



ЭРҮҮЛ
МЭНДИЙН ЯАМ



АШУҮИС
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The 4th Annual Meeting of The
Mongolian Neuroscience Society

MULTIDISCIPLINARY BRAIN SCIENCE 2017

Date:
September 15–16, 2017

Conference Secretariat:
Conference Center, The Ministry of Health, Mongolia

Co-organizers and Sponsors:



ICHMON
APARTMENT HOTEL



НАМБРИДЖ

MULTIDISCIPLINARY BRAIN SCIENCE 2017

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Battuvshin L.	MD, PhD, Executive director of the MNS
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Mongolian National University of Medical Science

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Mongolian Society of Neurosurgery

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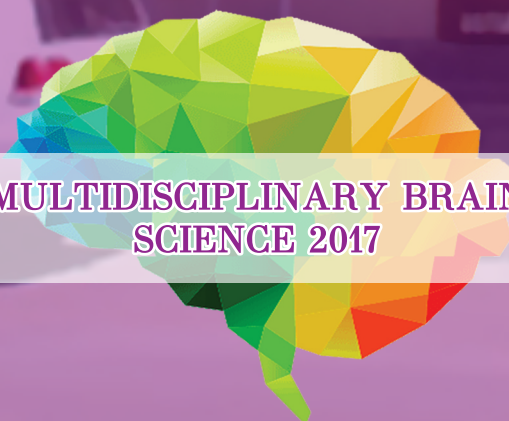
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THE 4th ANNUAL MEETING OF THE MONGOLIAN NEUROSCIENCE SOCIETY

ABSTRACT

Sep 15-16, 2017
Ulaanbaatar
Mongolia

MULTIDISCIPLINARY BRAIN
SCIENCE 2017



The 4th Annual Meeting of The Mongolian Neuroscience Society

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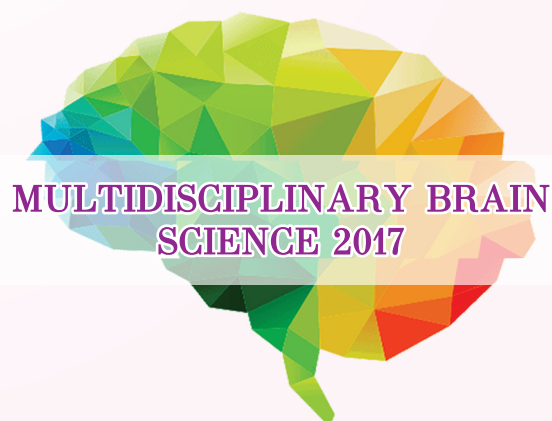
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PRESIDENT MESSAGE

Ladies and Gentlemen...

On behalf of all the members of Mongolian Neuroscience Society (MNS) I would like to give great thanks to all the participants in the 4th annual meeting of MNS. I am sure that this meeting will provide an exciting opportunity for exchange and present their new scientific findings, and establishing very close friendship with all the participants joined in this meeting.

As we know, we are faced in the stages of brain science. Particularly, the neuroscience is rapidly advancing to be a core of the life sciences in the world. Neuroscience has made extremely progressed and integrated research activities with multidisciplines, including neurophysiology, neuroimmunology, biochemistry, molecular cell biology, computational science, nanotechnology and social psychology, as well as clinical brain sciences including neurology, psychiatry and neurosurgery.

We really hope that this initiative would set the stage for the conferences that will result in long-lasting cooperative relationship and more fruitful collaboration

Finally, I sincerely hope our annual meeting that will provide participants eventually contribute to "Multidisciplinary Brain Science 2017". Based on this meeting, I believe that we have plenty of new ideas for our scientists and build our gorgeous human relationships.

I truly look forward to the success of the 4th annual meeting of MNS.

Thank you very much.

Boldbaatar Damdindorj MD, PhD.

President of the Mongolian Neuroscience Society



CONGRATULATORY MESSAGE

Dear distinguished scientists, professors, students, and invited guests,

It is my great pleasure to welcome you to The 4th Annual Meeting of Mongolian Neuroscience Society, Multidisciplinary Brain Science, which is supported by the Ministry of Health.

