral hemispheres activity. Etiology: genetic determinism. There are emotions connected with the activity of both left and right hemispheres of the brain. At the same time, the work of each hemisphere of the brain is associated with specific energy of meridians. Diagnosis and treatment are carried out according to the technology of Kr. Smith, M. Alan and J. Diamond's techniques.

Conclusion: thus, there are emotions associated with the structural and biochemical disorders, as well as the emotions of the subconscious mind and emotions associated with neurological imbalance of brain hemispheres. All the mechanisms are interconnected and without some correction reinforce each other. Only complex approach to the treatment makes it most effective.

Mathematical models of astrocyte signaling and astrocytic regulation of neuronal activity

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We develop mathematical and computational models of astrocyte dynamics and possible effects of astrocyte activation on synaptic transmission and neuronal firing. The aim is to verify molecular mechanisms explaining experimental data and to predict possible consequences of astrocyte and neuron activation in normal and in pathological conditions that can be virtually mimicked in the models.

The model of individual astrocyte signaling employed basic molecular kinetics underlying calcium changes in cytoplasm, e.g. calcium oscillations based on calcium exchange between cytosol and endoplasmic reticulum ER, and with extracellular space . We analyzed how calcium signals can be generated depending on IP3 level and taking into account morphological structure of astrocyte and astrocyte processes. Basic prediction verifying some experimental data was that the calcium signals were spatially localized in compartments and whole cell events were generated not by diffusive propagation, but based on self-organized criticality percolation transition.

We also considered how Ca^{2+} -dependent release of gliotransmitters can affect and regulate synaptic transmission and neuronal firing. We assumed that the regulation may occur on the scale of seconds. The firing dynamics of individual neurons in a spontaneous firing network was described by the Hodgkin-Huxley model. Network impact was simulated by a set of excitatory synaptic input driven by the Poisson spike train with variable frequency. Neurotransmitter release was described by its mean field concentration. The amplitudes of the excitatory postsynaptic currents (PSCs) obeyed the gamma distribution law. We assumed that astrocytes depressed the presynaptic release and enhanced the postsynaptic currents. Computational prediction was that the low frequency synaptic input may be suppressed while high frequency input may be amplified. We also found that the astrocytes may contribute in homeostatic regulation of the network activity by increasing or decreasing firing of the neurons. Another interesting prediction was that astrocyte activation may induce a bistability, e.g., coexistence of two stable firing levels and spontaneous transitions between them.

Neuroprotective properties of modulators of endogenous cannabinoid systems in some forms of cerebral pathology

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The endocannabinoid system (ECS) exerts important modulatory functions in the central nervous system, particularly the retrograde control of excitatory or inhibitory synapses, which enables this system to participate in the control of important neurobiological processes in healthy conditions. However, this physiological relevance acquires a maximal interest in neuropathological conditions affecting either the function or the structures of specific areas of the brain, conditions that have been associated with important changes in the activity of this modulatory system and its functional units. These units include cannabinoid receptor type 1 (CB1) and 2 (CB2), their endogenous ligands (endocannabinoids) and enzymes of endocannabinoid hydrolysis that are susceptible to pharmacological adaptation. Whilst CB1 receptors are mostly expressed in neurons, where they regulate neurotransmitter release and synaptic strength, CB2 receptors are found mostly in glial cells and microglia, which become activated and over-express these receptors during different forms of cerebral pathology. Among the group of the brain disorders that have been associated with the ECS, a special interest has been concentrated in various neurodegenerative diseases, including Alzheimer's disease, Parkinson's disease and ischemia. The neuromodulatory actions at CB1 receptors by endocannabinoids, of which anandamide and 2-arachidonoylglycerol are the two most studied representatives, allows them to counteract the neurochemical unbalances arising during these disorders. In contrast, the modulatory effects of these lipophilic mediators at CB2 receptors regulate the activity and function of glia and microglia. Indeed, the level of expression of CB1 and CB2 receptors or of enzymes controlling endocannabinoid levels, and hence the concentrations of endocannabinoids, undergo time- and brain region-specific changes during neurodegenerative disorders, with the initial attempt to counteract excitotoxicity and inflammation. In our communication we will review a possible usefulness of certain natural cannabinoid compounds as well as their synthetic analogues in experiments on cellular or animal models of mentioned diseases to demonstrate the neuroprotective potential of some ECS modulators.

Enriched environment and aging brain: molecular mechanisms of neuroprotection

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Experience of mice in a complex environment enhances neurogenesis and synaptic plasticity in the hippocampus of wild type and Alzheimer transgenic mice. Although environmental enrichment (EE) has significant effects on brain plasticity and neuropathology, the molecular mechanisms underlying these effects are unknown [Hu, 2013].

The objective of the study to describe neurogenesis and cell-to-cell communication in the hippocampus and basolateral amygdala aging rats after EE.

Methods: we used Wistar male rats aged 23 months, with conventional sanitary status and housed in animal facilities. At the beginning of the experiment, rats were randomly assigned to an enriched environment (EE) or standard condition (SC) group for 2 month. A model of enriched environment in rats uses enriched housing to provide cognitive and social stimulation. Enriched environment was organized according the protocol [Jankowsky J. L. 2003].

After exposition of EE or SC the behavioral tests were performed, then brains were removed. Paraffin-embedded sections were processed for immunohistochemistry with primary antibodies to markers of neurogenesis (Pax6, Ngn2, NeuroD1, NeuN), synaptogenesis PSD95, cell-cell contacts of astrocytes (Cx43). Apoptosis was be detected with TUNEL method. Evaluation of images produced using ImageJ.

Results: we have revealed improvement social and cognitive function after EE.

We have shown increase of apoptotic cell in the amygdala in the aging in SC, which is combined with high proportion of progenitor cells and decrease in the number of post-mitotic cells. At aging EE slightly increases apoptosis in the amygdala, inhibits early stages of differentiation of progenitor cells and increases the amount of post-mitotic cells.

In the aging brain we have shown decreased expression of Cx43 in all regions studied. EE has a stimulating effect on the Cx43 expression.

Our results have shown new features of neurogenesis in aging brain after enriched environment. It can become the basis for the development of new strategies and protocols neurorehabilitation.

**Features cerebral blood flow in various types of head pain - experience
transcranial doppler examination 1300 patients**

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The purpose: To study of peculiarity of cerebral flow under the different types of headache.

Material and methods: 1302 patients with headache were inspected. Transcranial ultrasonic Doppler examination were made to the all patients.

Results: Changes for tension headache in region of vertebral arteries it is typical (in 70,7% of cases); for discirculatory encephalopathy – reduction flow velocity in carotid arteries regions (in 55,4% of cases); asymmetry flow in carotid arteries regions it is typical for migraine (in 87% of cases); diffuse reduction flow velocity it is characteristic for vegetative of vessels (in 48,6% of cases); spasm/stenosis in carotid arteries regions it is typical for hypertension disease (in 73,2% of cases); asymmetry and spasm/stenosis in carotid arteries regions it is typical for paroxysmal hemicrania.

Conclusions: Specifically peculiarity of cerebral flow is characterized for each of types of chronic headache. Transcranial ultrasonic Doppler examination help in differential diagnosis and in selection of therapy.

DNA synthesis in mouse neocortex after contextual fear conditioning

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Molecular mechanisms of long-term memory formation require synthesis of proteins and RNAs. It was shown, that DNA synthesis could be also involved in memory mechanisms. We aimed to investigate learning-induced nucleoside analog 5-bromo-2'-deoxyuridine (BrdU) incorporation in adult mouse hippocampal dentate gyrus and in prefrontal and motor neocortex in fear conditioned and control mice 2 h, 72 h and 30 days after training and to reveal possible involvement of 3'-azido-3'-deoxythymidine (AZT) in this mechanisms. C57BL/6 male 2-3 month old mice were divided on several experimental groups: "passive control", "active control – context", "active control - foot shocks", "fear conditioning", "fear conditioning, AZT", "active control, AZT". "Fear conditioning" group was placed for 6 min into experimental camera, where 3 min they freely explored a new environment, then 3 foot shocks (1 mA, 2 s) were delivered with 1 min interval followed by 1 min again for exploration. All mice were i.p. injected with BrdU (100 mg/kg) 1 h before experiment. Mice from "fear conditioning +AZT" group received injection of AZT (20 mg/kg) 1 h before training, right after BrdU injection. 2h, or 72 h, or 30 days after the experiment one part of animals was tested for long-term memory performance and other was anesthetized, and brains were removed for immunohistochemical analysis of BrdU incorporation. Fear conditioning stimulated DNA synthesis in adult mouse brain, detected already 2 h after training. BrdU+ cells expressed proliferation markers PCNA and pHisH3 (Ser10). DNA synthesis increase was prominent both in hippocampal dentate gyrus and in prefrontal and motor neocortex. BrdU+ cells did not express GFAP, S100 β (astrocytic markers), Iba-1 (microglia), Tbr2, PCA-NCAM (neuroblasts), NeuN, NSE, MAP-2, Tu-20, Parv, Gad67, ChAT (mature neurons). BrdU+ cells coexpressed Nestin (neuronal stem cells marker), NG2 (oligodendroglial progenitors marker) and DCX (migration neuroblasts marker) 2h, 72h and 30 days after training. Test off contextual fear memory 2 and 72 h after training revealed long-term, but not short-term memory impairment, in AZT injected "fear conditioning" group. AZT injection produced significant decrease of BrdU incorporation in prefrontal and motor cortex detected 72 h after fear condition. Thus, our results demonstrated learning-induced DNA synthesis in adult mouse neocortex.

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Autoaggressive behavior of the HIV-positive patients with opium addiction in the conditions for the social isolation

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Aim: the study of the special features of the autoaggressive behavior of HIV-positive patients with the dependence on the opiates, which locating in the penitentiary.

Methods: clinical, clinico-psychopathological, the socio-psychological study (interview), the statistical analysis.

Results: The study of the suicidal (attempt at the suicide) and not suicidal (self-damage) manifestations of autoaggressive behavior in the HIV-positive patients with the opium addiction (22 men – group A) was executed. Control groups: the not infected HIV patients with the opium addiction (20 men – group B), HIV-positive without the dependence on the psycho-active substance (20 men – group C). Groups were compared with respect to the age (average age of $25,54 \pm 1,78$ of year). All included in a study were served the sentence in the men correctional colony of № 16 (Gromadsk, Krasnoyarskiy Kray, Russia). Not suicidal manifestations of autoaggression were predominated (72,7%) in the basic group (group A). Depending on the attainable purpose: relaxation (43,8%), manipulation (31,25%) and simulation (25%). 27,3% of subjects in the basic group accomplished suicidal attempts (66,7% – in the pubertal period, 33,3% – after reaching of maturity in connection with the entry into the sphere of criminal legal procedure). In the group B also predominated not suicidal manifestations (75%): more frequent manipulation (40%), relaxation (26,7%) and simulation (26,7%), in one case (6,7%) – it is infantile-masochisms. 80% of patients group B with the suicidal manifestations of autoaggression accomplished suicidal attempts at the pubertal age. The suicidal manifestations of autoaggressive behavior (55%) predominated in the group C ($p < 0,005$): before reaching of maturity – in 45,5% of cases, 54,5% – at the age is older than 18 years (one subject (9%) – in connection with diagnostics the HIV of status). Not suicidal manifestations (45% of cases) had a nature of the relaxation (66,7%) and simulation (33,3%).

Conclusion: Predominance for the patients with the addiction (groups A and B) the not suicidal manifestations of autoaggression can be examined from the positions of ethological theory – the presence of narcologic disease is the manifestation of indirect autoaggression and does not require additionally suicide. In the cases of the presence the HIV of infection without the narcologic pathology plays role the tendency toward the autodestruktion, to the risky forms of behavior.

РНК-детекторные зонды SmartFlare™

Принципы технологии SmartFlare™

Обычно для детекции РНК требуется трансфекция, трудоемкая подготовка образцов, усиление и/или обнаружение РНК на основе калибровочных кривых. В то время как РНК-детекторные зонды SmartFlare™ поглощаются живыми клетками с использованием существующих механизмов клеточного эндоцитоза. Подготовки образцов не требуется; просто добавьте зонды SmartFlare™ к культуре, оставьте на инкубацию на ночь и детектируйте на следующий день. Через некоторое время зонды выходят из клеток, не причиняя вреда, что дает Вам возможность проводить дальнейшие исследования на этой же культуре.

Каждый зонд SmartFlare™ состоит из золотой наночастицы, коньюгированной с многочисленными копиями двунитевого олигонуклеотида, в котором одна нить ("репортерная нить") включает флюорофор, блокированный золотой наночастицей (Рис. 1). Когда наночастица вступает в контакт со своей РНК-мишенью, такая РНК связывается со своей комплементарной "захватывающей" нитью и заменяет репортерную нить. Репортерная нить, флюорофор в которой теперь разблокирован, флюоресцирует и может обнаруживаться любой платформой обнаружения флюоресценции.

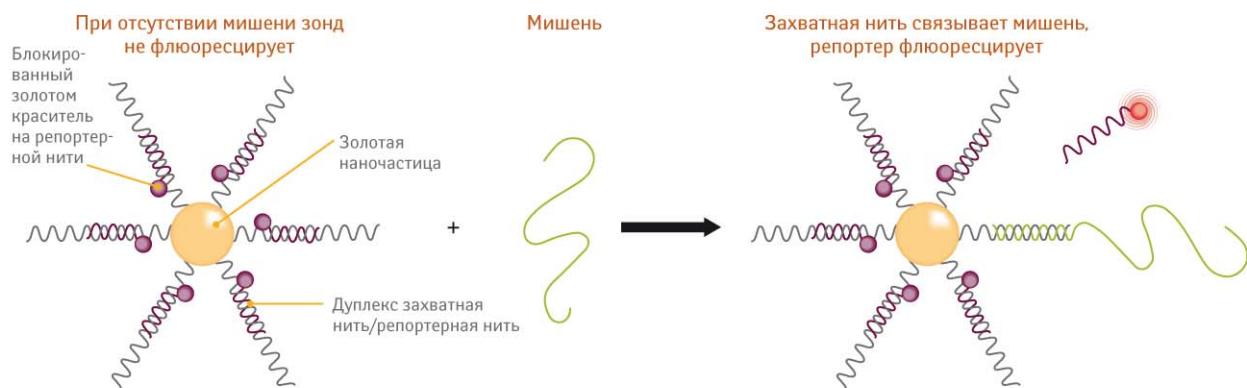


Рисунок 1. Молекулярный механизм действия РНК-детекторного зонда SmartFlare™.

Приложения в которых могут использоваться РНК-детекторные зонды SmartFlare™

- Наблюдение изменения уровней РНК во времени
- Клеточный сортинг на основе РНК-маркеров
- Количественное измерение miRNA
- Оценка уровней РНК и протеинов в одном образце
- Повторное использование клеточной популяции для дальнейших анализов после SmartFlare-эксперимента
- Детекция РНК в живых клетках с помощью проточной цитометрии
- Мультиплексное определение РНК (возможность определения нескольких целей)





Система очистки и концентрирования белков Amicon Pro

- Единое устройство
- Минимум шагов
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Установка фильтра Amicon[®] 0.5 мл во время процесса элюирования позволяет одновременно концентрировать или проводить процесс высокоеффективной дифильтрации (>99%).



Счетчик клеток Scepter™ 2.0

- Счетчик Scepter – революционное портативное устройство, перевернувшее представление ученых о подсчете клеток.

Обновленный Scepter 2.0 представляет собой следующее поколение технологии Scepter:

- Совместимость с большим типом клеток
- Счетчик Scepter – единственный устройство на рынке, способное выполнять подсчет частиц диаметром менее 6 мкм.
- Расширенный диапазон концентраций. Новые 40 микм-сенсоры могут считывать образцы, сконцентрированные до 1 500 000 кл./мл.
- Мощное ПО для комплексного анализа клеток:
 - Сравнение сетов клеток посредством наложения гистограмм и мультипараметрических таблиц
 - Создание шаблонов гейтинг-нейя
 - Создание отчетов, таблиц и графиков.
- Готовые к выполнению анализы настолько просто проводить, что работу можно начинать в первый же день
- Обработка от 1 до 96 проб
- Прямой абсолютный подсчет клеток
- Цифровая обработка данных

Проточная цитометрия Система guava[®] easyCyte™

- Изучаете ли вы рак, стволовые клетки, иммунные функции или какую-либо другую передовую область биологии клетки, вы быстро станете экспертом в анализе клеток, используя аналитические наборы Merck Millipore, которые разработаны и оптимизированы для применения с системами guava.



Factors of the frustration in the development of the narcologic pathology in the representatives of the Khakass ethnos

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Aim: the study of the frustrating factors, which be important for the formation and progression of alcoholism in the representatives of the title nationality of the Republic Khakasiya.

Methods: clinical, clinico-psychopathological, the socio-psychological study (interview), the statistical analysis.

Results: The influence of the socio-psychological factors, which increase the risk of the development of dependence on ethanol in the representatives of the title ethnoses of the national republic, is studied. The patients with alcoholism (II stage), who were treated under the hospital conditions (The drug and alcohol treatment center, Abakan, Russia), are studied: 75 men-Khakasses (group A) and 75 men-Slavs (group B). 75 healthy men-Khakasses (group C) were selected by the method of Paracopy. The average age of patients of the basic group was $43,75 \pm 2,39$ years. Patients, who had the concussion or contusion of the brain in anamnesis, from a study are excluded.

The systematization of the socio-psychological factors of risk of the development of dependence on alcohol was conducted with the use of a procedure «standardized interview». The modification of questionnaire T.V. Korobitsinoy (2000), which includes 50 parameters, is used. During the study the characteristics of the personal family of respondents and parental family in the basic group in the comparison with the group B (men-Slavs) and the clinically healthy men-Khakasses (group C) the reliable differences were revealed. The overwhelming majority of the inspected representatives of the Khakasses ethnoses (77,33%) of groups A and C brought up in the families, which observe the national traditions; however, tested groups A at the moment of a study reliably more rarely adhered to national customs and traditions, than their parents (20,0% in the group A and 60,0% in the group C, $p < 0,001$). Such parameters, as age at entry into the marriage, composition of family in the different years, quantity of children, level of the education of the respondents of group A and their parents also had essential differences.

Conclusion: A difference in the socio-psychological conditions, in which the personality is located after reaching of maturity, from training conditions in the childhood can be examined by the frustrating factors, which facilitate the development of alcoholism in the representatives of the title nationality of the Republic Khakasiya.

Cardiovascular control following SCI: from experimental models to patient's bed

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Background: Individuals with spinal cord injury (SCI) not only face paralysis, but also lifelong problems from a variety of autonomic dysfunctions including abnormal blood pressure and heart rate disturbances. Neurogenic shock during the acute injury period and persistent low resting arterial blood pressure during the chronic stages following SCI are both prevalent after cervical and upper thoracic SCI. However, individuals with either type of injury will often experience further reductions in arterial blood pressure in the upright posture, a condition known as orthostatic hypotension. Furthermore, the same individuals also suffer from episodes of life-threatening hypertension known as autonomic dysreflexia (AD).

Aims: First, to introduce the basic science and research data on the mechanisms that are responsible for the development of cardiovascular dysfunctions following SCI. Second, to outline evidence for experimental interventions that could result in development of clinically relevant therapeutic strategies for prevention/amelioration of these life-threatening cardiovascular events in individuals with SCI.

Experimental data: The experimental animal data suggest that the loss of tonic sympathetic descending control and aberrant plastic changes that occur within the spinal cord and peripheral autonomic nervous system after the injury are among the crucial mechanisms responsible for the abnormal cardiovascular control commonly observed in individuals with cervical and upper thoracic SCI. In rats and in humans, SCI results in changes in morphology and innervation of sympathetic preganglionic neurons (SPNs) that may contribute to the development of AD. There is also strong experimental evidence that both structural and functional changes in sensory and sympathetic ganglia also contribute to cardiovascular dysfunction following SCI. The latest animal evidence from my laboratory demonstrates that during the early stages following a SCI, the initiation of exercise could prevent aberrant plastic changes within the spinal cord and ameliorate abnormal cardiovascular responses resulting from injury to the spinal cord.