Brain science plays an important role in the development of new therapeutic modalities, social policy, economic growth, and modern technology for the humankind. Brain science stands on the shoulders of biology, chemistry, physics, and mathematics, thus forms a multidisciplinary platform for medicine, genetic engineering, computational science, social science, and psychology.

Mongolia is one of the ancient countries that established a series of famous empires by the intelligence, teamwork, and integration of Mongolian people. Indeed, this is the right time to aspire, integrate and collaborate for the development of the health, education, science, and technology of our country, as direct descendants of the legendary people. Therefore, I am very delighted to see all of you here and proud of you because despite of your different backgrounds, you are gathering at this place under the umbrella of Multidisciplinary Brain Science with enthusiasm and warm environment to discuss your research, to plan future collaborations, to see current advances in brain science by colleagues from abroad.

Dear members of Mongolian Neuroscience Society, as the Minister of Health, I would like to encourage you that we will intensely collaborate with you and fully support your endeavor to develop brain science in Mongolia.

Finally, I am confident that this meeting will be fruitful, inspirational, and motivational to every participant and look forward to the success of the event.

Tsogtsetseg Ayush MD, PhD
Minister, Ministry of Health, Mongolia

CONGRATULATORY MESSAGE

Dear doctors, researchers and invited speakers,

I would like to deliver my warmest greetings of the fortunate day that all we gathered here for this special occasion together. Allow me to express my profound gratitude and appreciation to the distinguished guests for making effort to attend today's annual meeting. Scientists have worked many years to unravel the complex working of the brain. Multidisciplinary brain science helps us to understand mechanisms and treatments of brain and mental disorders.



Even though Mongolian Neuroscience Society has been founded four years ago, this society has been significantly successful in pioneering the development of neuroscience, brain research, in Mongolia. I am proud to tell that today we are welcoming honorable invited speakers, professors and distinguished guests, delegates.

From now on, Mongolian Neuroscience Society makes difference, brings the new wave in the neuroscience, research and health field in Mongolia. I would say it is really big impact itself. They are going to start organizing the IBRO summer exchange program for Mongolian students as well as Central Asian students which is a very important effort to Mongolia.

I would like to ask the representatives from Government and other Ministries, and other governmental and nongovernmental organizations, and every person in this room to highly encourage this young powerful society in every task. It is our great pleasure to support this activity to promote policy changes and academic research programs. We realize big responsibility and opportunity that we have to continue this work successfully for the future of science, health, and education of Mongolian people.

Academician Batbaatar Gunchin MD, PhD

President, Mongolian National University of Medical Sciences



INVITED SPEAKERS

BIOGRAPHICAL SKETCH

Name: MUZAIMI MUSTAPHA, PhD
Associate professor
E-mail: mmuzaimi@usm.my

AREA OF EXPERTISE

- Fundamental Neuroscience
- Experimental Neurology
- Cognitive Neuroscience
- Addiction Neurobiology
- Cerebrovascular Diseases
- Neurogenetics

PROFILE

MBBCh (Wales)
Dip.BioMedicine (Cardiff)
PhD (Cardiff)
Coordinator Integrated Neuroscience Programme (INP)

CURRENT RESEARCHS AND PAST RELATED RESEARCHS:

- Addiction neurobiology
- Cognitive neuroscience
- Cerebrovascular diseases
- Neurogenetics

CURRENT RESEARCHS AND PAST RELATED RESEARCHS:

- Name: Mas Syazwanee Shab (Feb 2016)
Title: Implicating theta brainwaves as neural correlate of melodic, rhythmic verse of ayatul kursi from Holy Quran
Role: Main Supervisor (Master of Neuroscience)
- Name: Amanina Ahmad Safri (Feb 2016)
Title: Comparative study of pipeline processing using two different dti softwares in assessing white matter integrity in cerebral small vessel disease (CSVD) among asymptomatic individuals
Role: Main Supervisor (Master of Neuroscience)
- Name: Ummi Nasrah (Feb 2016)
Title: Determining endocannabinoid cb1 receptor involvement in rewarding properties of low dose mitragyna speciosa korth (ketum) alkaloid mitragynine abuse liability using conditioned place preference (CPP)
Role: Main Supervisor (Master of Neuroscience)
- Name: Waqiyuddin Abdullah (Feb 2016)
Title: Implicating gamma brainwaves as neural correlate of melodic, rhythmic verse of ayatul kursi from Holy Quran
Role: Main Supervisor (Master of Neuroscience)
- Name: Nadia Izzati Nordin (Feb 2016)
Title: Establishing TheNeuropotective Effect of Tualang Honey on Kainic Acid–(KA) Mediated Excitotoxicity in Rat Hippocampus
Role: Co–Supervisor (Master of Neuroscience)