Conclusions: Understanding the plastic changes that occur within the central and peripheral nervous systems following SCI and searching for experiential therapeutic interventions could play a significant role in the development of appropriate clinical rehabilitation strategies. Using this translational approach could provide clinically relevant insight to our understanding of the pathophysiology of SCI. (Research support: Canadian Institute for Health Research; Canadian Foundation for Innovation; Heart and Stroke Foundation of Canada; C. Neilsen Foundation; Christopher and Dana Reeve's Foundation).

Autonomic dysfunctions and sexual health following SCI

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Background: Spinal Cord Injury (SCI) significantly changes a person's motor, sensory and autonomic function, thereby affecting many areas of their life, including sexual functioning. For many, sexuality is an integral part of being human.

Changes to sexual function typically refer to changes in arousal (erection in men, vaginal lubrication and accommodation in women), ejaculation in men, and orgasm in both men and women. However, sexuality also includes the psychological and physiological effects of loss of motor and sensory function, bladder and bowel control, alterations to body image and sexual self-esteem. Furthermore, in men with SCI, fertility is affected not only by altered erectile and ejaculatory function, but also by changes to semen quality.

Individuals may also experience significant alterations in arterial blood pressure during sexual intercourse that could be life-threatening. The latest literature evidence suggests that the majority of individuals with SCI rated the regaining of sexual function among their highest rehabilitation priorities.

Aim: To introduce the impact of autonomic nervous system dysfunctions on sexual health following SCI.

Clinical evidence: The autonomic nervous system plays a crucial role in many sexual functions including erection, ejaculation and lubrication. These responses become partially or totally disrupted following SCI. Furthermore, sexual responses following SCI are commonly associated with aberrant blood pressure and cardiac responses.

The risk of autonomic dysreflexia (AD) and other cardiovascular abnormalities may be underestimated during ejaculation procedures in individuals with SCI and, thus, place the individuals at risk for acute cardiovascular dysfunctions. Research specific to AD associated with sexual activity or vibrostimulation sperm retrieval (VSSR) procedures is limited. Recently we reported on the presence of significant alterations in blood pressure in patients with atypical AD and referred to such prolonged and severe episodes as malignant AD (AD persisted for weeks, SBP 270 mmHg).

These clients initially experienced an episode of AD during sexual activity and, for several weeks afterward, additional significant episodes of AD that were triggered each time the client voided. Frequently clinicians found it difficult to provide accurate information to clients about the risks of AD during sexual activity due to the lack of research.

Sexual activity and ejaculation with a VSSR procedure in SCI men is accompanied by significant cardiovascular responses that are not evident in able-bodied men. These concerns have to be addressed by clinicians during the sexual rehabilitation and education of individuals with SCI.

Conclusions: This presentation will summarize clinical and literature data to provide some recommendations for sexual and reproductive clinical practice. It has to be recognised that despite the priority given to sexuality by people with SCI, the medical and research community has not done a sufficient research to provide enough evidence-based information to guide clinical sexual health practices. (Research support: Canadian Institute for Health Research; Canadian Foundation for Innovation; Heart and Stroke Foundation of Canada; C. Nielsen Foundation; Christopher and Dana Reeve's Foundation).

Mechanisms of potentiation of the protective effect of hypoxia by hypercapnia

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Objectives: To study the role of adenosine A1 receptors and mitoK⁺_{ATP} in the mechanism of the increase in resistance to acute hypoxia during combined exposure to hypoxia and hypercapnia.

Methods: The research was carried out on 390 mature white mice with bodyweight of 36±3 grams. All the animals were divided into 2 series with 195 mice in each, – a series to study mitochondrial receptors and a series for adenosine A1 receptors examination. Both series consisted of groups of 15 mice each, which received: mechanism blocker (mitoK⁺_{ATP} – 5-hydroxydecanoate (5-HD); adenosine A1 receptors – 1,3-dipropyl-8-phenylxanthine (DPCPX)) or mechanism activator (Diazoxide or 2-chloroadenosine (2-CADO)), according to the series prescription.

In each series there were also used: activator solvent Dimethylsulfoxide (DMSO), intact group and the groups exposed to normobaric hypoxia (NH) (O₂ - 13%), permissive hypercapnia (PH) (CO₂ – 7%), or hypercapnic hypoxia (HH) (O₂ - 13%, CO₂ - 7%), combined with application of the blocker or activator, or without them. 30-minute sessions of exposure to hypoxia and/or hypercapnia were carried out 30 minutes after the drug introduction.

The day after the exposure resistance to acute normobaric hypoxia (ANbH) was assessed in all the animals, ANbH was generated in a hermetic chamber by setting and maintaining O₂ concentration at about 5%. During the assessment lifetime under hypoxic conditions was measured, which was estimated judging by respiratory movements termination in the animal.

Results: In the first series the mice trained by HH significantly raised their tolerance to ANbH, mitoK⁺_{ATP} blocker in the group under similar impact reduced the effect down to control values, whereas the activator showed the highest values of survival time under hypoxic conditions in the experimental groups. In NH and PH groups the activator did not affect the resistance to ANbH.

In the second series, when adenosine A1 receptors were studied, the following results were received: HH group increased tolerance to ANbH, the blocker reduced the effect down to control values, whereas the activator, having been used once, did not affect the efficiency of the training. In NH group no increase in tolerance to ANbH was noted, whereas the addition of the blocker or the activator did not affect the resistance.

In PH group resistance to ANbH increased, however, addition of the blocker did not reduce the resistance, but addition of the activator caused significant increase in survival time under hypoxic conditions.

Conclusion: Mitochondrial ATP-dependent K⁺-channels and A1-receptors to adenosine take part in the mechanism of the increase of resistance to ANbH and neuroprotection during combined exposure to hypoxia and hypercapnia.

However, in relation to adenosine receptors this mechanism is realized not through the hypercapnic component which, probably, initiates neuroprotection without A1-receptors to adenosine participation.

Metabolic factors regulating Ca²⁺ activity in rat hippocampal astrocytes

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Astrocytes are major type of the glial cells in the brain. These cells have many well-defined functions including ion homeostasis, uptake of neurotransmitters, release of gliotransmitters, metabolic support for neighboring neurons etc. In the adult brain, astrocytes receive glucose from the blood capillaries and supply neighboring neurons with lactate. However, the suckling rodent brain relies largely on metabolic pathways alternate to glucose such as the utilization of ketone bodies. Being electrically non-excitatory cells, astrocytes generate Ca²⁺ signals that are involved in various functions of these cells. Astrocytic Ca²⁺ signaling strongly depends on the activity of local neuronal network. However, it is little known how Ca²⁺ dynamics in the astrocytes is affected by metabolic changes during the development. To address this issue we studied astrocytic Ca²⁺ activity in rat hippocampal slices of three age groups (P5-P10; P10-P20; P20-P30). The cells were loaded with membrane-permeable Ca²⁺ dye Oregon Green 488 BAPTA-1 AM. Astrocytes were identified with astrocyte specific marker sulforhodamine 101. Then time-lapse imaging (1 fps for 30 min) was performed with Zeiss LSM 510 confocal microscope. Astrocyte somas were identified with homemade image analysis software, which was also used to obtain the frequency and duration of somatic Ca²⁺ events. We found that frequency of Ca²⁺ events is significantly lower at P5-P10 than at later ages. It increases by P10-P20 and does not significantly change by P20-P30. Notably, the mean duration of Ca²⁺ events was not significantly different between P5-P10 and P10-P20, but significantly reduced by P20-P30. These experiments were performed at 34°C. To reduce overall metabolic activity we performed experiments at the room temperature. Surprisingly, no significant changes were observed in the frequency or the duration of Ca²⁺ event in all age groups with the decrease in the temperature. Strikingly, supplementing glucose with either ketone body (β -hydroxybutyrate), lactate, or pyruvate increased the frequency of Ca²⁺ events in P5-P10 astrocytes to the level that was not significantly different from the P10-P20 or P20-P30. However, no significant effect of the supplement was observed on the frequency at P10-P20 and at P20-P30, or on the events duration at all ages. Thus, we conclude that age specific energy substrates level the frequency of astrocytic Ca²⁺ events.

Principles of neuropsychological correction organisation

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Introduction Neuropsychological correction is one of spheres where we can meet the practical applications of the highest mental functions development theory (L.S. Vygotsky) and the theory of system dynamic localization of the highest mental functions (A.R. Luriya). The theoretical base of neuropsychological correction is made by the following point of view: all mental processes have complex multilevel structure and rely on work of brain structures set, each of which makes the specific contribution to their course.

Research objective The research is aimed to analyze the efficiency of neuropsychological correction at observance of correction stages organization and its fundamental principles.

Research methods Methods correspond to stages of neuropsychological correction: 1) diagnostic stage – by means of neuropsychological inspection to reveal an actual level of development and knowledge of the patient, to mark out features of brain structures functioning, and also to develop the individual correctional program; 2) adjusting stage – to create at the patient and his relatives necessary motivation and active installation on passing through neuropsychological correction; 3) correctional stage – to carry out correctional program according to the plan developed in advance; 4) the assessment of correctional work efficiency – to conduct control neuropsychological examination which will allow to record result of correction (it is possible to estimate the maximum effect not less, than 6-7 months of correctional work later).

Results During the neuropsychological correction organization in the condition of observance above designated conditions indicators of neuropsychological correction efficiency and stability are found at preservation of results.

Conclusion The received result is explained by observance of the neuropsychological help organization principles, when possibility of “exit” out of limits or borders of development and need of transitions to qualitatively new level of functioning in the course of self-organization is revealed.

Role of oxidative stress in development of Parkinson's disease

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Research objectives: discovering for the most significant oxidative markers in patients in different stages of Parkinson's disease.

Products of lipids peroxide oxidation (by oxidized lipids, 4-hydroxynonenal (4-HNE)); protein (nitrotyrosine), DNA (8-hydroxydeoxyguanosine (8-OHdG)) and the caspase-3 plays a key role in apoptosis) have been investigated with an assessment of the general antioxidant activity level in Parkinson's disease patients. Chemiluminescent, flow cytometrical, ELISA kit analysis methods of blood and liquor were used for this purpose. The patients were supervised in neurogenetics branch of Scientific Research Institute of Neurology of the Russian Academy of Medical Science. The rate of disease progression were determined with Hoehn and Yahr stages (1 - 4 stage, both initially diagnosed (non-treated) and receiving treatment patients). A total of 240 patients aged 39-73 years were surveyed. The control group included 30 persons aged 29-50 years.

The maximum intensity of the POL and hydroperoxides level is equally raised for patients at 1-4 disease stages in comparison with non-treated patients. The concentration increase of 4-HNE in a blood plasma and liquor was maximal for patients on 3rd stage of disease. The nitrotyrosine level were increased at all patients in comparison with healthy ones. The quantity of lymphocytes with active caspase-3 is considerably raised at patients with the 3rd stage of disease. The concentration increase of 8-OHdG in a blood plasma is most expressed at patients of 2 and 3 stages of disease. The concentration of 8-OHdG in liquor at patients in 2nd and 3rd stages is higher than at patients in 4 disease stage. The gradual decrease in lipoprotein's oxidation resistance depending on the stage of disease is discovered, which points to emaciation of patient's endogenous antioxidative protection.

The new data were obtained, which testify to lipids, protein and DNA oxidative damage in blood and liquor, apoptosis factors activations depending on disease's stage and DOFA-therapy duration. This data can be significant for early diagnostics Parkinson's disease strategy developing and patient's therapy efficacy increase. Results confirm the oxidative stress importance in a pathogenesis of Parkinson's disease.

Social stress and oxytocin release: molecular mechanisms and modulation

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Emotional states related to stress and anxiety disorders have serious consequences for the patient as well as for the health care system at all. Our knowledge of the neurobiology of these processes are inadequate, as evidenced by the high proportion of patients who do not respond to currently used treatments. Study of molecular mechanisms and the search for new diagnostic and therapeutic strategies is an important topic in the field of neuroscience, where a special role belongs to the brain neuropeptides that are not only involved in the physiology of stress-induced pathologies emotional states, but they may also have clinical significance. On the basis of data obtained in animal studies, neuropeptides and their receptors have a great potential. Neuropharmacology, served as an important and effective tool in the management of emotional states associated with stress, anxiety and depression.

The aim of the study is to investigate alterations of molecular mechanisms regulating processing and release of oxytocin affecting their biological effects under physiological conditions and in stress-induced disorders in developing and adult brain in order to determine new molecular targets for their pharmacological correction. Actuality of the study is determined by high prevalence of central nervous system diseases associated with stress-induced impaired brain neuroplasticity controlled by neuropeptides. At the same time, the importance of the research idea is confirmed by current trends in neurosciences focused on the following outstanding questions for further research: molecular mechanisms of central release of neuropeptides, neuropeptides in brain development, regulation of neuroplasticity, learning and memory, anxiety, social behavior, and neurodegeneration. Until now, there is poor understanding regarding the mechanisms underlying oxytocin and arginine-vasopressin processing and release in the context of stress-induced behavioral and cognitive impairments. Therefore, solving the above-mentioned questions will provide new approaches in understanding of the cellular and molecular mechanisms of stress- and anxiety-induced behavioral reactions that will be essential for translational research.

Help in the socialization of preschool age child with ASD

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According to the research of the last decade the prevalence of the syndrome of infantile autism and similar disorders is increasing and it is currently 15-20 children per 10 000 children (D. Wolf, E. Mash, 2003).

Autism - is a developmental disorder that affects the child's ability to communicate with people around him. In all cases, it is characterized by abnormalities in the functioning of the three areas: social interaction; communication; limited range of interests and activities.

Typically, preschoolers with ASD determined kindergartens combined type, designed for children with different types of speech disorders.

The greatest difficulty for the child with ASD is a communication as such, especially when the child including impaired speech development . A good yield in this case could be an alternative communication system , in particular , communication with the card application . Another difficulty for the autistic child is to control your behavior , holding themselves in the framework of approved social . The unpredictability of the situation , a new element in the environment , or the sequence of processes can cause severe emotional stress and behavioral disruption .

MBDOU based on number 50 combined type worked with an autistic child using the following means:

- The system of communication through the exchange of cards (PECS)
- Work with the schedule
- Inclusion in gaming activities or routine processes by peers (tutoring)

Despite the fact that most of the current pre-school educational institutions can not fully meet the special educational needs of a child with ASD, certain adjustments made to the work of the preschool, help a child with autism to successfully adapt to his new environment, and in the future may facilitate adaptation in the regular school.

Stereotactic destruction and neuromodulation techniques in treatment of movement disorders

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FSBI "Federal Neurosurgical Center" of the Russian Ministry of Public Health, Novosibirsk

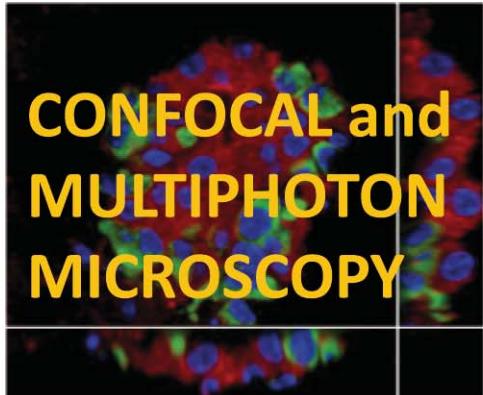
Objectives: To set out the results of stereotactic thermodestruction and neurostimulation of deep brain structures (DBS) with the use of neurophysiologic navigation and microelectrode analysis in treatment of patients with Parkinson's disease.

Methods: Over a period of 2013 starting from the launch of the Functional division of the Federal Neurosurgical Center in Novosibirsk there were 90 patients with extrapyramidal pathology. The main group consisted of 73 patients with lateralized form of Parkinson's disease to whom stereotactic destructions of deep brain structures were performed. There were 38 men and 35 women aged from 41 to 75 (middle age was $60,4 \pm 7,6$ years) with advanced stages according to Hoehn and Yahr scale and not less than 70% activities according to Schwab and England scale in "ON" period. 17 patients from the 2nd group were offered DBS for management of ambilateral semiology with such nosology. This group consisted of 11 men and 6 women aged from 49 to 66 (middle age was $58,5 \pm 5,1$ years). Final verification of target's edges was performed with the help of "MicroGuide Pro" (AlphaOmega) intraoperative multi-channel system of microelectrode recording.

Results: Unilateral thermal destructions of basal ganglia were performed on 73 patients (33 ventrodorsal pallidotomy and 40 ventro-intermediate thalamotomy to stop dyskinesia, rigidity and tremor respectively). Intracerebral electrodes were stereotactically implanted into subthalamic nucleus of 17 patients from both sides with single-step installation of Activa PC (Medtronic) generator into the left subclavicular area. This allowed significant life quality improvement in this category of patients (PDQ-39 scale) by means of tremor and rigidity regress contralaterally at the average of 87% (UPDRS scale), dyskinesia decrease and reduction of fluctuation for 75%. In the group of neuromodulation associated with zero mortality there were neither perioperative complications, no problems with implanted devices in the course of monitoring.

Conclusion: The usage of neurophysiological navigation allows performing more safety for all types of neuromodulation operations on submillimeter accuracy level reaching the maximum clinical effect during decrease of complications risk for each patient.

Компания Nikon, являясь мировым лидером в области оптических приборов и технологий, предлагает решения во многих областях, включая медицину и биологию. Микроскопы и другие системы Nikon отличаются универсальностью, великолепными характеристиками и высочайшей производительностью. В сердце каждого прибора находится высококачественная оптическая система, позволяющая пользователю с легкостью получать удивительные изображения. Надежность и творческий подход – основы работы Nikon. Мы производим продукцию, которая соответствует современным требованиям биологии и медицины.



Высокое качество изображений

Улучшенное соотношение сигнал/шум.

Получение высококачественных трехмерных изображений с высокой скоростью.

Регистрация спектральных изображений в процессе одного сканирования.

Наблюдение за живыми объектами.



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Acute Brain Inflammation and Oxidative Damage Are Related to Long-Term Cognitive Deficits and Markers of Neurodegeneration in Sepsis animal models-Survivor

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Survivors from sepsis present long-term cognitive deficits and some of these alterations resemble the pathophysiological mechanisms of neurodegenerative diseases. For this reason, we analyzed beta-amyloid peptide (A β) and synaptophysin levels in the brain of rats that survived from sepsis and their relation to cognitive dysfunction and to acute brain inflammation. Sepsis was induced in rats by cecal ligation and puncture, and 30 days after surgery, the hippocampus and prefrontal cortex were isolated just after cognitive evaluation by the inhibitory avoidance test. The immunocontent of A β and synaptophysin were analyzed by Western blot analysis. A β increased and synaptophysin decreased in septic animals both in the hippocampus and prefrontal cortex concurrent with the presence of cognitive deficits. Prefrontal levels of synaptophysin correlated to the performance in the inhibitory avoidance. Two different treatments known to decrease brain inflammation and oxidative stress when administered at the acute phase of sepsis decreased A β levels both in the prefrontal cortex and hippocampus, increased synaptophysin levels only in the prefrontal cortex, and improved cognitive deficit in sepsis-survivor animals. In conclusion, we demonstrated that brain from sepsis-survivor animals presented an increase in A β content and a decrease in synaptophysin levels and cognitive impairment. These alterations can be prevented by treatments aimed to decrease acute brain inflammation and oxidative stress.

The influence of connexin receptor blocker to the expression of glutamine and glutamate transporters in neurovascular unit cells at hypoxia *in vitro*

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The neurovascular unit (NVU) consists of cerebral microvessels endotheliocytes, astroglia, neurons and regulate interface between the peripheral circulation and the central nervous system. Intercellular communication and energy coupling between NVU cells are provided with the glutamine transporter (SLC1A5) and glutamate transporter (EAAT2). Different pathogenic stimuli like inflammation, hypoxia, ischemia, toxins can cause changes in the expression and activity of transport proteins.

Aim. To study the expression profile of glutamine transporter (SLC1A5) and glutamate transporter (EAAT2) in neurovascular unit cells under physiological conditions and hypoxia under the influence of a blocker of connexin-43 *in vitro*.

Material and methods. The study was carried out by using the multicellular model of neurovascular unit *in vitro* containing neurons, astrocytes and endothelial cells. Chemical hypoxia has been modeled *in vitro*. The NVU was cultured under: 1). standard conditions, 2). chemical hypoxia, 3). standard conditions with carbenoxolone, 4). chemical hypoxia with carbenoxolone. Immunohistochemical staining of the SLC1A5, EAAT2 transporters and confocal microscopy were applied to detect expression of the molecules.

Results and discussion. The NVU *in vitro* neurons showed low expression of protein transporters SLC1A5 ($1,0 \pm 0,5\%$) under physiological conditions. Acute hypoxia chemical induces a significant increase amount the NVU neurons, which expressed the molecules SLC1A5 - almost five times ($5,0 \pm 1,2\%$).

The NVU astrocytes features is, that in physiological conditions a large number of cells expressing the glutamate transporter (EAAT2) - $9,6 \pm 1,0\%$ and a slight amount of cells expressing glutamine transporter (SLC1A5) - $1,0 \pm 0,3\%$. Acute hypoxia induces an increase number of NVU astrocytes with SLC1A5 at five times ($5,0 \pm 0,6\%$) and the decrease of EAAT2-positive astrocytes at 1,5 times - $6,0 \pm 1,8\%$. The incubation of NVU *in vitro* with connexin43 blocker (carbenoxolone) in normoxia conditions showed changes of transporter molecules expression. Blocking of connexin-43 functions caused a decrease in the number of neurons expressing the glutamine transporter ($0,02 \pm 0,01\%$) and astrocytes expressing glutamate transporter ($2,4 \pm 0,1\%$). Carbenoxolone prevents increasing amounts of astrocytes expressing EAAT2 and SLC1A5, which is observed in acute hypoxia.

Extracellular matrix perineuronal nets in homostatic plasticity and epilepsy

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The extracellular matrix (ECM) plays an important role in use-dependent and homeostatic synaptic plasticity. Distinct aggregates of ECM molecules surround cell bodies and proximal dendrites of some central neurons, forming so-called perineuronal nets (PNNs). These nets are heterogeneous in their structure and composition and are composed of molecules produced by both neurons and astrocytes, such as hyaluronic acid (HA), chondroitin sulfate proteoglycans of the aggrecan family, tenascin-R and link proteins. Hyaluronic acid (HA) is the backbone of the neural ECM, which has been shown to modulate α-amino-3-hydroxy-5-methyl-4-isoxazolepropionate (AMPA) receptor mobility, paired-pulse depression, L-type voltage-dependent Ca²⁺channel (L-VDCC) activity, long-term potentiation and contextual fear conditioning.

To investigate the role of HA in the development of spontaneous neuronal network activity, we used microelectrode array recording and Ca²⁺imaging in dissociated hippocampal cultures enzymatically treated with hyaluronidase.

Our findings revealed an appearance of epileptiform activity 9 days after hyaluronidase treatment. The treatment transformed the normal network firing bursts and Ca²⁺oscillations into long-lasting “superbursts” and “superoscillations” with durations of 11–100s. The changes in Ca²⁺transients in hyaluronidase-treated neurons were more prominent than in astrocytes and preceded changes in electrical activity. The Ca²⁺superoscillations could be suppressed by applying the L-VDCC blocker diltiazem, whereas the neuronal firing superbursts could be additionally suppressed by 6-cyano-7-nitroquinoxaline-2,3-dione as an antagonist of AMPA/kainite receptors. Ongoing experiments are designed to investigate alterations in cell excitability and synaptic currents after hyaluronidase treatment.

Our present results suggest that changes in the expression of HA can be epileptogenic and that hyaluronidase treatment *in vitro* provides a robust model for the dissection of the underlying mechanisms.

Protective effect of new medical gas against parkinson's disease

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Aim. Therapeutic applications of molecular hydrogen (H_2), one of medical gases, have been reported in a variety of human diseases and their animal models. Although the mechanism of action of H_2 has not been clearly demonstrated, it is assumed that its anti-oxidative properties are likely to underlie therapeutic efficacy. We have previously showed that H_2 in drinking water reduced dopaminergic neuronal loss in Parkinson's disease (PD) model mice. However, inhalation of H_2 did not remain in brain tissue for several minutes and drinking water with saturated H_2 (H_2 water) did not increase H_2 concentration in striatum. These results may imply that the effect of H_2 is an indirect effect. The aim of this study was to investigate the mechanism of action of H_2 water.

Methods. MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine)-induced PD model mice (C57BL/6J) were used. Saturated H_2 water was generated by bubbling H_2 gas. Ghrelin expression was tested by quantitative RT-PCR and ELISA. Nigral dopaminergic neurons were counted by stereological and immunological analyses.

Results. H_2 supplementation increases gastric expression of mRNA encoding ghrelin, a growth hormone secretagogue, and ghrelin secretion, which are antagonized by the b1-adrenoceptor blocker, atenolol. Strikingly, the neuroprotective effect of H_2 water was abolished by either administration of the ghrelin receptor-antagonist, D-Lys³ GHRP-6, or atenolol.

Conclusion. The neuroprotective effect of H_2 water in PD is mediated by enhanced production of ghrelin. Our findings point to potential, novel strategies for ameliorating pathophysiology in which a protective effect of H_2 supplementation has been demonstrated.

Neuroimmunological changes in the *Cstb*^{-/-} mouse: a model for progressive myoclonus epilepsy

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Loss-of-function mutations in the *cystatin B* gene encoding cystatin B (CSTB) an inhibitor of cysteine proteases cathepsins cause neurodegenerative disorder called progressive myoclonus epilepsy of Unverricht-Lundborg type (EPM1). Main neuropathological change in *Cstb*^{-/-} mouse includes early microglial activation that precedes astrocytosis, neurodegeneration and the onset of disease symptoms. We aimed to characterise the properties of *Cstb*^{-/-} microglia in primary cultures and in brain tissue and to check the presence of peripheral inflammation in young presymptomatic *Cstb*^{-/-} mice.

Resting and activated cultured *Cstb*^{-/-} and control microglia were analysed for cytokine production, chemotaxis and phagocytosis. Brain tissue and directly extracted from the brain microglia were studied for expression of MHC II and M1-M2 polarization using western blotting, immunohistochemistry and flow cytometry. Myeloid cell population in bone marrow and spleen, cytokines' level in blood serum were analysed by flow cytometry. P14 and P30 animals were studied.

Our results show increased secretion of proinflammatory chemokines by *Cstb*^{-/-} microglia, which is chemotactically more active. *Cstb*^{-/-} microglia show decreased expression of MHC II on the cell surface. The brains of presymptomatic *Cstb*^{-/-} mice show an imbalance between pro-inflammatory M1 and anti-inflammatory M2 microglia in favour of M1 phenotype. *Cstb*^{-/-} microglia also show elevated expression of p38MAPK and its phosphorylated form, p-p38MAPK, one of the key inflammatory markers involved in cell activation and the synthesis of cytokines. In addition, infiltrated peripheral lymphocytes and granulocytes, as well as a higher number of macrophages are present in the brains of presymptomatic *Cstb*^{-/-} mice. Moreover, the number of granulocytes in *Cstb*^{-/-} bone marrow and spleen, as well as the levels of pro-inflammatory chemokines and cytokines in the serum are elevated.

The data suggest dysregulated activation of *Cstb*^{-/-} microglia as a key factor in EPM1 disease pathogenesis. CSTB-deficiency is associated with early inflammatory processes both in the brain and the peripheral tissues. This study opens new avenues for therapeutic interventions for EPM1.

Multiphoton microscopy basics and principles. Multiphoton applications in modern neurobiology. Olympus digital and confocal microscopy.

I. N. Ovoshnikov, D. L. Melnikov

Olympus Moscow LLC, Moscow, Russia

Targets: To clarify principles behind two-photon visualization phenomena and how it could be applied to the most challenging neurobiology tasks.

To give basic understanding about complexity and diversity of different multiphoton microscope setups, while showing adaptative capability and high degree of flexibility to fulfill the highest requirements of the fundamental studies.

To give brief overview of digital, confocal and multiphoton products of Olympus.

Methods: Fluorescent microscopy, confocal laser scanning microscopy, multiphoton microscopy, screening systems.

Results: In modern neurobiological studies CLSM (confocal laser scanning microscopy) plays an important role. It is a powerfull method to reveal and visualize even smallest of details, neurocell possess. 3-D reconstruction and colocalization statistics, panoramic view and super-resolved images (based on single molecule localization experiments) all of these well known for every neurobiologists applications would not being used without CLSM-method.

CLSM-method could be further improved by usage of infra-red lasers and multi-photon simultaneous absorption phenomena. This allows scientists to have deeper penetration in living or fixed specimen during an observation period.

Newest Olympus multiphoton systems FV1200MPE and FVMPE-RS were produced and optimized especially for multiphoton studies. Both systems have flexible design and empowered features to claim themselves as leaders in multiphoton imaging.

Assessment of social behavior of animals with models of prenatal developmental disorders of the brain

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Aim: To explore the features of cognitive function and social behavior in the rat model of prenatal brain development disorders.

Materials and methods: model was created by subcutaneous injection to rats on the 12th day pregnancy of rotenone (E1, 0,5 mg/kg, n=8), combination of rotenone and valproic acid (E2, 0,5 mg/kg rotenone, 500 mg/kg valproic acid, n=7), 100% DMSO (C, 1 ml/kg, n=9). Assessment of social activity of animals has been conducted by means of the 3-chamber activity test and the test tube with the aggression. 3-chamber activity test was performed according to the standard protocol (Nadler J.J. et al. 2004), time (in seconds) was rated of contact of infant rats with earlier "familiar" infant rat incentive in the 3rd session of dough by means of the program for the automated assessment of movements of infant rats ANY-Maze (Stoelting Co, USA). Aggression was determined by the test tube. This was a plastic tube with the two ends of the pipe to the left of the test male tucked right - male-stimulus. The test is completed when one of the males displace each of the pipe, just held on 5 attempts, rated by male test victories of 5 attempts. Statistical analysis was performed using the Mann-Whitney test. Results are presented as $M \pm m$, where M - mean value, m - standard error mean, p - level of significance.

Results: The rats with the model of prenatal brain development disorders induced by the injection rotenone and valproic acid showed significant ($p = 0,03$) increase in the contact time with the former "friend" rat in comparison with the control, and the tendency to its increase in the group with rotenone, indicating that inappropriate social contact with other individuals of the rats with NDP: group E1 – 64.7 ± 33.6 sec, group E2 – 92.5 ± 42.2 sec, control (C) - $23,0 \pm 13.6$ sec. In both experimental groups showed a trend toward an increase in aggressive of rats (2.2 ± 0.6 wins in control group, 3.0 ± 0.5 in E1 aConclusion: we found alterations in social contacts with other rats and aggression in the model of neurodevelopmental disorders in animals exposed to rotenone and combination of rotenone and valproic acid prenatally.

Probing neural cells with carbon nanotubes: Implications for translational medicine

V. Parpura

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Carbon nanotubes (CNTs) with their unique properties have emerged as a promising material for use in neural prosthesis. We have varied neuronal and astroglial morpho-functional features using diverse forms of CNTs, which were either applied to cells as colloidal aqueous solutes or served as strata for cellular growth.

Chemically-functionalized water-soluble single-walled CNTs (ws-SWCNTs) promoted selected neurite outgrowth of cultured neurons. When applied *in vivo* at the site of an acute spinal cord injury, ws-SWCNTs aided axonal regeneration and locomotor recovery. Although not immediately apparent from the work *in vivo*, these nanomaterials also affected astrocytes. Ws-SWCNTs made astrocytes in culture larger and stellate/mature, changes that were associated with the increase in glial fibrillary acidic protein immunoreactivity (GFAP-ir). Thus, ws-SWCNTs could have more beneficial effects at the injury site than previously thought; by affecting astrocytes, they could provide for a more comprehensive re-establishment of the brain computational power.

Films of SWCNTs can be used as retainable strata for growth of neural cells in culture. Passive conductivities of these films can be systematically varied by the thickness of these films, while their surface topology remains unaffected. Conductive SWCNT films (0.3, 28 and 42 S/cm) were biocompatible for neuronal and astroglial growth.

Specific levels of conductivity appeared important as they differentially affected neuronal and astrocytic growth. SWCNT strata at a low level of conductivity (0.3 S/cm) promoted the outgrowth of neurites. A decrease in the number of growth cones as well as an increase in neuronal cell body area was evident at an intermediate conductivity level (28 S/cm), while at higher conductivity (42 S/cm) these effects disappear. Astrocytes plated onto SWCNT films of higher conductivity (42 S/cm) grew bigger and rounder, which was associated with a decrease in GFAP-ir.

Additionally, there was a graded increase in the adhesion and proliferation of astrocytes as conductivity of SWCNT films increased. Described changes of neural cell morpho-functional properties are critical to understand because CNT-coated electrodes have been shown to be advantageous over standard metal electrodes for use as neural implants in brain recording and stimulation *in vivo*. Since the CNT films can have a wide range of conductivities based on their thickness, our data can be used to start making predictions/estimates on which conductivity might work best for coating the implants. Taken together these studies demonstrate that CNTs can be used as strata and colloidal aqueous solutes to affect neural cells growth, thus showing the proof-of-principle for their use in neural prosthesis applications.

Exocytotic release of glutamate from astroglia in health and disease

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Astrocytes can exocytotically release the gliotransmitter glutamate. Increased cytosolic Ca^{2+} concentration is necessary and sufficient in this process. Vesicular glutamate transporters (VGLUTs) are responsible for vesicular glutamate storage and exocytotic glutamate release from astrocytes. Over-expression of individual isoforms of VGLUTs in astrocytes shows that VGLUT-3, but not VGLUT-1 and VGLUT-2, enhances glutamate release from astrocytes without affecting their intracellular Ca^{2+} increase. Inhibition of glutamine synthetase (GS) activity by L-methionine sulfoximine in astrocytes, which raises cytoplasmic glutamate levels, greatly increases the exocytotic glutamate release. Thus, VGLUTs and cytoplasmic glutamate levels in astrocytes, in addition to cytosolic Ca^{2+} , can regulate exocytotic release from these cells.

Huntington's disease (HD) causes preferential loss of a subset of neurons in the brain although the huntingtin protein is expressed broadly in various neural cell types. Full-length mutant huntingtin expression perturbs astrocyte gliotransmitter release. BACHD astrocytes show augmented exocytotic glutamate release with unaltered Ca^{2+} dynamics. These astrocytes have a biochemical footprint that would lead to increased availability of cytosolic glutamate, i.e. augmented *de novo* glutamate synthesis due to an increase in the level of the astrocyte specific mitochondrial enzyme pyruvate carboxylase, and unaltered expression of GS and VGLUT3. This work identifies a new mechanism in astrocytes that could lead to increased levels of extracellular glutamate in HD and thus may contribute to excitotoxicity in this devastating disease.

Endoscopic assistance during ventral approach in operations for vertebral traumas

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A problem of choice of the most optimal method for surgical invasion in order to perform spinal cord decompression and stabilization in case of traumatic injury to the spine has no final solution.

Well known ventral approaches with addition of dorsal stabilization are traumatic for ventral and paravertebral muscles. Making the size of approach smaller leads to reduced ability of adequate visual control. To compensate this deficiency we use special endoscope Vitom in the operation theatre in case of ventral approach in both – retroperitoneal and transthoracic stages.

From 2012 to 2013 years 136 patients were operated for complicated spinal trauma in the Neurosurgical Department of Krasnoyarsk Regional Hospital. The patients underwent anterior bisegmental spinal fusion from retroperitoneal and transthoracic approach and posterior transpedicular fixation. In 56 cases the operation was performed with help of endoscopic assistance. The endoscope was placed in the upper angle of the wound and was held by special pneumohand or holder. In case of more visualization needed endoscope could be placed through additional port.

During assessment of visual control adequacy without using of optic and with endoscope help it was discovered that the angle of view has increased from 58° to 96° respectively. At the same time the length of the surgical wound has been reduced from $17\pm3\text{sm}$ to $10\pm2\text{sm}$. Duration of the operation with endoscope assistance was a little bit longer: 243 ± 37 and 264 ± 24 minutes respectively, what might be explained by discovering additional pieces of broken vertebrae compressing the dural sac. There were no significant difference in subjective assessment of pain syndrome by VAS on the first and the tenth postoperative days. More radical dural sac compression by pieces of the broken vertebra on the side closer to the surgeon was registered on control CT scan of injured spinal level. This zone can not be visualized without the endoscope. Neurological outcomes were traced during 6 months postoperatively in both groups and had no significant differences depending mostly on the level of initial compression.

At the current time using of advanced technologies allows not only to minimize inevitable surgical aggression, but also to apply video fixation materials in the educational process and for the performed work analysis.

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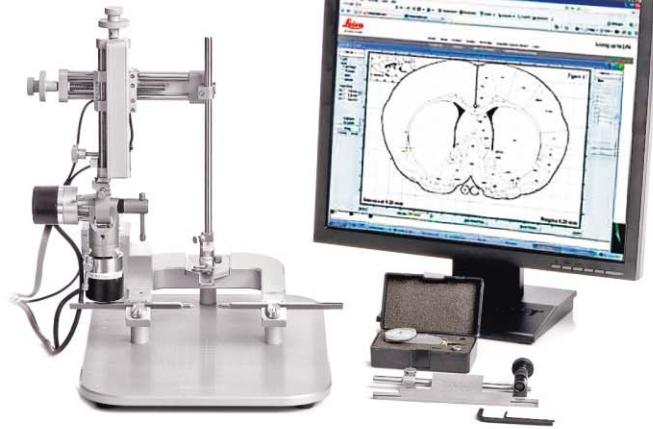
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реклама

Reducing of operative traumatism in degenerative spondilolisthesis

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Method of choice in degenerative vertebral instability is transpedicular spinal fusion with intervertebral spondilodesis and neural structures decompression. Usage of dorsal open approach for stabilization is traumatic for paravertebral muscles and leads to increased rate of scar formation. In 2012 in Neurosurgical Department a technology of percutaneous placing of transpedicular screws was started during operations in degenerative spondilolisthesis with endoscopic assistance by system EasyGo for neural structures decompression and intervertebral cage placing for spondilodesis formation. Analysis of operative treatment of patients with lumbar spondilolisthesis from 2012 to 2013 was performed. There were 64 patients on the base of Neurosurgical Department of Krasnoyarsk Region Hospital. 2 groups of patients have been analyzed. The first group of patients ($n=31$) underwent standard transpedicular spinal fusion of instability with intervertebral cage placing and neural roots decompression. The second group of patients ($n=33$) underwent endoscopic neural roots decompression with help of system EasyGo and intervertebral cage placing with following percutaneous placing of transpedicular screws under C-arch control and with robotic assistance.

The first group had operation time 134 ± 17 minutes, blood loss 530 ± 180 ml, postoperative scar length 12 ± 3 sm, dose of radiation 0,5 MeV, clinically in 93,4% of cases pain radicular syndrome has disappeared. Assessment of late treatment results after 6 months according to VAS (initially pain syndrome 7-8): no pain and return to work – 80,5%, partial pain syndrome (with VAS=2-4) – 3,2%, pain syndrome (with VAS=4-6) – 16%.