PUBLICATIONS

- Iza Sazanita Isa, Siti Noraini Sulaiman, M Muzaimi. New Features Extraction based on MRI Brain White Matter and Small Vessel Stroke Prediction for Neural Network Input Classification. IEEE Computer Society, 2015
- M Muzaimi. Book Chapter. 'Neurotechnological Advances in Exploring Melodic Recitation of the Noble Qur'an: Uncovering the Neural Circuitry in the Human Brain' in M.H. Kamali et al. (eds.), Islamic Perspectives on Science and Technology, 2016 (Springer)
- Zuraidda Z, Muhammad Nur Hilmi CH, Mohd Normani Z, Nik Adilah NO, M Muzaimi, Zefarina Z. Determination of the Neurocognitive Status Using Objective Measurement: p300 among Tinnitus Patients. International Medical Journal, 2016 (in press)
- Nurul Iman W Ismail, Nanthini Jayabalan, , Sharif M Mansur, Christian P Muller, M Muzaimi. Chronic mitragynine (kratom) enhances punishment resistance in natural reward seeking and impairs place learning in mice. Addiction Biology, 2016 (in press)

INVITED SPEAKERS

BIOGRAPHICAL SKETCH

Name: HYUNGJU PARK, PhD

Senior Researcher

Head of Molecular Neurobiology Lab Department of Structure & Function of Neural Networks Korea Brain Research Institute (KBRI)

Daegu, South Korea

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RESEARCH SUMMARY

- Synaptic plasticity studies to understand the mechanisms of cognitive functions. Research interests include (1) dissecting how neurotrophin secretion is regulated by neuronal activity and controls synaptic plasticity, and (2) investigating physiological roles of neuron-glia interaction in normal or diseased brain circuits.
- Skills include (1) electrophysiology & fluorescence imaging tools using acute brain slices and cultured cells, and (2) molecular biology tools for cloning/manipulating/delivering targeted genes.

WORKING EXPERIENCE

Senior Researcher / Lab Head

2015 ~ present Molecular Neurobiology Lab

Department of Structure & Function of Neural Networks

Korea Brain Research Institute (KBRI), Daegu, South Korea

Adjunct Professor

2015 ~ present Department of Brain & Cognitive Sciences

Daegu Gyeongbuk Institute of Science & Technology (DGIST), Daegu, South Korea

Associate Specialist (advisor: Dr.Mu-ming Poo)

2012 ~ 2015 Department of Molecular & Cell Biology

UC Berkeley, Berkeley, CA, USA.

Postdoctoral fellow (advisor: Dr.Mu-ming Poo)

2009 ~ 2012 Department of Molecular & Cell Biology

UC Berkeley, Berkeley, CA, USA.

Postdoctoral fellow (advisor: Dr.C Justin Lee)

2007 ~ 2009 Center for Neural science

Korea Institute of Science & Technology (KIST), Seoul, South Korea

EDUCATION:

Ph.D. (Biological Science /Neurobiology)

2000~2007 Seoul National University, Seoul, Korea

(advisor: Dr. Bong-Kiun Kaang)

B.S. (Biological Science)