The second group of patients with endoscopy using for neural roots decompression and intervertebral cage placing and also with percutaneous screws placing had operation time 153 ± 12 minutes, blood loss 100 ± 30 ml, postoperative scar length: 5 separate incisions (3sm central and 1,5sm for screws placing), dose of radiation 10,3 MeV, clinically in 93,9% of cases pain radicular syndrome has disappeared completely. Assessment of late treatment results after 6 months according to VAS (initially pain syndrome 7-8): no pain and return to work – 84,8%, partial pain syndrome (with VAS=2-4) – 6,1%, pain syndrome (with VAS=4-6) – 9%.

At current time using of endoscopic technologies allows not only to reduce trauma of paravertebral muscles significantly, but also to reduce volume of intraoperative blood loss without dramatic increase of operation time length and without radiation dose excess.

The estimation of the manifestation of autistic features in patients with the chronic neurologic pathology

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The purpose was to find differences in the socially-psychological parameters, characteristic for the chronic frustration, at the patients with the chronic neurologic pathology and the different degree of the manifestation of the autistic features.

Methods: 18 people at the age from 28 to 56 with chronic neurologic pathology were inspected. The estimation of the manifestation of autistic features was conducted with the aid of the AQ-test. The signs of the chronic frustrating situation were revealed with the aid of the structured interview and were evaluated at points.

Results: The results of evaluating the autistic features showed the spread of data for the men from 16 to 26 marks, average mark – 20,8, for the women – from 14 to 29 marks, average – 21,1.

The level of the manifestation of autistic features on the AQ-test in patients with the neurologic pathology proved the same high as in patients with the schizophrenia in our previous research. For the men with the schizophrenia average mark – 19,2, for the women with the schizophrenia – 23,7.

The manifestation of autistic features in the group of healthy composed for men from 9 to 25 marks, on average – 14,3, for the women from 7 to 24 marks, on average – 15,5.

We calculated in the points a quantity of signs, which indicate the risk of the development of frustration in patients with the chronic neurologic pathology for the indices of the AQ-test above and below of median – 20,5. Six of nine patients with weakly expressed autistic features had on 1 point and 3 patients had 2-3 points.

Only of 2 patients with the expressed autistic features had 1 to a point. Other patients with the expressed autistic features had shown 2 points and above of indicators of the chronic frustration.

Conclusion: Patients with chronic neurologic pathology had high the risk of the development of frustration. This high risk was realized in an adult condition as a result of discrepancy of the socially-psychological «niche» put by conditions in the childhood and socially-psychological «niche» in which the personality is located after reaching of maturity.

The limitation of social contacts, leaving into itself, which is accompanied by the high indices of AQ-test, can be protective character in this situation and the high level of the manifestation of autism testify show the presence of patient in the chronic frustrating situation.

Role of anxiety and depressive disorders in the development of disorders of hemostasis system in patients with acute coronary syndrome

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Purpose. The purpose of the study was to research the effect of anxiety and depressive disorders on the hemostatic system in patients with acute coronary syndrome (ACS).

Material and methods. The study included 126 patients of both sexes (mean age $60,3 \pm 0,9$ years) in the first 24 hours of acute coronary syndrome, had not been systematically taking antiplatelet therapy before hospitalization. The first 72 hours after the transfer patients from the emergency room were interviewed to identify the anxiety-depressive disorder (ADD). The patients were divided into two groups: the first - patients with ACS and ADD ($n=78$) and the second - patients with ACS without ADD ($n=48$). In the first 24 hours of hospitalization and in the dynamics of the disease on the 10th day of hospitalization coagulation and vascular-platelet hemostasis were studied.

Results. As a result of research it was revealed that patients with ACS at all stages of the survey revealed high levels of fibrinogen, soluble fibrin monomer complexes, D-dimer. However in patients with ACS in combination with ADD values of these parameters are significantly higher than patients without ADD. Patients with ACS in combination with ADD level of spontaneous aggregation on the first and 10th day of hospitalization is not only significantly higher than control group, but also the values in the group of patients with ACS without ADD. Both groups of patients had enough high values of platelet aggregation stimulated adenosine at $0.1 \mu\text{M}$.

Conclusion. The presence of patients with ACS of associated ADD promotes the development of procoagulant activity of the hemostatic system, in particular, enhancing the functional activity of platelets.

Effectiveness and potential neuroprotective effect of method tempo-rhythmic correction (TRC) of gait in patient with Parkinson's disease

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Objectives. The purpose of the study - to evaluate the effectiveness of the method tempo-rhythmic correction (TRC) of gait in patients with Parkinson's disease, and influence on slowing of the disease progression.

Materials and methods. Main our method TRC of gait, when patient do step in moment external signal, which is produced with individually rhythm and temp. Patient with Parkinsons Disease (3 stage of Hoehn&Yahr) was randomization in 3 group (30 patients in group). Group 1 ($65,2 \pm 6,0$) have optimization of pharmacologic treatment (21 day) and TRC together. Since 22 day to 6 month pharmacologic treatment not changed. Group 2 ($66,0 \pm 5,7$) have optimization of pharmacologic treatment (21 day) only. Since 22 day to 6 month pharmacologic treatment not changed, but we added TRC of gait. Group 3 ($65,4 \pm 5,7$) have optimization of pharmacologic treatment (21 day) only. Since 22 day to 6 month pharmacologic treatment not changed. Method TRC of gait not used in this group.

For control of parameters of gait we used special digital device at baseline (day 0), at 21 day, at 42 day and 6 month. We investigate average step length and coefficient of step variability ((maximal step length-minimal step length) / average step length).

Results. At Baseline patient in all groups have resembling parameters of gait. At 21 day maximal average step length (43,65 vs 39,95 vs 39,75) and minimal coefficient of step variability (0,26 vs 0,53 vs 0,52) was in group 1. It has a tendency to normalization of walking parameters in group 1. At day 42 change of parameters of gait we have in group 2 also. We have alike data in group 1 and 2, but in group 1 average step length is more, step variability coefficient is little vs group 2. In group 3 we see major differences this groups 1 and 2. If compare date in group 3 at baseline, 21 day and 42 day we have not difference at average step length (36,20-39,75-42,51). Coefficient of step variability is decrease at day 21 vs baseline (0,52 vs 0,39), but compare day 21 vs day 42 difference is minimal (0,39 vs 0,36). At 6 month we have something worsening in all group (natural disease progression). But in group 1 and 2 average step length w as more vs group 3 (46,85 vs 45,67 vs 38,21). Coefficient of step variability in was 0,28 vs 0,32 vs 0,43)

Conclusion. Method TRC of gait is effective to correction of gait (and rehabilitation) in patient with Parkinson's Disease. More early added TRC to complex treatment of this patient is more effectiveness. It may be related with neuroprotective action TRC.

The specifics of patho psychological testing among the group of patients having the cranio cerebral trauma (on the example of memory violations)

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Introduction. The Cranio cerebral Trauma (CT) belongs to the most widespread types of traumatic pathology (about 40% of all types of traumatic damages) and is one of the main reasons of an invalidization and mortality of the population. CT consequences as they can gain chronic character, worsening quality of life of the patient. Expressiveness of cognitive violations in the remote period of CT is defined by initial degree of its weight and mentions such spheres of mental activity, as memory, attention, speed of arriving information processing, executive functions.

Research objective. Studying the memory violation in groups of patients of average level of damage after transferred CT is the general objective of research.

Research methods. Methods of patho-psychological research, relating to violations identification such as mediated, direct, delayed and semantic memory.

Results of research. By results of the conducted research decrease in direct memory (7,6,6,5 – a storing curve) was revealed; decrease in the delayed memory (in 45 minutes – 2,3 words); at the mediated storing from 16 offered concepts reproduce 9-10 (a technique «Pictogram»). Violations of semantic memory were insignificant. Patients missed on 1 semantic unit (story reproduction).

Conclusion. Thus, research showed that in group of patients with CT of average level of damage all types of memory are broken. In this regard, in the recovery period carrying out psycho-correctional actions on improvement of cognitive functions at patients is prescribed.

Computer thermosensometry in the diagnosis of predominantly sensory chronic inflammatory demyelinating polyneuropathy

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Purpose: The study of thermosensometry prospects in diagnosis of temperature sensitivity disorders in predominantly sensory CIDP in adult patients.

Methods: The study was conducted on the basis of the Department of Medical Genetics and Clinical Neurophysiology. The first group consisted of healthy volunteers – 12 people, mean age – 26.3 ± 10.2 ye.o.: men – 3 (25%), women – 9 (75%). The second group included 24 patients with predominantly sensory chronic inflammatory demyelinating polyneuropathy (CIDP), mean age – 30.6 ± 14.37 ye.o.: men - 7 (29%), women - 17 (71%). The survey was conducted using an original modification of the domestic diagnostic equipment «Sensotester MD» (MBN, Moscow, RF) from distal parts of the upper and lower extremities, in conditions of sensory deprivation. Statistical analysis was performed using software packages STATISTICA v.7.0 (StatSoft, USA).

Results: In clinical symptoms of predominantly sensory CIDP prevailed syndrome of sensitivity disorders: polyneuropathy type hyperesthesia (72% of cases) with a transition to hyperpathia, or hypoesthesia (28%). In objective neurological symptoms at the time of the survey dominated all kinds of sensitivity disorders. Primarily, vibration sensitivity (100% of cases) suffered at early stages of predominantly sensory CIDP in the patients. The symptoms of sensitive ataxia dominated in coordination sphere disorders. The computer thermosensometry data: we were found declines of heat and cold sensitivity symmetrically on both sides of extremities of light/moderate degree, significant differences with the control group was not revealed. The pain threshold of the effect of heat and cold often recorded cold hyperalgesia (79%), thermal hyperalgesia (24%). Violation of thermal sensitivity indicates hypofunction of C-fibers, the test for cold sensitivity is indicates lesion of A- δ fibers. The presence of thermal hyperalgesia associated with sensitization of primary C-afferents.

Conclusion: The computer thermosensometry is a new method of temperature sensitivity study in the diagnosis of predominantly sensory CIDP in adults. In the diagnostic sense may consider the most informative an assessment of pain thresholds on the effects of heat and cold.

Effectiveness of gnostic brain area stimulation for the correction of poststroke cognitive impairments using original computer train programs

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The aim of the present research was to assess of efficiency of neurorehabilitation methods of poststroke cognitive impairments using original computer programs influencing to gnostic brain areas.

Methods: 36 poststroke patients (female-17, male-19) were examined and treated. In addition to usual treatment all patient received a course of original computer training during 12 days, 25-35 minutes duration. Assignments included cognitive functions training sessions based on the activation of optical-spatial gnosis, with the possibility of biofeedback. Initial level cognitive impairments and results of restoration were estimated with use of MMSE, FAB, the Clock Drawing Test, MOCA, IADL, Assessment of Global Impression of Patient and Global Impression of Clinician (CGI, PGI).

Results: The initial cognitive assessment in both basis and control groups were not revealed significant changes (Mann-Whitney test, $p = 0,4$) before treatment course. There were significant improvement of cognitive functions according to MMSE ($p=0,04$), IADL ($p=0,04$) in basis group after the treatment. The indicators of control group testing were not revealed significant changes ($p > 0,1$) after treatment course. In most cases CGI Scale was marked as "significant improvement" in the basic group, and was marked as "minor improvement", in most cases of control group according to PGI and CGI. There were improvement of modal specific cognitive functions based on the MOCA: auditory attention ($p=0,01$), nominative function and semantic organization of language ($p=0,04$) in basis group.

Conclusions: The significant effect of computed training of the gnostical cortex regions (second brain unit by A.R. Luria) were revealed in the present study. There were noted the improvements of modal specific functions: auditory attention, nominative function, semantic organization of language. The indicators of executive functions groups testing were not revealed significant changes after training of the gnostical cortex regions.

Efficiency of using ci-therapy in neurorehabilitation of the patients with central hemiparesis after stroke

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The aim of our research is to create and evaluate an effectiveness of gait recovery methodology based on CI-therapies of lower limb for the patients with central hemiparesis during recovery post-stroke period.

Methods: 50 patients were included into our investigation, at the age from 45 till 70 years, with a syndrome of the moderate or severe central hemiparesis in the recovery post-stroke period. Patients were divided into two groups. The I group ($n = 25$) contained the patients whose received standard medical therapy, moto-rehabilitation and the CI-therapy method. The II group ($n = 25$) patients received only moto-rehabilitation and standard medical therapy. Before and after a course of treatment for assessment these methods we used: neurological status, objective evaluation of gait by author's method of laser analyzer (LA-1), Dynamic Gait Index. The statistical significance of differences between samplings were analyzed by criteria of Wilcoxon.

Results: in the I group patients had significant improvement ($p < 0.05$, by criteria of Wilcoxon) by the LA-1 and Dynamic Gait Index. In the II group patients had significant improvement ($p < 0.05$) by the Dynamic Gait Index. But statistically significant differences between the data of LA-1 before and after a course of treatment haven't been identified. Conclusion: the technique of CI-therapy decreases the risk of falls during walking and can be used as a part of the recovery comprehensive treatment of patients with central hemiparesis during recovery post-stroke period.

Selective callosotomy for treatment intractable epilepsy using frameless stereotactic neuronavigation

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Objectives. Callosotomy has been used successfully for many years in the treatment of intractable epilepsy with myoclonic, atonic, tonic seizures (generalized or secondary generalized). The goal of the study was to evaluate the efficacy of the selective partial (anterior two-thirds) callosotomy using frameless navigation.

Methods. The medical records of 12 patients with a follow-up 6-10 months were retrospectively evaluated. Patients suffered from a variety of intractable generalized seizure types (atonic, tonic, tonic-clonic). The male/female ratio was 10:2, age between 19 and 61 years (mean 34 years). All patients underwent MRI and EEG-monitoring. All patients had no indication for focal resection surgery. Surgical procedure performed in semi prone position, the head was fixed. Craniotomy and microsurgical interhemispheric approach without retraction with using frameless navigation (Omnisight, Integra Radionics) to avoid large bridging vein. The partial callosotomy was performed with navigation control. Postoperative MRI was performed at 5-7 days after surgery. We recommended fix therapy on preoperation level without reduction for 6 months after surgery.

Results. The size of callosotomy by intraoperative neuronavigation and postoperative MR imaging are correlated. There was no postoperative morbidity or death. 66% (8 patients) showed significant improvement in seizure control. We evaluated the outcome by ILAE classification: Class I – 0 patient, II – 1 patient (8%), III – 2 patients (16%), IV – 5 patients (42%), V – 4 patients (34%), VI – 0 patient.

Conclusion. Our first experience shows, that callosotomy as palliative procedure has good medical, social and economic performance. Frameless stereotactic neuronavigation is a safe, effective, and important surgical adjunct of successful corpus callosotomy.

Electroencephalography as a method of neuromonitoring during endarterectomy

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Introduction. Electroencephalography (EEG) is an important method for the assessment of brain functioning and sedation level during cardiovascular surgery.

Goal of the study. The main goal of the study was to assess the responsiveness of EEG for monitoring of the brain function and sedation state in patients during carotid endarterectomy.

Methods. We applied EEG as a method of realtime intraoperative neurophysiological monitoring during carotid endarterectomy. 21 patients (18 male, 3 female) were examined.

Results. We revealed the following intraoperative EEG changes during the main stage of the operation (occlusion of the common carotid artery - CCA): 30 % decrease of the amplitude of the main rhythm (A) on the occlusion side for less than 30 sec – in 2 patients; 30-40 % A decrease for more than 30 sec with a following complete A restoring – in 1 patient; 50 % A decrease for less than 30 sec – in 2 patients; 50 % A decrease for more than 30 sec with a following complete A restoring – in 1 patient; 70 % A decrease without following A restoring – in 1 patient; spectral shifting and slow wave index increase for less than 30 sec – in 3 patients. We observed no intraoperative EEG changes in 11 patients. According to the data mentioned above, 9 patients had transient intraoperative EEG changes, which were not associated with postoperative neurological complications. In 1 male patient a clinically significant A decrease was observed and these rhythm changes remained stable. Such EEG changes were associated with a severe postoperative neurological deficit (severe right-sided hemiparesis, sensory motor aphasia).

We also estimated the anesthesia depth in real time. During sevoflurane inhalation anesthesia in 7 of the 21 patients we observed the EEG pattern 'burst-suppression', which was associated with bispectral index values 22-29 (more than optimal anesthesia depth).

Conclusion. We made the preliminary conclusion about the possibility of the application of EEG as a method of intraoperative neurophysiological monitoring during carotid endarterectomy, because sensitivity of EEG to cerebral ischemia and anesthesia depth was shown in our study.



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Endoscopic endonasal transsphenoidal surgery with using of neuronavigation system: experience with 125 patients

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The pituitary adenomas are one of the most frequent tumors of the scull base. The endonasal transsphenoidal approach is commonly used for the operative treatment of these tumors. The combination of neuronavigation and endoscopy is the newest trend in pituitary surgery.

Aim: The aim of this study is to analyze the results of endoscopic endonasal transsphenoidal surgery of pituitary adenomas with using of neuronavigation system.

Material and methods: There are 125 patients with pituitary adenomas underwent the endoscopic endonasal transsphenoidal surgery at the Krasnoyarsk Regional Hospital from 2009 year. There were 50 male and 75 female patients; mean age at the time of surgery was 48,42 years. Mean preoperative performance status (Karnofsky scale) was 72,12 (range 30-100). The nonfunctioning tumors was in 78,4% of the patients. The secreting adenomas was in 21,6% of the patients (PRL-secreting tumors – 12,0%, GH-secreting tumors – 9,6%). 74,2% of the patients had any visual disturbances. The tumor size was large and giant in 40,9% of the patients. The mean tumor size was 3,2 cm. 35% of the patients had the cavernous sinus infiltration. We used the navigation system during all of our surgeries. We did not use any fluoroscopy.

Results: The neuronavigation system accuracy calculated by the computer automatically, showed a mean value of 0,8 mm. There were no complications attributable to inaccurate localization from the neuronavigation system. Using of navigation system allows to plan of the operation in each case and allows to be guided in the sphenoid sinus, sella turcica, suprasellar and parasellar region anatomy. Total tumor removal was achieved in 69,3%, subtotal removal in 13,84% and partial removal in 16,83%. The mortality rate was 1,6%. We had only 1 case of CSF leakage after surgery. Improvement of visual function was detected in 72,2%. Diabetes insipidus occurred in 25% after surgery. In 10,7% of cases, anterior pituitary insufficiency was detected. Mean postoperative performance status (Karnofsky scale) was 76,9% (range 40-100).

Conclusions: The endoscopic endonasal transsphenoidal surgery with using of neuronavigation system allows removing of pituitary adenomas totally or subtotally with low rate of mortality and acceptable morbidity.

TrkB signaling mechanism as a basis for implementation of antihypoxic and neuroprotective action of brain-derived neurotrophic factor (BDNF) during normobaric hypoxia *in vitro*

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Objective. Nowadays there is an active searching of substances able to protect cells from negative effect of hypoxia. Brain-derived neurotrophic factor (BDNF) is an important member of the neurotrophin family may be considered as one of the potential substances to control cell metabolic rate under hypoxemia. Therefore studying the mechanisms of antihypoxic and neuroprotective action of BDNF is a priority goal in neurobiology. The aim of the investigation was to study the influence of the tropomiosin-related kinase B signaling mechanism on the realization of antihypoxic and neuroprotective properties of Brain-derived neurotrophic factor (BDNF) during normobaric hypoxia *in vitro*.

Methods. Dissociated hippocampal cells were taken from the brain of CBA mice embryos (E18) and cultured during 30 days *in vitro* (DIV). Modeling of hypoxia was performed after 14th DIV by replacing the normoxic culture medium by a medium with low oxygen for 10 minutes. There were 3 experimental groups: BDNF (1 ng/ml), a selective antagonist of the TrkB receptor - k252a (150nM), BDNF (1 ng/ml) in combination with k252a (150nM) were added into culture medium 20 minutes before acute hypoxia. For the immunostaining principal cytoskeleton protein of neurons (MAP2) and astrocytes (GFAP), and TrkB receptor were marked in dissociated hippocampal cultures on the 7th day after acute normobaric hypoxia.