1996~2000 Seoul National University, Seoul, Korea

PUBLICATIONS

- Lee SH, Lim CS, Park H, Lee JA, Han JH, Kim H, Cheang YH, Lee SH, Lee YS, Ko HG, Jang DH, Kim HK, Miniaci MC, Bartsch D, Kim E, Bailey CH, Kandel ER, Kaang BK. Nuclear Translocation of apCAM- Associated Protein Activates Transcription for Long-Term Facilitation in Aplysia. *Cell*. 2007 May 18; 129(4): 801-12. (co-first author)
- Yim SJ, Lee YS, Lee JA, Chang DJ, Han JH, Kim H, Park H, Jun H, Kim VN, Kaang BK. Regulation of ApC/EBP mRNA by the Aplysia AU-rich element-binding protein, ApELAV, and its effects on 5-hydroxytryptamine-induced long-term facilitation. *Journal of Neurochemistry* 2006 Jul;98 (2): 420-9.
- Park H, Lee JA, Lee C, Kim MJ, Chang DJ, Kim H, Lee SH, Lee YS, Kaang BK. An Aplysia type 4 phosphodiesterase homolog localizes at the presynaptic terminals of Aplysia neuron and regulates synaptic facilitation. *Journal of Neuroscience*. 2005 Sep 28; 25(39): 9037-45.
- Jang DH, Han JH, Lee SH, Lee YS, Park H, Lee SH, Kim H, Kaang BK. Cofilin expression induces cofilinactin rod formation and disrupts synaptic structure and function in Aplysia synapses. *Proc. Natl. Acad. Sci. USA*. 2005 Nov 1; 102(44): 16072-7.



INVITED SPEAKERS

BIOGRAPHICAL SKETCH

Name: SUKHBAT GALSAN–YONDON MD, PhD
Professor and Academic of International Academy of Sciences

CURRENT POSITION:

Executive Director “Avarga” Physical Education Institute, Mongolia
Professor of National University of Medical sciences, Mongolia
Executive Director NADO , Mongolia

WORKING EXPERIENCE

- Lecturer, Department of Physiology, State Medical Institute, Mongolia (1977–1983,)
- Aspirant (doctoral), P.K. Anokhin's Institute of Normal Physiology. Moscow. Russia (1983–1986)
- Head of Department Physiology, National Medial University of Mongolia– (1986–2003)
- Vice Director, National Center of Anthropology, Mongolia (1996–1997)
- Secretary of Scientific Council National Medial University of Mongolia. (1987–1992),
- Secretary of Scientific Council of Health Sciences University, Mongolia (2008–2013)
- Professor, Department Physiology, Health Sciences University of Mongolia (2003–present) and Professor, Department Physiology, National University of Medical sciences , Mongolia (since 2014)
- Executive Director of “Avarga “ Physical Education Institute (since 2003)
- Executive Director NADO , Mongolia (since 2014)

EDUCATION BACKGROUND

- Graduate course the Medical Institute, Mongolia (1971 –1977).
- Post graduate course, defense of doctoral thesis was at P.K. Anokhin Institute of Normal Physiology, Russian Academy of Medical Sciences under the guidance of famous scientist–Professor Sudakov Konstantin V., (1983 –1986).
- Education course at Mongolian National University (1980 –1981).
- English language course at “Onon” International Language Center (1999–2000).
- Over 120 courses, workshops and conferences.(national and international)

MEMBERSHIPS:

- Vice chairman, Scientific Board of Biomedicine and Public Health, HSMU of Mongolia.(2001–2004)
- Member of professional council by Biomedicine in Ministry of Health, Mongolia .(since 2012)
- Chairman Scientific Council 'Avarga” Institute of Physical Education Mongolia. (2004 –present)
- Vice president of Mongolian Association for Sports Management (since 2004)
- Vice president (2004–2009) and senior member AASM (Since 2010)
- Member Scientific Council, “Orkhon” University, Mongolia. (2005 –2015)
- Board member Scientific Council, Health Sciences University, Mongolia (2008 –2013)
- Member Scientific Council, Biomedical school of Health Sciences University, Mongolia. (2010 –2016)
- Editor – member of several national and international journals(5 journals)

RESEARCH INTERESTS:

- Human Physiology, Emotional stress, Health education and Sports physiology and management.
- He is the author of over than 650 publications in particular over 20 textbooks and monographs,
- He is scientific supervisor and consultant of 55 dissertation's works for PhD and masters of Science, supervisor for 5 research projects and grant

INVITED SPEAKERS

BIOGRAPHICAL SKETCH

Name: YU-MIN KUO, PhD
 Business Address: Department of Cell Biology and Anatomy, College of
 Medicine, National Cheng Kung University
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 E-mail: kuoym@mail.ncku.edu.tw



EDUCATION/TRAINING

1985-1989	National Chung-Hsing University, Taiwan	Animal Husbandry	B.A.
1990-1993	Michigan State University, USA	Animal Science	M.S.
2003-2008	Arizona State University, USA	Molecular and Cellular Biology	Ph.D.

ACADEMIC POSITION:

2009 – Present	Professor, Department of Cell Biology and Anatomy, College of Medicine, National Cheng Kung University
2011 – 2012	Visiting Professor, University of Arizona, Tucson, Arizona, USA; Banner Sun Health Research Institute, Sun City, Arizona, USA
2004 – 2009	Associate Professor, Department of Cell Biology and Anatomy, College of Medicine, National Cheng Kung University
2000 – 2004	Assistant Professor, Department of Cell Biology and Anatomy, College of Medicine, National Cheng Kung University
1998 – 2000	Postdoctoral Fellow, Sun Health Research Institute, Sun City, Arizona, USA.

PUBLIC AND ACADEMIC SERVICES:

2017 – Present	Vice Dean, College of Medicine, National Cheng Kung University, Taiwan
2016 – Present	Editorial Board of Frontiers in Cell and Developmental Biology
2015 – Present	Editorial Board of Frontiers in Aging Neuroscience
2015 – Present	Editorial Board of Journal of Alzheimer's Disease
2015 – Present	Associate Editor of BMC Neuroscience
2015 – Present	Council Member, Association of Anatomists of the Republic of China
2012 – 2015	Chairman, Department of Cell Biology and Anatomy, College of Medicine, National Cheng Kung University
2005 – 2008	Director, Audio-Visual Center, College of Medicine, National Cheng Kung University

PUBLICATIONS

- Lin TW, Shih YH, Chen SJ, Lien CH, Chang CY, Huang TY, Chen SH, Jen CJ, Kuo YM. (2015) Running exercise delays neurodegeneration in amygdala and hippocampus of Alzheimer's disease (APP/PS1) transgenic mice. *Neurobiology of Learning and Memory* 118:189-197.
- Yang TT, Lo CP, Tsai PS, Wu SY, Wang TF, Chen YW, Jiang-Shieh YF, Kuo YM. (2015) Aging and exercise affect hippocampal neurogenesis via different mechanisms. *PLoS ONE* 10(7): e0132152.
- Lin TW, Liu YF, Shih YH, Chen SJ, Huang TY, Chang CY, Lien CH, Yu L, Chen SH, Kuo YM. (2015) Neurodegeneration in amygdala precedes hippocampus in the APPswe/PS1dE9 mouse model of Alzheimer's disease. *Current Alzheimer Research* 12:951-963.
- Hsu YC, Tsai SF, Yu L, Chuang JI, Wu FS, Jen CJ, Kuo YM. (2016) Long-term moderate exercise accelerates the recovery of stress-evoked cardiovascular responses. *Stress* 19:125-132.
- Shih YH, Tsai SF, Huang SH, Chiang YT, Hughes MW, Wu SY, Lee CW, Yang TT, Kuo YM. (2016) Hypertension impairs hippocampus-related adult neurogenesis, CA1 neuron dendritic arborization and long-term memory. *Neuroscience*. 322:346-357.
- Wu SY, Chen YW, Tsai SF, Wu SN, Shih YH, Jiang-Shieh YF, Yang TT, Kuo YM. (2016) Estrogen ameliorates microglial activation by inhibiting the Kir2.1 inward-rectifier K⁺ channel. *Scientific Reports* 6, 22864
- Tsai SF, Chen PC, Calkins MJ, Wu SY, Kuo YM. (2016) Exercise counteracts aging-related memory impairment: a potential role for the astrocytic metabolic shuttle. *Frontiers in Aging Neuroscience* 8,57.