Results. The carried out experiments revealed 10-minutes normobaric hypoxia to cause the negatively effect on the viability of dissociated hippocampal cultures. Moreover immunocytochemical staining of TrkB showed the presence of changes in the distribution and the expression of the receptor on the membrane of neurons after hypoxia. Preventive application of BDNF (1 ng/ml) reduced the consequences of oxygen deficiency by partial preservation of the functionally active neurons. Using the selective antagonist of TrkB receptor - k252a (150 nM) partially offset by the positive effect of BDNF (1ng/ml) during hypoxia and in posthypoxic period.

Conclusion. We suppose antihypoxic and neuroprotective properties of BDNF (1 ng/ml) were mainly caused by the activity of the tropomyosin-related kinase B receptor and the subsequent launching of signaling mechanisms.

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Brain monitoring by optical biopsy

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Optical biopsy is the most promising method of functional monitoring and structural visualization of different tissues *in vivo*. Coherent optical tomography, laser Doppler flowmetry, optical reflectance, absorption and fluorescence spectroscopy, optical diffuse tomography and other optical methods are the “workhorse” of medicine and biology. Optical diagnostic tools are minimally invasive or noninvasive at one hand, but informative and low-cost at other one. Coherent optical tomography allows producing the 3D reconstruction of a tissue with “optical wavelength resolution”, but depth of penetration is not more than one mm in turbid tissues, therefore, this method has only invasive way of application in neuromonitoring. In contrast, diffuse optical tomography allows obtaining the penetration depth up to several cm but with low resolution being the way to transcranial noninvasive investigation. One of the methods that combine IR reflectance spectroscopy (NIRS) and diffusive optical tomography is optical topography. Optical topography is applicable for the transcranial visualization of brain functional activity due to different absorption of oxy- and deoxyhemoglobin. Method has several cm of resolution and 1-2 cm penetration depth. Optical topography produces real-time visualization up to 50 fps. Promising noninvasive brain monitoring method is photoacoustic imaging that combines optical NIR spectroscopy like optical topography and acoustic response registration. This method provides bigger penetration depth (7 cm) and higher spatial resolution (500 mm). “Optical window” in the NIR region corresponds to absorption band for the only cell chromophore (hemoglobin in deoxy- or oxyforms). Two photon absorption of femtosecond Ti:sapphire laser radiation produces UV quantum to excite fluorescence of several endogenous fluorophores such as NADH, FAD etc. But direct observation of two-photon excited fluorescence reduces the penetration depth up to several mm only. Application of two-photon microscopy and spectroscopy gives some advantage to traditional one-photon fluorescence microscopy and spectroscopy with UV excitation in optical biopsy *in vivo*.

We will discuss the ways to increase penetration depth of one- and two-photon excitation optical spectroscopy of biological tissues *in vivo* by tissue optical clearing. Different ways to detect response of optical absorption in turbid media – acoustic, electron paramagnetic resonance - will be analyzed. We will present our data on UV laser-induced autofluorescence method to monitor brain metabolism in experimental hypoxia and intracranial hypertension.

Neuroinflammation and neurogenesis: glial control

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Neuroinflammation is considered as an important mechanism of neurodegenerative diseases. It is usually attributed to the activity of microglial cells serving as effectors of local cytotoxicity and producers of proinflammatory cytokines. Recently, astrocytes became to be within the focus of experimental studies aimed to elucidate the pathogenesis of neuroinflammation. Astroglial cells play well-recognized role in the regulation of metabolic status of neurons, local blood flow and structural integrity of the neurovascular unit, but in addition, they serve as a source of cytokines and gliotransmitters able to affect neuroinflammation.

Neurogenesis occurs in special niches for neural stem/progenitor cells in the brain where newly born neuronal and glial cells interact with cerebral endothelial cells. Embryonic and adult neurogenesis are under the control of numerous mechanisms associated with glial cells (patho)physiology. Neuroinflammation may dramatically affect neurogenesis determining the stem cells fate, migration of astroglial and neuronal precursors, integration of newly forming neurons into synaptic networks.

There is an accumulating experimental evidence that local proinflammatory mediators released by the cells of microglial and astroglial origin stimulate neurogenesis and synaptogenesis, regulate migration of astroglial precursors. Abnormal activation of microglia within the neurogenic niches reduces viability and proliferative potential of brain progenitor cells. Taking into the consideration that neurogenesis is required for learning and memory consolidation, glia-derived pro- and anti-inflammatory molecules appear to be very important local regulators of cognitive functions and behavior, however, their biological effects may vary from stimulatory to inhibitory ones.

Animal models of Alzheimer's disease allow determining the common molecular and cellular events controlling neuroinflammation and neurogenesis for further identification of potential molecular targets for prevention and pharmacotherapy.

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Prevalence of Parkinson's disease in Zheleznogorsk: variation by age and gender

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Purpose: The epidemiology study of PD in the closed independent territorial formation (CITF) Zheleznogorsk, Krasnoyarsk region (Eastern Siberia).

Methods: The CITF include Zheleznogorsk city, two settlements and three villages. We used international epidemiological methods including door-to-door from September 2009 till August 2012. Mean age of the patients with PD was 71.3 ± 7.5 [95 % CI 42-85] ye. o.

Results: We observed 135 patients with PD. Women were 89/135 (65.9%) pers., mean age - 72 ± 10.7 [95% CI: 42-82] ye.o. Men were 46/135 (34%) pers., mean age – 67.3 ± 7.0 [95% CI: 49-85] ye.o. Thus, women prevailed ($p \leq 0.05$). The highest age-specific prevalence rate was recorded among women 70-75 ye.o., among men - 65-70 ye.o. (0.36 per 1000 vs 0.17 per 1000 general population, $p \leq 0.01$). Mean age of PD onset was 65.4 ± 9.54 [95% CI: 18-80] ye.o., including women – 65.7 ± 12.2 [95% CI: 18-80] ye.o., men – 65.0 ± 7.8 [95% CI: 45-76] ye.o. Patients had hypokinetic rigid syndrome and tremor (mixed form of PD) in 119/135 (88.1%) cases. Hypokinetic rigid syndrome without tremor (hypokinetic rigid form of PD) was in 12/135 (8.8%) cases and prevailed among men ($p < 0.01$). PD was the cause of disability in 15/82 (18.2%) cases. In the CITF population prevalence of PD was 0.92 per 1000 among person at all ages in 2010, 1.26 per 1000 in 2011, 1.25 per 1000 in 2012; and incidence of PD was 5.9 per 100000 population per year to the 2010, 10.8 - to the 2011, 13.7 - to the 2012Conclusion: Prevalence of Parkinson disease (PD) varies by geographic location, ethnicity and gender. Gender differences have been reported in most studies, with men having higher rates. The documentation of accurate prevalence and incidence for common neurodegenerative diseases such as PD is helpful for the planning of resources and the community cost of this condition.

The present study estimates both the incidence and prevalence of PD in the CITF Zheleznogorsk RF. We showed that prevalence of PD in the CITF population varied from 0.92 per 1000 in 2010 till 1.25 per 1000 in 2012. The overall prevalence of PD in the CITF Zheleznogorsk was 1.16 per 1000 general population, 2.87 per 1000 population over the age of 40. Thus the prevalence of PD corresponds to the Russian and European data.

The perspectives of the cell therapy in parkinson's disease treatment

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Parkinson's disease (PD) is a chronic progressive neurodegenerative disorder. The substitutive cell therapy is a tempting perspective in the treatment of PD, especially at the advanced stages. The embryonal stem cells (ESCs) are able to differentiate practically into any cell type presented in the human body. The human ESCs are obtained from the inner cell mass of the human blastocysts which have not been used during the infertility treatment by the means of the extracorporal (artificial) impregnation. However, the survival rate of the dopaminergic neurons-ESCs derivatives is significantly lower which is explained by the lack of the trophic support in the transplantation site, by the oxidant stress as well as by axotomy.

The neural stem cells (NSCs), hemopoietic and mesenchymal stem cells (HSCs and MSCs) are the other potential sources of the dopaminergic neurons. In some studies there was the information about the possibility of the HSCs differentiation into the neural cells. After the expansion during the invitro cultivation and the directed differentiation into the functional dopaminergic neurons the HSCs derivatives could be used for transplantation. However, the studies done later showed that the transdifferentiation of HSCs into the nerve cells occurred rather seldom and in all cases the characteristics of these cells corresponded to microglia.

In many studies using the animal model of PD there was shown the improvement in the clinical symptoms after the transplantation of the cells-MSCs derivates. It should be noted that the MSCs action mechanism is not only in the restoration of the dopaminergic neurons population but also in their trophic effect exhibited concerning the existing dopaminergic neurons. The autologic nature of the stem cells that allows to avoid an aggressive suppressive therapy is the other advantage of the HSCs and MSCs usage.

At present in the human brain there have been discovered the two zones of an active neurogenesis: the subventricular zone of the lateral ventricle of brain and the subgranular layer of the dentate gyrus of the hippocamp which are called the "neurogenesis niches". NSCs and the proliferative progenic cells could be also used in the development of the cell therapy of PD because they have the ability to proliferate and differentiate. There have been also described the neuroprotective features of NSCs, they have a low immunogenicity. However, the usage of this cell type is restricted by the technical difficulties of their long-term cultivation and a small amount of the dopaminergic neurons obtained from the human NSCs does not give the hope for their practical use.

The organization of specialized neurological care for patients with neurofibromatosis type 1 in university clinic

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Purpose: The organization of a special neurological care for patients with neurofibromatosis type 1 (NF1) in the Neurological Center of the University Clinic (NC UC).

Methods: We used clinical supervision of patients with hereditary neurocutaneous syndrome (NCS), pedigree analysis, video-EEG monitoring, MRI, CT, neuropsychological testing, retrospective and prospective analysis of the medical records. We organized the NCS register on the basis of NC UC. Total 796 people examined, 107 (13.4%) clinical cases of NCS analyzed, and 74 (69.1%) of them enabled for statistical analysis. The ectodermal forms of NCS prevailed ($39; 75 \pm 6.0\%$): 22 ($56.4 \pm 7.9\%$) male and 17 ($43.6 \pm 7.9\%$) female. The patients age ranged from 3 months to 57 years, Me [$Q_{25}; Q_{75}$] – 8 [3; 31] ye.o. Children and teenagers – $69.2 \pm 7.9\%$, adults – $30.8 \pm 7.9\%$. Cutaneous signs of NCS were 15 ($38.4 \pm 7.8\%$) cases, neurological and cutaneous signs – 13 ($33.3 \pm 7.5\%$), isolated CNS disorders – 11 ($28.2 \pm 7.2\%$). Among the ectodermal forms of NCS, we observed 21 ($40.3 \pm 6.8\%$) patients with NF1 and 17 ($32.7 \pm 6.5\%$) patients with tuberous sclerosis complex (TSC).

Results: The study NF1 included 21 ($40.3 \pm 6.8\%$) people: female – 11 ($52.4 \pm 10.9\%$), male – 10 ($47.6 \pm 10.9\%$). Age of the patients ranged from 3 months to 60 years, Me [$Q_{25}; Q_{75}$] – 8 [3; 39] ye.o. Diagnosis of NF1 was made in accordance with International Standards of National Institute of Health, 1994. Neurocutaneous signs prevailed ($66.6 \pm 10.3\%$), including spots colored with “coffee with milk” in conjunction with Kroube symptom ($33.3 \pm 10.3\%$), neurofibromas ($28.5 \pm 9.8\%$), symptomatic oncogenic epilepsy ($19.0 \pm 8.5\%$). Generally, NF1 onset was from birth (15; $71.4 \pm 9.8\%$). We diagnosed NF1 in 19 patients ($90.5 \pm 6.4\%$) at first time, Me [$Q_{25}; Q_{75}$] of NF1 diagnosis – 8 [3; 32] ye.o. Familial forms of NF1 with an autosomal dominant inheritance prevailed (17; $81.0 \pm 8.5\%$). Now, 15 ($71.4 \pm 9.8\%$) patients with NF1 consist at the dispensary in NC UC, 2 ($9.5 \pm 6.4\%$) patients have a disability.

Conclusion: NF1 is common clinical forms of NCS in our neurologist practice ($40.3 \pm 6.8\%$ of all cases of NCS), including 69.2% cases with an autosomal dominant inheritance. Organization of specialized neurological care for with NCS in the Neurological Center of the University Clinic has improved the availability of quality health services to the population of the Krasnoyarsk Territory.

Influence of anxiety and depression on echocardiographic parameters of patients with acute coronary syndrome

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Purpose. This study has assessed the functional parameters of the cardiovascular system by echocardiography in patients with acute coronary syndrome (ACS) in combination with anxiety and depressive disorders (ADD).

Material and methods. Were examined 152 patients in the first 24 hours after the onset of ACS. All patients in the first 48 hours after hospitalization was performed transthoracic echocardiography (EchoCG) on the apparatus «Vivid E9» (General Electric, USA). These echocardiographic indices were analyzed: stroke volume (SV) of left ventricular (LV), minute volume of heart (MVH), ejection fraction (EF), determined by the method Teichholz, end-systolic volume (ESV), end-diastolic volume (EDV), thickness of interventricular septum in diastole (TISD), thickness of posterior wall the LV in diastole (TPWLD), anteroposterior size of the left atrium (LA). Local contractility of LV assessed by the presence of hypo- or akinesia and dyskinesia zones. Diastolic function of LV was assessed by transmural blood Dopplerograms, noted the presence of valvular cardiac pathology. In the first 72 hours after being transferred from emergency rooms all patients were tested of test of Spielberg-Hanin, Hospital Anxiety and Depression Scale, Beck questionnaire and depression scale epidemiological studies Center USA for determine the presence or not ADD.

A result of study patients with ACS in conjunction with ADD have significant excess volume indices of LV in comparison with patients without ADD, in addition, this group have an increase in the size of the LA, MVH and left ventricular has hypertrophy in terms TISD comparison with the group. According to data EchoCG in patients with ACS and ADD very often visualized local contractility disturbances LV, zone of dyskinesia and defeat sclerotic of the aortic and mitral valves and diastolic dysfunction of LV in the type «slow relaxation» in comparison with patients with ACS without ADD.

Conclusion. In patients with ACS concomitant ADD has a negative effect on the functional parameters of the cardiovascular system, which may be one of the reasons for unfavorable prognosis in these patients.

Condition of patients' immunity system in with acute coronary syndrome in combination with anxiety and depressive disorder

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Purpose. Anxiety-depressive disorders (ADD) have a negative impact on the course and prognosis of patients with coronary heart disease, but the mechanisms of their cor-relation are not studied enough. Immune inflammation is considered one of the most important factors of comorbidity of acute coronary syndrome (ACS) and ADD. The purpose of the study was research condition of patients' immune system with ACS in combination with ADD.

Material and methods. The study included 60 patients in the first 24 hours of ACS. In the first 72 hours after being transferred from emergency rooms all patients were tested of test of Spielberg-Hanin, Hospital Anxiety and Depression Scale, Beck questionnaire and depression scale epidemiological studies Center USA for determine the presence or not ADD in 27 (45%) patients identified ADD. First 24 hours and on the 10th day of hospitalization blood lymphocyte phenotype were studied. Research blood lymphocyte phenotype was performed method of flow using direct immunofluorescence whole peripheral blood with using the monoclonal antibodies (BeckmanCoulter, USA), labeled with FITC (fluorescein isothiocyanate), PE or RD1 (phycoerythrin), ECD (phycoerythrin-TexasRed-X), PC5 (phycoerythrin-cyanin 5) and PC7 (phycoerythrin-cyanin 7) in the following panels: CD45-FITC/CD4-PE/CD8-ECD/CD3-PC5, CD45-FITC/CD56-RD1/CD19-ECD/CD3-PC5, CD5 -FITC/CD45-PE/CD19-ECD/CD27-PC5, TCR $\gamma\delta$ -PC5.

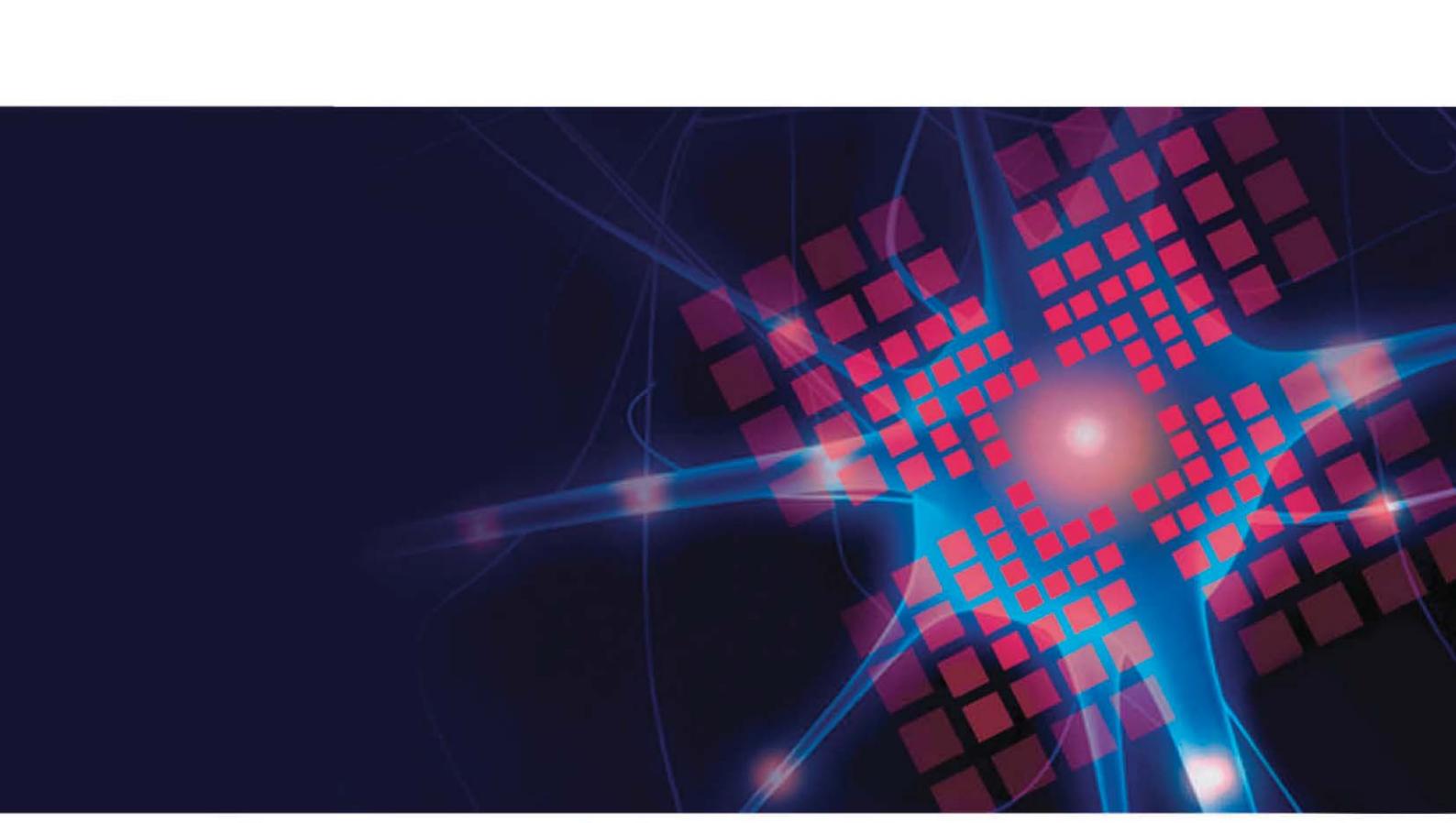
As a result of research it was revealed that patients with ACS in combination with ADD lymphocyte counts decrease and immunoregulatory induction of inflammatory processes increase.

Conclusion. The presence of ACS patients associated ADD reduces lymphocyte and increase immunoregulatory induction of inflammatory processes, which may be the main mechanism of thrombotic events in patients with ACS.

Role of pharmakogenetics in prevention of valproate-induced adverse drug reactions from central nervous system

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Epilepsy is a widespread socially important chronic disease of brain which is treated for many years; 30% of the patients with epilepsy should take antiepileptic drugs (AEDs) for the life term. Main aim of antiepileptic therapy is full epileptic seizures control and, in case of their absence, minimization of adverse drug reactions (ADRs) and their patient's life quality negative influence. In case of severe complications there is a necessity of the drug cancellation (even if it controls the epileptic seizures effectively) and the way of therapy changing. Treatment emergent ADRs events from CNS may influence negatively the patient's social and family adaptation sometimes to a greater extent than the disease itself. The number of VPA-induced ADRs is great and is connected with the pharmacokinetics and the pharmacogenetics of the VPA drugs themselves. Pharmacogenetics of VPA is a rapidly growing field of interest encompassing genetic variation in genes encoding drug transporters, drug-metabolizing enzymes and drug targets, as well as genes related to the action of drugs. The interest is based on the fact that only 30-60% of common drug therapy is successful and that ADRs cause 7% of all hospital admissions, 4% withdrawal of new medical entities, and cost society an amount equal to the cost of drug treatment per se. Pharmacogenetic tests advantages: genetic tests do not require to intake VPA, i.e. it is possible to predict pharmacological response before the beginning of the intake (there is a possibility of high risk of treatment-emergent ADRs groups stratification); a single blood sample or other biological material is needed at any time once in patient's life (economic effectiveness); genetic tests are based on the PCR method and do not require determination at several temporary points; molecular genetic testing results are unchangeable during the whole life of a patient and gives an opportunity to create a so-called Pharmacogenetic Passport of a patient with epilepsy; tests assess only genetic part which influence the VPA pharmacologic response; genetic tests are not expensive and do not require equipment for carrying out TDM; using methods of personalized medicine of the tests we can carry out large population studies and it's of great importance from the point of epileptic characteristics of VPA metabolism. The genotype of an individual is essentially invariable and remains unaffected by the treatment itself. Several examples exist where subjects carrying certain alleles do not benefit from drug therapy due to ultrarapid metabolism caused by multiple genes or by induction of gene expression or, alternatively, suffer from ADRs due to the presence of defective alleles. However, it will take time before this will be a reality within the clinic.



Нейрокурс

профилактика и коррекция нарушений
психического состояния человека на основе
технологии функционального биоуправления
с биологической обратной связью

*Профилактика и коррекция психоэмоциональных
состояний, психосоматических расстройств
и невротических нарушений*

*Коррекция психофизиологического состояния
у лиц с аддиктивными расстройствами,
в том числе, связанными с употреблением
психоактивных веществ*

*Диагностика и коррекция психофизиологического
состояния при синдроме дефицита внимания*

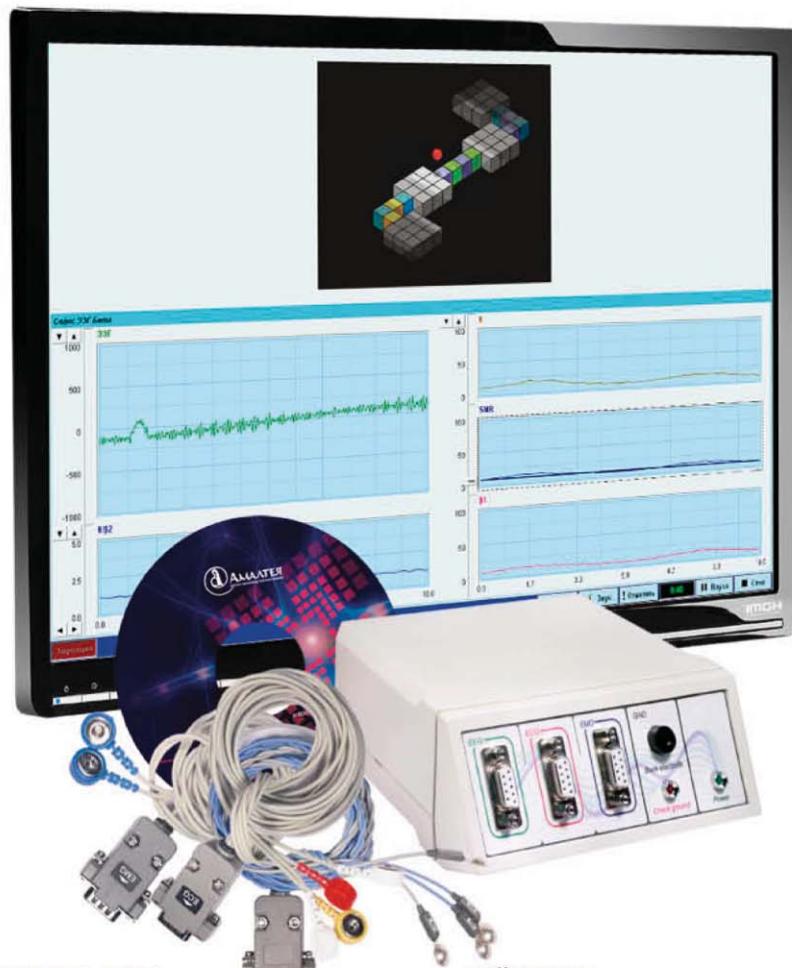


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НАУЧНО – ПРОИЗВОДСТВЕННАЯ ФИРМА «АМАЛТЕЯ» ПРЕДСТАВЛЯЕТ «НЕЙРОКУРС» – УНИКАЛЬНУЮ РАЗРАБОТКУ, НЕ ИМЕЮЩУЮ АНАЛОГОВ НА РЫНКЕ ОБОРУДОВАНИЯ, РАБОТАЮЩЕГО С ИСПОЛЬЗОВАНИЕМ ТЕХНОЛОГИЙ ОСНОВАННЫХ НА ПРИНЦИПЕ БИОЛОГИЧЕСКОЙ ОБРАТНОЙ СВЯЗИ



«НЕЙРОКУРС» ВКЛЮЧАЕТ В СЕБЯ:

- СПЕЦИАЛЬНЫЙ МНОГОФУНКЦИОНАЛЬНЫЙ ПРИБОР, НЕОБХОДИМЫЙ ДЛЯ РЕГИСТРАЦИИ ФИЗИОЛОГИЧЕСКИХ ПОКАЗАТЕЛЕЙ (ЭЭГ, ЭМГ, ЭКГ);
- ПРОГРАММНОЕ ОБЕСПЕЧЕНИЕ «НЕЙРОКУРС» ПРЕДНАЗНАЧЕННОЕ ДЛЯ ОБРАБОТКИ ПОЛУЧАЕМЫХ ДАННЫХ, ФОРМИРОВАНИЯ СИГНАЛОВ ОБРАТНОЙ СВЯЗИ И РЕАЛИЗАЦИИ КОРРЕКЦИОННЫХ МЕТОДИК;
- МЕТОДИЧЕСКОЕ ПОСОБИЕ, СОДЕРЖАЩЕЕ ПРАКТИЧЕСКИЕ РЕКОМЕНДАЦИИ ДЛЯ ПРОВЕДЕНИЯ ДИАГНОСТИЧЕСКОЙ, ТРЕНИРОВОЧНОЙ, КОРРЕКЦИОННОЙ И РЕАБИЛИТАЦИОННОЙ РАБОТЫ «КОМПЛЕКС МЕТОДИК ПРОФИЛАКТИКИ И КОРРЕКЦИИ НАРУШЕНИЙ ПСИХИЧЕСКОГО СОСТОЯНИЯ ЧЕЛОВЕКА НА ОСНОВЕ ТЕХНОЛОГИИ ФУНКЦИОНАЛЬНОГО БИОУПРАВЛЕНИЯ С БИОЛОГИЧЕСКОЙ ОБРАТНОЙ СВЯЗЬЮ».

В ПРОГРАММНОМ ОБЕСПЕЧЕНИИ «НЕЙРОКУРС» ПРЕДУСМОТРЕНА ВОЗМОЖНОСТЬ АВТОМАТИЗИРОВАННОГО ПРОВЕДЕНИЯ РЯДА ПСИХОДИАГНОСТИЧЕСКИХ МЕТОДИК И, ВПЕРВЫЕ – СПЕЦИАЛЬНОГО ПСИХОФИЗИОЛОГИЧЕСКОГО ИССЛЕДОВАНИЯ ФУНКЦИИ ВНИМАНИЯ У ВЗРОСЛЫХ И ДЕТЕЙ – **ДИАГНОСТИКА С ПРОБАМИ**.

«НЕЙРОКУРС» - это современный высокотехнологичный инструмент, созданный для оптимизации диагностической и лечебно-профилактической работы при:

- лечении и коррекции нарушенных состояний – при психосоматических и некоторых психических расстройствах, при психоэмоциональных нарушениях;
- восстановлении ресурсов организма – при реабилитации после значительных физических и психоэмоциональных нагрузок, болезней, при постстрессовых нарушениях;
- повышении стрессоустойчивости – при профессиональных, возрастных и кризисных стрессовых нагрузках. Для обеспечения адекватного поведения при стрессах, активного противодействия им, снижения физиологических затрат и расширения спектра эффективных поведенческих стратегий;
- обучении и тренировке новых возможностей – при работе по повышению работоспособности, поддержанию высокой концентрации внимания, расширению возможностей произвольного контроля поведения и произвольной саморегуляции состояния, обучение профессионально важным качествам.

«Нейрокурс» с успехом используется в работе психотерапевтов, наркологов, психиатров, психологов, спортивных психологов, врачей-терапевтов, реабилитологов, дефектологов.

Psychosocial factors in the assessment of prognosis and prevention of acute cerebrovascular accident

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Objective. The purpose of our study was to establish the relations between psychosocial factors and acute cerebrovascular accident (ACVA) and death within a five - year dynamic study (2004-2008) among the adult population.

Material and methods. In 2004 474 persons aged 19 to 64 years were randomly taken under medical observation in 10 clinics of Krasnoyarsk. 381 (85.4 %) patients went through the repeated psychometric study in 2006. In 2009 the cases of ACVA and death were established among the persons included in the study during 2004-2008. To assess the mental state of patients the Beck Depression Inventory (BDI) questionnaire and the questionnaire of personal and reactive anxiety by Spielberger –Khanin were used. The total score of <12 according to BDI questionnaire determined that the person has no reliable signs of depressive spectrum disorders (DSD), with the total score of ≥ 12 DSD is revealed. The sum score ≥ 20 indicated the presence of depressive state (DS). The severity levels were determined: mild, middle or moderate and severe. When decoding the anxiety test by Spielberger –Khanin we have revealed the levels of reactive (ReA) and personal (PeA) anxiety: low, normal, elevated, expressed and high.

Results. Age median in patients included in the study was 43.2 (29, 6 -51, 9) years. Males were 166 (35.0 %) and females - 308 (65.0 %). In 2004 DSD occurred equally often (33, 7% vs 35, 1%, $p = 0.655$) in males and females. DS was identified in 11.4 % of the population. During 2004-2008 ACVA was diagnosed in 5 persons (in 2004, 2005, 2006, 2007 and 2008) and death - in 5 patients (3 - in 2006 and 2 - in 2007). In 2006 the high levels of ReA ($p = 0.002$) and PeA ($p = 0.001$) and the increase of depression severity according to BDI questionnaire (moderate - in 2004 and severe - in 2006) ($p = 0.000$) were found in patients with ACVA. In 2006 the high levels of both ReA ($p = 0.007$) and PeA ($p = 0.001$) were recorded in persons who died then in the period up to 2008.

Conclusion. Depression and pathological anxiety are the risk factors of acute cerebrovascular accident and death. With the purpose of preventing ACVA an effective therapy of psychogeneses is necessary.

Update on Functional Neurosurgery

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Introduction: Functional neurosurgery is the specialty that deals with surgical treatment of so-called “functional” conditions – these include chronic pain, movement disorders, epilepsy, psychiatric and behavioral diseases. Recently, functional neurosurgery has experienced a major growth in the range of indications that may be successfully treated with modern surgical interventions and in the number of available treatment modalities. Here we discuss the series of major innovations that have a potential of revolutionizing the field of functional neurosurgery.

Methods and Results: 1. Classic surgical interventions aimed at interruption of abnormal circuits and elimination of sources of aberrant information (known as destructive, or ablative, surgery) are being supplemented and almost completely replaced by the neuromodulation procedures that are almost universally reversible, adjustable and testable. Majority of functional neurosurgical operations today are done through use of electrical stimulation, focal administration of chemical agents (transmitters, agonists and antagonists, growth factors, etc.), or their combination.

2. To make surgery more successful, functional neurosurgery is now relying on sophisticated imaging information, including anatomical, biochemical and functional approaches, and using this information for patient selection and choice of targets and procedures. There are now many examples of both research and clinical applications of integrated imaging that changed the way we perform functional neurosurgical procedures.

3. Interdisciplinary collaboration seems to be the main source of progress in functional neurosurgery. In addition to continuous cooperation between neurosurgeons and neurologists, functional neurosurgery today is dependent on support from psychiatrists, psychologists, pain and headache specialists, basic scientists, and biomedical engineers.

Conclusion: Functional neurosurgery is currently experiencing a stage of rapid and systematic progress. The presentation summarizes recent growth in every facet of this fascinating and most promising neurosurgical subspecialty.

Prognostic value of subcortical structures and brain stem condition in patients with hemorrhagic stroke

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Krasnoyarsk State Medical University named after

Prof. V.F. Voino-Yasenetsky, Krasnoyarsk, Russia

Four-stage algorithm of patients' selection for operative treatment was established on the base of analysis of disturbance in sound signal conduction through the brain stem (according to data from Auditory Evoked Potential, neuromyoanalyzer "Neuromyan" NMA-4-01) and peripheral blood flow (according to CT perfusion data, CT scanner GE Light Speed) in patients with putamenal localization of hemorrhagic stroke focus (studies 2010-2011 years). 1. After arriving of a patient with putamenal localization (PL) of hemorrhagic stroke the level of consciousness is evaluated. If it is below 9 in Glasgow Coma Scale (GCS), the patient receives conservative treatment. 2. All left patients with the score above 9 have volume of their hematoma measured. If the volume is less than 30 ml and midline shift is less than 5mm, the patients receive conservative treatment. 3. Patients with 9 and higher score in GCS and with the hematoma volume more than 30ml or midline shift more than 5mm, need Auditory Evoked Potential studying. In case of increased stem interpeak intervals (I-V and III-V) more than 20% above normal values, it is assumed that the brain stem has already suffered significantly, thus, operation will not lead to clinical improvement, and so, the patient receives conservative treatment. 4. Patients with 9 and higher score in GCS and with the hematoma volume more than 30ml or midline shift more than 5mm, without critical elevation of the interpeak intervals on Auditory Evoked Potential studying, need CT perfusion scanning. Patients with widespread and significant critical decrease of perifocal blood flow will also receive conservative treatment. Those patients that are left after all four stages of selection should be treated surgically with the low-invasive removing of intracerebral focus of hemorrhage under the control of neuronavigation.

Results of surgical treatment of patients with putamenal hemorrhages who were in sub compensated state (GCS from 9 to 10) have been analyzed in this work. The patients were selected according to the algorithm (n=12). Four patients operated in sub compensated state have died out of 12 (postoperative lethality 33,4%). For comparison: postoperative lethality among patients with GCS from 9 to 10 and with putamenal hemorrhages selected control of subcortical and brain stem structures condition (according to data from Krasnoyarsk Regional Hospital in period of 2008-2010) accounted for 58.8%.

To sum up, the low-invasive hematomas removing in patients underwent differential selection on the base of proposed algorithm, gives encouraging results.

To a question about cerebral vasospasm in patients with aneurismal subarachnoid hemorrhage

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Krasnoyarsk State Medical University named after Prof. V.F. Voino-Yasenetsky, Krasnoyarsk, Russia

Analysis of treatment of 6 patients in acute period of aneurismal subarachnoid hemorrhage (CAH), Hunt-Hess II-III with linear blood flow velocities from 140 to 212 sm/sec has been made. There were 4 males and 2 females aged from 36 to 57 years in the studied group. All patients underwent examination on the first or the second day from the moment of hemorrhage.

All patients were in clear consciousness (GCS score 15), they had unspecified symptoms of brain involvement and meningeal syndrome. Severity of CAH was assessed with Fisher scale. All 6 patients had Fisher II-III level of CAH according to Computer Tomography (CT) scan results. Also all patients underwent CT perfusion scan (CT scanner - GE Light Speed). Rates of cerebral blood flow (CBF), cerebral blood volume (CBV) and mean transit time (MTT) were assessed on base of reconstructed perfusion pictures. All 6 patients from the group have been operated openly in a period of 3 first days from the moment of the hemorrhage. In postoperative period (on the first day after the operation) Multispiral CT scan and Transcranial Doppler studies were performed. On 7-10 postoperative days in case of stable conditions patients underwent cerebral angiography for assessment of degree of aneurism isolation from blood flow. We saw no clinical or neurovisual signs of ischemia postoperatively in 3 patients who had clear consciousness and high (but not critical!) linear velocities of blood flow (firstly, in Middle Cerebral Artery) and had no obvious zones of decreased blood flow accordingly to CT perfusion. Ischemia postoperatively was registered clinically and on CT scan in 2 patients with high linear blood flow velocities. 1 female patient with high blood flow velocities and signs of hypoperfusion had no clinical or CT signs of ischemia.

To sum up, based on confined clinical data, it is possible to say that: 1. compensated patients with high rates of linear blood flow velocities might have both – normal or decreased perfusion level; 2. patients in compensated state with high rates of linear blood flow velocities but with no signs of hypoperfusion according to CT perfusion scan, have more promising results of open surgical intervention in acute period; 3. patients in compensated condition with high rates of linear blood flow velocities and with hypoperfusion sighs on CT perfusion scan have bigger chances for ischemic changes development in postoperative period.

Extracellular acidosis and Na⁺/H⁺ exchange blocker 5-(n-ethyl-n-isopropyl) amiloride (EIPA) prevent zinc/kainate toxicity in cultures of cerebellar granule neurons

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Purpose. Currently it stays unknown how acidosis influences the neuronal damage which is caused by the zinc entry resulted from hyperactivation of AMPA/kainate receptors in consequence of brain ischemia/hypoxia. Our study was performed using cultured cerebellar granule neurons (CGNs) subjected simultaneous exposure to zinc/kainate toxicity and acidosis initiated by either acidification of incubation medium or inhibition of Na⁺/H⁺ exchanger by EIPA.

Methods. Primary CGN cultures were prepared from cerebella of 7-8-day-old Wistar rats, kept in a CO₂-incubator (5% CO₂/95% air, 98% relative humidity, 36.5°C) and maintained there before experiments for 7 days in vitro. After experiments cultures were fixed in ethanol-formaldehyde-acetic acid mixture (7:2:1) and stained with trypan blue. The surviving neuron percentage was estimated by calculation of intact CGNs in five fields of vision under magnification x40. The living cells were loaded with 0.005 mM FluoZin-3 AM followed by triple washing in balanced salt solution and fluorescent analysis of intraneuronal zinc ion concentration ([Zn²⁺]_i) which was quantified using a Cytofluor plate reader (CytoFluor II, PerSeptive Biosystems, USA) or microscope image system (Olympus, Yapan).

Results. CGNs were insensitive to ZnCl₂ exposure (0.005 mM, 3 h) and slightly sensitive to kainate (0.1 mM, 3 h). Simultaneous treatment of CGNs with kainate+ZnCl₂ caused pronounced neuronal death, which was attenuated by external acidosis (pH 6.5) or Na⁺/H⁺ exchange blocker EIPA (0.03 mM). [Zn²⁺]_i was raised under ZnCl₂ or kainate+ZnCl₂ exposure. This raising was significantly decreased by external acidosis but increased by EIPA. Neuronal imaging demonstrated that EIPA causes the release of Zn²⁺ from intracellular stores. These data imply that external acidosis retard ZnCl₂/kainate toxic effect by decreasing Zn²⁺ entry in neurons while EIPA prevents intraneuronal stores from overload with zinc.

Conclusion. The data obtained suggest that in CGN cultures exposed to ZnCl₂/kainate toxicity, neuroprotective effect of extracellular acidosis is mediated by decreasing Zn²⁺ entry in neurons while EIPA prevents intraneuronal stores from a Zn²⁺ overload.

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Sensitivity to acetylsalicylic acid in impedance aggregometry in patients with ischemic and haemorrhagic stroke

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Acetylsalicylic acid (ASA) plays important role in the prevention and treatment of ischemic stroke (IS) and in the prevention of the appearance of ischemic lesions in the brain in hemorrhagic stroke (HS). However, intracerebral hemorrhage is a serious complication of therapy ASA and thrombosis can develop despite regular intake, it is «clinical aspirin resistance.» This dictates the relevance of individual choice and intake mode and dose ASA, based on preliminary laboratory analysis.

Objective: study features of the ASA influence on platelet aggregation in patients with acute ischemic stroke.

Methods. Induced platelet aggregation tests were performed on the aggregometer Chronolog 700 by impedance method in whole blood with 5 µM ADP induction.

Results. 58 patients with IS and 39 patients with HS was investigated, control group consisted of 58 clinically healthy volunteers. It was revealed, that in patients with HS compared with IS patients was increased lag phase aggregogram after incubation with ASA ($p<0,05$), which can be a parameter that determines the risk of bleeding or thrombosis in patients receiving ASA. Compared with the control group, 28% of IS patients remained hyperaggregation (aspirinresistance) on a background of ASA, and 31% of HS patients showed a reduction aggregation already prior incubation with ASA, that means contraindication to the use of antiplatelet agents.

Conclusion. Determination of platelet aggregation in patients with IS is important to identify aspirinresistance that allows for correction of therapy, and in patients with HS can warn hyperaggregation platelets, which may promote the formation of secondary ischemic cerebrovascular disease.

Prevalence of febrile seizures at children aged from newborn to 14 years old in Krasnoyarsk

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Purpose: The study of prevalence of febrile seizures (FS) at childhood population in the Krasnoyarsk city (Eastern Siberia, RF).

Methods: The Krasnoyarsk is a city and the administrative center of the Krasnoyarsk Krai (Russia), located on the Yenisei River. It is the first city in Eastern Siberia. The Krasnoyarsk experiences a continental climate with long and very cold winters, and short but warm summers.

The retrospective analysis of official medical records of infectious division of City Children's Clinical Hospital № 1 (Krasnoyarsk) held us in 2009 to 2012. For the analyzed period in an infectious hospital 578 children with FS and an acute respiratory virus infection (ARVI) are hospitalized.

Results: The prevalence of FS among children aged from newborn to 14 years old was 75-112/100000 childhood population of the Krasnoyarsk city in 2009-2012. Annually the increase in number of the entered patients with FS occurred during the winter and spring period that is bound to lifting of incidence of ARVI and flu. Relation FS around boys and girls was 57.3% vs 42.7%.

We showed a dominance of FS around children from 12 to 36 month old (57.6%). The greatest number of FS registered in 2010 - 177 (30.6%), and the lowest in 2009 - 130 (22.5%).

Leading place on the frequency of cases of FS among districts of the Krasnoyarsk city take Soviet's district (179 pers.) is as the most multioccupied and big on the area the district of the Krasnoyarsk city, and also Lenin's district (112 pers.) is as the most adverse in social aspect the industrial region.

Conclusions: The prevalence of FS in the Krasnoyarsk city exceeds those in the Russian Federation. The conducted research testifies that development and carrying out correcting actions are necessary for decrease in risk of FS development in the studied nursery of childhood population in Eastern Siberia.

Amyotrophic lateral sclerosis discovery of TDP-43 and subsequent development

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Amyotrophic lateral sclerosis (ALS) is a progressive, generally sporadic, neurological disease of unknown cause affecting adults. In 2006, a nuclear protein, TDP-43, was identified as the major pathological protein in both ALS and frontotemporal lobar degeneration with ubiquitin inclusions (FTLD-U). Sporadic ALS is now recognized to be a multisystem TDP-43 proteinopathy widely affecting both neurons and glial cells in the CNS. It is important to note that mutations of the *TDP-43* gene can cause an autosomal-dominant disease clinicopathologically indistinguishable from sporadic ALS, strongly suggesting that TDP-43 is related directly to the pathomechanism underlying ALS. In TDP-43 proteinopathy without *TDP-43* mutation, ALS is much more common than FTLD-TDP, although both diseases are recognized to represent part of a continuous spectrum. More recently, TDP-43 pathology has also been clearly demonstrated in FTLD/ALS (c9FTD/ALS) patients with repeat expansions in the *C9orf72* gene. In the form of c9ALS, the neuropathology of sporadic ALS has been clearly shown to have distinct additional features.

However, it has also become apparent that deposition of pathological TDP-43 can occur in many other neurodegenerative disorders (secondary TDP-43 proteinopathies), including Alzheimer's disease and Parkinson's disease. Recently, ataxin 2 intermediate-length polyglutamine expansions were found to be associated with ALS. In fact, TDP-43-positive inclusions morphologically indistinguishable from those of ALS have been reported in polyglutamine diseases (strictly, not only SCA2 but also SCA3/MJD). Coexistence of Huntington's disease and ALS has also been described in several patients.

In this International Congress on Neuroscience, I will review the neuropathologies of ALS and other important neurodegenerative diseases with TDP-43-positive inclusions, and discuss the role of TDP-43 as the pathological protein in these TDP-43 proteinopathies.

Role of preoperative DTI tractography for surgical management of gliomas

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Background: Tractography is a powerful tool for intraoperative decision-making concerning glioma resection. We reported visualization of tractography as a preoperative planning using 3D Slicer and its 'Tractography Interactive Seeding' module (MICCAI 2013 DTI Challenge). Almost all intended fibers were visualized except a case with a different scanning sequence and/or angle setting. Thus tractography should be carefully used as a reference considering it is computer based statistical visualization and should be drawn considering clinical scenario and surgical approach based on normal anatomy. **Object:** The purpose of this study is to provide pre-operative evaluation of Diffusion Tensor Imaging (DTI) tractography datasets for brain mapping white matter pathways during glioma resection. **Materials and methods:** Over forty cases with gliomas near motor cortex area were performed pre-operative MRI included DTI scans (6 and 12 gradient directions, b -value = 1000 s/mm²) acquired on a 3T scanner (Philips and Toshiba). Using MedINRIA software, we analyzed DTI datasets and co-registered T1-weighted and FLAIR scans with tumor and edema prior to tumor resection. Some cases of the tumor were resected under awake craniotomy and directly monitored with patient's motor function and MEP (motor evoked potential), when we confirmed practical neurological function of patients based on the pre-operative DTI (FA color map and tracking of corticospinal tract [CST]). **Results:** As DTI experts demonstrated that the CST projection to the cortical motor foot area is mainly reconstructed than the lateral projection to the face and hand area, our DTI datasets revealed that the correlation between pre-operative white matter bundles (CST projection on the software) and the practical motor function of patients was confirmed in awake craniotomy. Metal artifacts for cranioplasty after removal of the tumor had limitations of DTI scanning (3T) to analyze accurate CST projection (false negative). **Conclusion:** DTI tracts are complex models of white matter anatomy that can provide clinically relevant information for the planning of glioma surgery in motor areas. Clinical evaluation of DTI tractography techniques can help establish the validity of tractography-derived information to assist with neurosurgical decision-making especially in awake craniotomy.

Role of preoperative functional MRI in awake craniotomy management of gliomas

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Background: Syntax is considered essential in language and searching for the area of syntactic operations has recently attracted attention in neuroscience. In our previous functional magnetic resonance (fMRI) studies, we have identified the left inferior frontal gyrus (IFG, so-called Broca's area) and the left lateral premotor cortex (LPMC) as grammar centers. Moreover, we have recently shown that agrammatical comprehension is caused by a glioma in these regions (Kinno et al., 2009).

Object The purpose of this study is to compare the activation patterns by pre-operative fMRI in language-related areas clinically identified by Wada test, as well as by functional mapping during awake craniotomy.

Methods Sixty-six consecutive patients with glioma underwent preoperative fMRI with a picture-sentence matching task since 2006. The full data were available from 65 patients (41 men, average age 38.4 years) including tumor laterality (55 left, 10 right), tumor location (38 frontal, 9 insular, 7 temporal, 1 parietal, 8 multi-lobular) and laterality index (53 right, 8 left, 4 bilateral).

The activation patterns in fMRI with these tasks including three main conditions of sentence types (active, passive and scrambled) were calculated in ANCOVA after statistical adjustment of error rates and evaluated with regard to localization and lateral dominancy. The functional mapping during awake craniotomy searching for the location of speech arrest by electric stimuli was performed with regard to the language-related tasks (naming, verb generation, and counting).

Results Out of 65 cases with fMRI, awake craniotomy was performed in 53 cases, and language-related areas were identified by functional mapping during awake craniotomy in 39 cases. The 37 left-dominant cases were evaluated as left-dominant in 36 cases (97%) by Wada test, whereas with fMRI, 26 cases (70%) were left-dominant, two case was right-dominant, and nine cases were bilateral.

The other two right-dominant cases were assessed as left-dominant and bilateral respectively by both Wada test and fMRI scan. Focusing on 30 cases with confirmed Broca's area, 28 cases (93.3%) corresponded to the regions identified by fMRI, in which ten cases were triangular (F3t), eleven cases were opercular (F3op), and seven cases were LPMC. Only two non-corresponding cases included the right hemisphere on fMRI.

Conclusion Activated regions on pre-operative fMRI during picture-sentence matching tasks closely corresponded to language-related regions determined by functional mapping during awake craniotomy. Further evaluation of grammar centers in the brain should be investigated with functional mapping and will potentially contribute to our understanding of human language.

Всё для биологических лабораторий

РЕАКТИВЫ
всех ТИПОВ



Расходные материалы
и пластик

ОБОРУДОВАНИЕ

настольное:

- МИКРОСКОПЫ и АКСЕССУАРЫ,
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- ПОДГОТОВКИ и АНАЛИЗА ЭКСПЕРИМЕНТА
- НЕСТАНДАРТНОЕ ПО СПЕЦИФИКАЦИИ

КОНТРАКТНЫЕ УСЛУГИ:

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- АНТИТЕЛА,
- ГЕННАЯ инженерия

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- ❖ доставка до клиента
- ❖ представители в регионах России,
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Age and gender peculiarities of comorbid pathology in school children with ADHD

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Introduction: ADHD is one of the most widely-spread forms of neurological alterations seen in children. The goal of this study was to assess comorbid pathology in school children (elementary education) for further clarifying the relations of comorbidity and age and/or gender features in this pathology.

Methods: we have examined 172 children with ADHD (90 boys and 82 girls) aged from 7 to 10 (average 8.7 ± 1.1). At the first step, we have analyzed the questionnaires filled out by parents and teachers containing information on ADHD symptoms. At the second step, the children have been examined by neurologist, psychiatrist, pediatrician, and psychologist.

Results: Comorbid pathology was revealed in 81.4% of children with ADHD with its prevalence in the age group of 8-9 y.o. Boys demonstrated significant 1.9-fold increase in the association of ADHD with 3 or more comorbid disorders. Numerous forms of neurotic, neurosis-like and anxiety disorders have been found in 33.1% of children with ADHD. 30.2% of children with ADHD have demonstrated speech and school skills alterations (dysgraphia, dyscalculia, dyslexia), and in 24.4% of children, demonstrative behavior was evident.

Neurosis and anxiety predominated in children of 8-9 y.o. either in boys or girls equally. Speech and school skills alterations were more pronounced in boys (1.7-fold increase comparing to the group of girls), and it was a tendency to higher prevalence of this type of alterations in children of 8-9 y.o. (15.1%). Demonstrative behaviors were found in the children in all the tested age groups with the same prevalence (24%), but the boys were mainly affected (90.5% of all the cases).

Conclusion: understanding the association of ADHD with other neurological disorders would help to improve diagnostics and treatment protocols in children.

EEG power dynamics and cognitive function in patients with different severity of syntax assessed coronary artery disease

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Background and aims: Modern technology such as computed electroencephalography (EEG) that is used to detect signs of brain damage could also be used to determine the advantages and disadvantages of surgical myocardial revascularization methods in certain category of patients. The present study investigated EEG power dynamics and cognitive function in patients with different severity of angiographically assessed coronary artery disease (CAD) undergoing on-pump coronary artery bypass grafting (CABG).

Methods: A total of 51 male patients were divided into two groups: with a moderate coronary lesion (SYNTAX score \leq 22, n = 22, mean age 56.6 \pm 5.62 years) and with a severe coronary lesion (SYNTAX score \geq 23, n = 29, mean age 56.5 \pm 5.38 years). The severity of the coronary lesions was assessed using the results of coronary angiography and a SYNTAX calculator (<http://www.rnoik.ru/files/syntax/index.html>). Monopolar EEGs were recorded 3–5 days before surgery and 7–10 days and 1 month after surgery in an eyes closed resting-state in 62 sites of 10-20 system with NEUVO encephalograph (Compumedics, USA). The EEG power was calculated in frequency ranges of 0-50 Hz. Cognitive function were assessed preoperatively by the mini-mental state examination (MMSE), Frontal Assessment Battery (FAB) and Trial Making Test (TMT), part A.

Results: The analysis of cognitive scales revealed significant inter-group differences only MMSE scale, patients with SYNTAX scores \leq 22 had greater MMSE score (mean 28.3 \pm 0.95 and 27.5 \pm 1.40, (p=0.02), respectively). Also SYNTAX scores negatively correlated with MMSE ($r = -0.38$, $p=0.006$). All the patients demonstrated theta1 power increase 7–10 days after CABG, but this effect was more pronounced in patients with severe SYNTAX scores (\geq 23), especially in frontal brain areas ($p < 0.05$). 1 month after CABG theta1 power remained heightened in patients with SYNTAX scores \geq 23, and it had returned to baseline in patients with SYNTAX scores \leq 22 ($p = 0.007$).

Conclusion: A high SYNTAX score is associated with cognitive deficit and EEG markers of brain damage after on-pump CABG at the 1-month follow-up. The SYNTAX score may thus be an indirect indicator of involvement of other vascular zones, particularly cerebral arteries. Careful preoperative assessment, preparation, and more effective intraoperative brain protection are essential for this CAD patient category.

Demonstration of anxiety in adolescence in rate and pathology

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Objective: to study the emotional anxiety in adolescence in normal and pathological conditions.

Methods: comparative, organizational, standardized.

Results: it is expected that anxiety in adolescents in rate and pathology is a qualitative and quantitative originality.

Conclusion: anxiety is a subjective demonstration of distress personality, its maladjustment.

Anxiety is age-appropriate. Thus, according to many authors in adolescence, which is transition, crisis, the most significant are sensitive relationships with fellows, violation of sexual development, crises of identity, authority, depersonalization syndrome, conflicts of self-esteem, narcissistic crises and suicide attempts, asociality and delinquency. They distinguished groups of teenagers whose indicators of anxiety range from maximum to minimum. Adolescents with low prevalence of anxiety should pay special attention to the motives and raise their sense of responsibility. Adolescents with high prevalence of anxiety should reduce the subjective significance of situations and tasks and shift the focus to understanding the formation and activity of a feeling of success. Uncertain and anxious teenager is always suspicious and it generates mistrust towards others. Such teenager fears others, waits for mockery and offence. This promotes the formation of psychological defense reaction in the form of aggression directed to others. Aggression mask hides anxiety not only from others but from the teenager himself. Nevertheless, at heart such teenagers have the same anxiety, perplexity and uncertainty, the lack of strong support. Negative consequence of anxiety is reflected in the fact that, without affecting the whole intellectual development, a high degree of anxiety may adversely affect the formation of divergent (creative) thinking for which the inherent personality traits such as lack of fear of the new and unknown. Thus, the persons who are classified as a high-anxiety, inclined to perceive a threat to their self-concept and vital activity in a broad range of situations and react very intense expression of a state of anxiety.

Comparative study of brain activity in regions involved in perception and processing of socially or sexually significant odor stimulus in male rats with normal or accelerated senescence using fMRI

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Aging is associated with a general decline of physiological functions, and those which depend on the central nervous system, such as sexual behavior are the most affected. The present study was aimed to reveal the alterations in brain activity related to perception and processing of sexually significant odor stimulus and their behavioral correlates in rats differing in the rate of aging.

Methods. We compared brain activity in regions involved in the perception (olfactory bulbs) and processing (thalamus, hypothalamus, frontal cortex, hippocampus) of sexually or socially significant odor stimulus using fMRI as well as odor perception using behavioral tests (odor habituation and social recognition) in 5-month old male rats with normal (Wistar rats) or accelerated senescence (D-galactose-treated Wistar rats or OXYS rats with hereditary defined accelerated aging).

Results. BOLD-signal magnitude in the hippocampus was significantly reduced in response to receptive female odor (sexual stimulus) exposure while this parameter was increased in response to male odor (social stimulus) exposure in Wistar rats chronically treated with D-galactose. Similar alterations were observed in OXYS rats. Moreover, time of odor exploration in behavioral tests was increased and neuronal activity in olfactory bulbs in response to both types of stimuli correlated in D-galactose-treated rats indicating possible disturbances in odor discrimination at the level of olfactory bulbs. However the olfactory threshold was not changed since the magnitude of BOLD-signal in the olfactory bulbs in response to the same concentration of odor did not vary significantly between rats with normal and accelerated senescence.

Conclusion. Our results evidence that accelerated senescence is associated with profound disturbances at the level of processing the olfactory information in the hippocampus. We suggest that the alterations observed are caused by aging-related oxidative stress that damages neurons and astrocytes in the hippocampus (Lei et al., 2008). Signs of altered odor discrimination in the olfactory bulbs and augmented time of odor exploration may evidence that disturbances at the level of odor perception in the olfactory bulbs are also involved in aging-related dysfunction.

Neuroprotective potential of isolated and combined exposure to hypoxia and hypercapnia during focal stroke

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Objectives: To assess neuroprotective efficiency of hypoxic, hypercapnic, and hypercapnic-hypoxic respiratory exercises on the model of focal ischemic stroke in rats.

Methods: 60 Wistar rats were divided into 4 groups: normobaric hypoxia (O_2 – 13%), permissive hypercapnia (CO_2 – 7%, O_2 – 21%), hypercapnic hypoxia (O_2 – 13%, CO_2 – 7%), reference group. Exposures lasted 15 days, 20 minutes each. Then focal ischemic injury was modeled by photoinduced thrombosis method. 72 hours after the stroke neurological deficit (ND) and motor-coordinating disturbances (MCD) were assessed on Katz and NSS scales, and by rotarod-test. Then brain sections were prepared with Nissl staining, and the volume of infarction was measured.

Results: ND in reference group was 1.91 ± 0.83 on NSS scale and 11.36 ± 5.05 – on Katz scale, whereas MCD – 19.55 ± 10.61 seconds. In normobaric hypoxia group ND on NSS scale was 1.92 ± 1.26 , on Katz scale – 10.77 ± 6.72 , and MCD – 54.15 ± 39.4 seconds. In isolated hypercapnia group deficit on NSS scale was 1.17 ± 0.71 , on Katz scale – 9.39 ± 5.39 , and MCD – 32 ± 21.39 seconds. In hypercapnic hypoxia group deficit on NSS scale was 0.72 ± 0.75 , on Katz scale – 5.44 ± 5.58 , whereas MCB – 59.39 ± 36.12 seconds. On histological level: in hypercapnic hypoxia group the volume of ischemic injury was 1.84 times smaller than in reference group, 47% smaller than in normobaric hypoxia group, and 37% smaller than in permissive hypercapnia group. Permissive hypercapnia exposure reduced the volume of the stroke by 34% as compared with the reference group. Infarction volume in normobaric hypoxia group was 25% smaller as compared to the reference group.

Conclusion: Thus, combined exposure to hypercapnia and hypoxia has a greater neuroprotective potential during focal stroke as compared with their isolated exposure. Moreover, hypercapnic exposure is predominant in positive effects potentiation when combined with hypoxia.

Structure and frequency of early postoperative cognitive dysfunction in patients undergone direct myocardial revascularization. Statins effects

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Aim: To analyze the pattern of early postoperative cognitive dysfunction (POCD) in patients, who have undergone on-pump CABG and rosuvastatin effects.

Methods: 109 male patients (the average age was $55,8 \pm 5,4$ years), who have undergone elective on-pump CABG, were included in the study. Sixty nine patients treated with rosuvastatin 20 mg per day 10-14 days before CABG and during the early postoperative period. Neuropsychological testing was performed using the automated software complex "Status PF on days 3-5 prior to surgery and 7-10 days after it. Attention function (the Burdon's test), visual short-term memory (10 words memorizing test, 10 numbers memorizing test, 10 nonsense syllable memorizing test), neurodynamic functions (complex visual-motor reaction, functional mobility of nervous processes and brain performance) were assessed. Individual analysis of changes in neuropsychological performance with the further calculation of the relative percent change was performed. POCD was confirmed on the basis of arbitrary criteria such as "20% decline on 20% of the tests".

Results: The following features of early POCD pattern have been found: 35% of patients experienced short-term memory decline, 30% - neurodynamics and 20% - attention. An increase of number of errors (30%) and the missed target signal (30%) were among the most frequent deteriorations, reporting the current decline of the neurodynamic functions. Decline of attention functions such as warming-up and exhaustion occurred equally (20%). Decline of words memorizing (26%) has been less common, whereas deterioration of numbers memorizing (35%) as well as of nonsense syllables (35%) have been observed more frequently. Combination of decline in two domains (neurodynamics and memory) have been found in 35 % of cases, in three ones (neurodynamics, memory and attention) - in 19% of patients. The incidence of early POCD was 55 % in patients with rosuvastatin, without rosuvastatin – 81% ($p=0.000001$).

Conclusions: Cognitive deficit has been more likely in cognitive domains such as memory and neurodynamics, which appear to be important to preserve the quality of life of patients. Administration of rosuvastatin (20 mg) decreases the incidence of POCD in the early postoperative period in patients, who have undergone on-pump CABG.

Analysis of diagnostics of peripheral nervous system disorders in patients suffering from carbohydrate metabolism disorder

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Purpose: Detection of early diabetic neuropathy DN markers has great diagnostic significance and depends to a large extent on sensitivity, degree of reproducibility, specificity of the methods applied.

Our research is to determine if the damage to nerve fibers of optic nerves is a marker of peripheral nervous system disorder in patients with impaired carbohydrate tolerance and those suffering from diabetes type 2.

Methods: In 2011-2014, on the basis of Neurology Clinic of SibGMU we examined 45 patients (men and women, aged 30-70) with carbohydrate metabolism disorder. 23 of them (52%) have impaired carbohydrate tolerance (ICT), 22 (49%) have new-onset diagnosed DM type 2 (DM 2). Electroneuromiography (ENMG) of lower limbs with Neuron-specter 4 VP and Optical coherence tomography (OCT) was performed to all the patients.

Results: Analysis of ENMG of lower limbs showed moderate symptoms of motor axonopathy in 12 (52%) patients, whereas 11 (48%) people had no changes in ENMG indices. Patients of the group DM type 2 displayed marked symptoms of axon and demyelination process with reduction in conduction velocity and conduction blocks in 20 (91%) patients, and 2 (9%) displayed symptoms of sensory axonopathy.

Based on the results of OCT, ICT patients group had moderate symptoms of dystrophic changes in nerve fibers with their thinning on temporal sides of both eyes in 20(87%) patients, whereas 3(13%) people had their nerve fiber structure conforming to age-specific normal indices. 18 (82%) patients with DM 2 got over 15% destruction of ganglion cells combined with marked dystrophic changes and thinning of nerve fibers on temporal sides of both eyes, 4 (18%) patients had marked dystrophic changes of nerve fibers on the temporal side without changes in the structure of ganglion cells.

Conclusion: Considering the results of the research we have found a significant change in ENMG characteristics and indices of nerve fiber structure of optic nerves by means of OCT, which confirms the viability of applying the given method at early stages of DM.

Peripheral nervous system disorders in patients suffering from carbohydrate metabolism disorder

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Purpose: The number of patients with diabetes mellitus (DM) has risen in recent years, many of them becoming permanently disabled, with their quality of life decreasing dramatically. The majority of these patients develop peripheral nervous system disorders; the frequency of development of various forms of neuropathy with DM makes up 65-80%. Our work is detection of peculiarities of development and clinical implications of polyneuropathy (PN) for early diagnostics in patients with carbohydrate metabolism disorder.

Methods: In 2011-2014, on the basis of Neurology Clinic of SibGMU we examined 45 patients (men and women, aged 30-70) with carbohydrate metabolism disorder. 23 of them (52%) have impaired carbohydrate tolerance (ICT), 22 (49%) have new-onset diagnosed DM type 2 (DM 2). Electroneuromiography (ENMG) with Neuron-specter 4 VP was performed to all the patients' lower limbs.

Results: Neurological manifestation of PN was detected in 16 (66%) patients with ICT: complaints about distal paresthesia and focal neurological symptoms such as stocking type hypesthesia; 7 (34%) people of this group did not point out any complaints. Achilles reflex decrease was recorded in 13 (57%) patients, increase in pallesthesia in 1 (5%) patient, thermoesthesia in 4 (18%) patients, pselaphesia in 5 (22%) patients. Patients with DM type 2 pointed out foot numbness – 10 (46%) patients, pain in the legs, mostly at night time – 7 (32%) patients, occasional cramps in limbs – 5 (22%) patients. Decrease in patellar reflexes was recorded in 9 (41%), in Achilles reflex in 13 (59%) cases. Almost all patients of the group with DM type 2 mentioned sensory disorder, most often of polyneurotic type, with legs – 18 (82.5%) and arms – 4 (17.5%) people. Analyzing ENMG of lower limbs among the patients with ICT we detected signs of motor axonopathy in 19 (83%) patients and sensory and motor axonopathy in 4 (17%) patients. Patients of the group DM type 2 displayed symptoms of axon and demyelination process with reduction in conduction velocity and conduction blocks in 13 (59%) patients, and 9 (41%) displayed symptoms of sensory axonopathy.

Conclusion: Clinical peculiarities of PN in patients with ICT as well as with DM type 2 are predominant sensory disorders. We have found a significant change in ENMG characteristics, which confirms the viability of applying the given method at early stages of DM.

RNA-probe using for the investigation of the neuroprotective action mechanisms of brain-derived neurotrophic factor (BDNF) in the modeling of normobaric hypoxia *in vitro*

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Objective. Nowadays hypoxia is considered as the main factor of cell death during ischemic brain injury. BDNF as a neurotrophic factor is not only participate in neuronal differentiation and formation of synaptic contacts during neurogenesis, but can also be an active corrector of functioning of mature neurons. We have previously shown preventive application of BDNF to promote a preservation of functional activity of neural networks and to prevent cell death in primary dissociated hippocampal cultures. According to several authors one of the main ways to protect brain neurons from hypoxic damage is TrkB-dependent activation of NF- κ B (Sakharnova et al., 2012). In this regard, the aim of investigation was to study the influence of BDNF on the activation of NF- κ B1 during normobaric hypoxia *in vitro*.

Methods. Studies were conducted on dissociated hippocampal cells received from the brain of CBA mice embryos (E18). Modeling of hypoxia was performed after 14th DIV by replacing the normoxic culture medium by a medium with low oxygen for 10 minutes. To evaluate the activation of NF- κ B1 RNA-probes (SmartFlare, Merck Millipore) were used. The RNA-probes allow to investigate the gene activation and the appearance of cytoplasmic mRNA during the life of cells. Each RNA-probe consists of gold nanoparticles conjugated with multiple copies of double-stranded oligonucleotide. One of the strand ("reporter thread") include a fluorophore which blocked by a gold nanoparticle. When an RNA-probe contacts with its target RNA, one of the strands of the oligonucleotide binds to its complementary "exciting" strand and replaces the reporter thread. The disconnecting of the reporter thread leads to the release of the fluorophore from the nanoparticle's block and fluorescence can be detected.

Results. It was shown hypoxia to cause an increase the number of NF- κ B1 activated dead cells. Preventive application of BDNF (1 ng/ml) significantly ($p < 0.05$) reduced the amount of dead cells. Moreover there was no difference between the number of cells with mRNA NF- κ B1 and the parameters of the sham cultures.

Conclusion. Thus, the antihypoxic effect of BDNF realized by TrkB-dependent intracellular reactions which did not associated with the activation of NF- κ B1 synthesis, and implemented in earlier links of antiapoptotic reactions.

Physiology and Pathophysiology of Neuroglia

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The neuronal doctrine, which shaped the development of neuroscience was born from a long-lasting struggle between reticularists (led by Camillo Golgi), who assumed internal continuity of neural networks and neuronists (championed by Santiago Ramon y Cajal), who defined the brain as a network of physically separated cellular entities, defined as neurones. Today, however, we know that integration and information processing in the brain occurs through close interactions of two cellular circuits represented by neuronal networks embedded into internally connected astroglial syncytium. Our understanding of glial function changed dramatically over last two decades. This change concerns the whole concept of how the brain is organized, and how the development, life and death of neural circuits are controlled. There is compelling evidence demonstrating that these are the astrocytes that are creating the compartmentalisation in the CNS, and these are the astrocytes that are able to integrate neurones, synapses, and brain capillaries into individual and relatively independent units. Astroglial syncytium allows intercellular communication route, which permits translocation of ions, metabolic factors and second messengers. The resulting potential for parallel processing and integration is significant and might easily be larger, but also fuzzier, than the binary coded electrical communication within the neuronal networks. The neuronal-glial circuitry endowed with distinct signalling cascades, form a «diffuse nervous net» suggested by Golgi, where millions of synapses belonging to very different neurones are integrated first into neuronal-glial-vascular units and then into more complex structures connected through glial syncytium. These many levels of integration, both morphological and functional, presented by neuronal-glial circuitry ensure the spatial and temporal multiplication of brain cognitive power.

Neuroglial cells are intimately involved in all forms of neurological diseases and this are neuroglia, which, to a very large extent, determine the progression and outcome of neuropathological process. Astrocytes are specifically involved in various neurodegenerative diseases including Alzheimer's disease, Amyotrophic lateral sclerosis, Parkinson's disease and various forms of dementia. Recent evidence suggest that early stages of neurodegenerative processes are associated with atrophy of astroglia, which causes disruptions in synaptic connectivity, disbalance in neurotransmitter homeostasis and neuronal death through increased excitotoxicity. At the later stages astrocytes became activated and contribute to neuro-inflammatory component of neurodegeneration.



Learnt helplessness: basic compounds and core mechanisms of formation among the children having weak somatic

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Introduction. The research concerns the detailed theoretically-methodological analysis of the modern psychological researches devoted to studying of a "helplessness" phenomenon. The question of studying the relevance of "learned helplessness" phenomenon interrelation with somatic health of the person in the course of his human development is raised. The special role in this article is given to the specific features of each period of development since the pre-school age (5-7 years) till the teenage stage (15-17 years). The presented integrative approach includes both inter and intra personal factors determining children's development in particular specific features of the age, somatic health, specific child's health and disease perception, special type of parental attitude to the child's state of health, special type of parental attitude to the child determining the learned helplessness formation. Expediency of mechanisms specifics of formation the «learned helplessness» from the position of psychosomatic approaches, also taking into account basic provisions of the modern cultural and historical concept is proved.

Aim of the research. To study the basic compounds of learned helplessness phenomena and to reveal the connection between the phenomena of "learned helplessness" and the somatic health in the process of ontogenetic development; to study the connection between learned helplessness, somatic status and specific social aspects of family relations in the situation if child's weak health.

The tasks of the research. Among the tasks of research are to analyze the state of learned helplessness problem in modern psychology, to learn the connection between specific features of the age, somatic health, specific child's health and disease perception, special type of parental attitude to the child's state of health, special type of parental attitude to the child determining the learned helplessness formation.

Methods of the research. The theoretical and methodological basis of the research is presented with culturally historical approach in Psychology, principle of system and psychosomatic approach, ideas of L.S. Vygotsky about the social situation of development and the zone of nearest development as the most important circumstances of child's personality formation, conceptual theory of "learned helplessness" phenomena systemized by M. Seligman, conceptual theory of "personal helplessness" phenomena systemized by D.A. Ciring, basically theoretical points concerning regulatory functions of psycho, laws and mechanisms of all types activity regulations, theoretical issues concerning the fixed forms of family behavior and their connection with development of children having weakened health, the latest data about the interpersonal perception of phenomenon "health" and "disease".

Results of the research. As a result of research the author presents the conclusion that the specific perception of "health" and "disease" phenomena closely connected with inefficient parental attitude to the children state of health develops the phenomena of learnt helplessness in the process of ontogenetic development of a child with weak health. Conclusions. So it can be concluded that building a special developing program, aimed to optimize the perception of own somatic status by children and their parents, will-power development will lead to prevention of learned helplessness formation.

Haemodynamic abnormalities at men having hereditary tainted paranoid schizophrenia

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The aim of the study is research of the blood flow velocity in the cerebral arteries of the brain using the method of color duplex scanning at men with paranoid schizophrenia with hallucinatory and delusional variants, the comparative analysis of change of blood flow velocity at men.

Methods. Clinical and psychopathological, statistical, transcranial dopplerography of encephalic haemodynamics using the method of color duplex scanning. Peak systolic and end-diastolic linear velocity of blood flow and the peripheral vascular resistance index in the anterior, middle and posterior cerebral arteries were fixed.

Results and discussion. In the analysis of blood flow velocity parameters have been identified, that the peripheral vascular resistance index of the anterior cerebral artery met standard but the peripheral vascular resistance index of the middle cerebral artery is raised, though these data are statistically doubtful ($p > 0,001$). In turn the indicator of vascular resistance in the posterior cerebral artery appeared ($p < 0,001$) to be raised authentically. In other parameters in patients with paranoid schizophrenia with hallucinatory and delusional variants the decrease of peak systolic and end-diastolic velocity of blood flow was found significantly ($p < 0,001$). The decrease was bilateral and symmetrical.

Conclusion. Thus, according to the results of transcranial duplex scanning of major cerebral arteries, the patients with hallucinatory variant of paranoid schizophrenia are characterized by the disorders of cerebral hemodynamic indicators, in fact, slowing the rate of blood flow in the anterior, posterior and middle cerebral arteries, and increased peripheral vascular resistance index in the posterior cerebral arteries. The study results correspond to data in the literature about the slowing of blood flow velocity in intracranial arteries.

In complex treatment the usage of methods aimed at normalizing the velocity of blood flow in the vascular bed of the brain, may be appropriate in the development of treatment and rehabilitation of patients with paranoid schizophrenia.

From Genes to Environment: Studying Autism Spectrum Disorders (ASD) with Computational Systems Biology

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Autism is a neurodevelopmental disorder characterized by specific activity patterns and aberrant social interaction and communication. Even though its etiology is not well understood, a number of neuropathological events during central nervous system development, in childhood and adolescence, have already been described. A complex interface between genetic and environmental factors is also suggested to account for the disorder. Evidence shows a deregulation of the homeostatic control of neuronal networks by astroglia, microglial activation, and neuroinflammation; changes that persist even until adulthood and may represent a common cellular disturbance in autism spectrum disorders (ASD). The great variability of symptoms found in the patients makes a difficult challenge the identification of disrupted signaling pathways associated to ASD, which is critical to identify potentially novel biomarkers for diagnoses as well as novel therapeutic targets. In the present study, (i) we characterized the multifactorial nature of autism, molecular functions, cellular components, and biological processes associated to the disorder, (ii) we showed *RAC1*, in particular, and the RHO family of GTPases, in general, could play a critical role in the neuropathological events associated with autism, with calcium (Ca^{2+}) as the most central component in interface between genetic and environmental factors, and (iii) we proposed a model of glutamate receptors (NMDARs)-mediated Erk activation of α -secretase activity and mitochondrial adaptation to apoptosis that may explain the early brain overgrowth and disruption of synaptic plasticity and connectome in autistic children, which could potentially be targeted by magnesium-based drugs and rapamycin.

Super Resolution Optical Systems: imaging beyond the diffraction limit.

Zykov P., head of microscopy department, BioVitrum Ltd., Russia

Super-resolution microscopy is one of the most significant developments in biological imaging since the invention of the microscope. Super-high Resolution Microscopes, with capabilities that seemed impossible just a decade ago, have arrived, greatly extending the boundaries of cellular imaging. Nikon has recently introduced two new systems, based on two highly effective technologies developed by researchers at Harvard and UCSF, respectively.

N-STORM super-resolution microscope provides dramatically enhanced resolution that is 10 times or better than that of conventional optical microscopes and will be capable of multi-spectral two-dimensional and three-dimensional nanoscopy, with lateral resolution to approximately 20nm and axial resolution to approximately 50nm.

Nikon's new N-SIM microscopy system can produce nearly two times the resolution of conventional optical microscopes by using Structured Illumination Microscopy technology.



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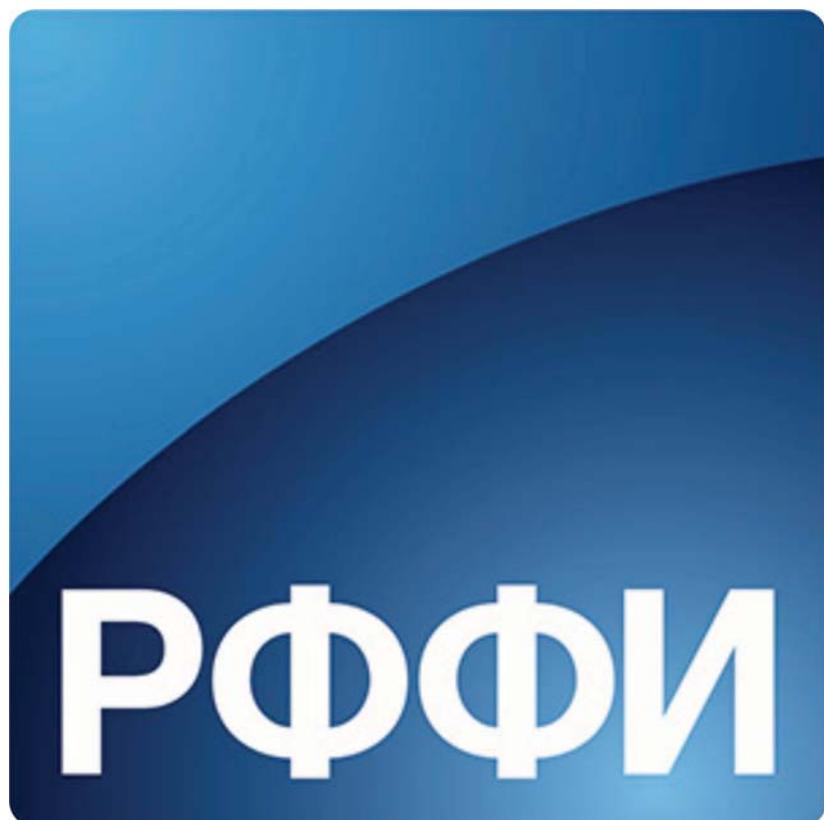
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