INVITED SPEAKERS

BIOGRAPHICAL SKETCH

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 Address: Department of Life Sciences, National Cheng Kung University #1 Ta-Hsueh Road, Tainan City, Taiwan ROC.
 Phone : +886-6-275-7575 ext 65537
 E-mail: stzeng@mail.ncku.edu.tw

EDUCATION

Ph.D., Department of Biochemistry, Medical College of Virginia, Richmond, Virginia.
 M.S., Institute of Biochemistry, School of Medicine, National Taiwan University, Taipei, Taiwan.
 Bachelor, Department of Chemistry, National Cheng Kung University, Tainan, Taiwan

ACADEMIC APPOINTMENTS

2008–present	Distinguished Professor, Department of Life Sciences, College of Bioscience and Biotechnology, National Cheng Kung University, Tainan, Taiwan
2008–present	Adjunct Professor, Institute of Basic Medical Sciences, College of Medicine, National Cheng Kung University, Tainan, Taiwan
2005–2008	Professor, Department of Life Sciences, College of Bioscience and Biotechnology, National Cheng Kung University, Tainan, Taiwan
2002–2005	Associate Professor, Department of Life Sciences, College of Bioscience and Biotechnology, National Cheng Kung University, Tainan, Taiwan
2001–2002	Assistant Professor, Department of Biology, College of Science, National Cheng Kung University, Tainan, Taiwan

PROFESSIONAL EXPERIENCES

2004	Visiting scholar, Institute of Neuroscience, UC Berkeley.
1988–1990	Teaching assistant, Institute of Biochemistry, School of Medicine, National Taiwan University
1994–1997	Post-doctoral Fellow, Neurochemistry Group, UCLA School of Medicine
1997–2001	Associate research fellow, Taichung Veterans General Hospital

ADMINISTRATIVE EXPERIENCES

2015–present	Chairperson, Department of Life Sciences, National Cheng Kung University
2013–2016	Vice Dean, College of Bioscience and Biotechnology
2012–2014	Director, Center for Teaching and Learning Development, Office of Academic Affairs
2012–2014	Director, Division of Academic Services, Offices of Academic Affairs
2013–2015	Director, Yunlin Chiayi and Tainan Regional Teaching Resource Center

PUBLICATIONS

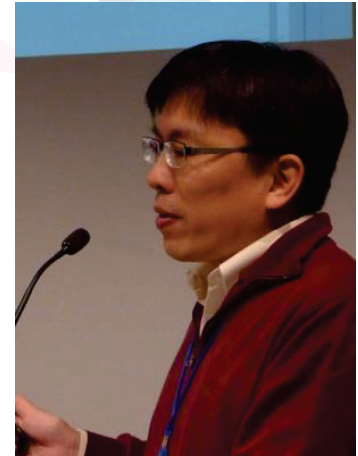
- Chih-Yen Wang, Chien-Wen Cheng, Wei-Hua Wang, Po-See Chen, Shun-Fen Tzeng* (2016, Dec). Postnatal Stress Induced by Injection with Valproate Leads to Developing Emotional Disorders Along with Molecular and Cellular Changes in the Hippocampus and Amygdala.. *Molecular Neurobiology*, 53(10):6774–6785. (SCI)
- Chih-Yen Wang, Yun-Ti Hsieh, Kuan-Min Fang, Chung-Shi Yang and Shun-Fen Tzeng* (2016, Dec). Reduction of CD200 expression in glioma cells enhances microglia activation and tumor growth. *Journal of Neuroscience Research*, 94(12):1460–1471. (SCI).
- Yuan-Ting Sun, Shun-Fen Tzeng, Thy-Sheng Lin, Kuei-Sen Hsu, Eric Delpire, Meng-Ru Shen (2016, Oct). KCC3 deficiency-induced disruption of paranodal loops and impairment of axonal excitability in the peripheral nervous system. *Neuroscience*, 335: 91–102. (SCI)
- Chih-Kai Liao#, Kuan-Ming Fang#, Kitman Chai, Chin-Hsien Wu, Chia-Hsin Ho, Chung-Shi Yang, Shun-Fen Tzeng* (2016, Aug). Depletion of B-cell CLL/lymphoma 11B gene expression represses glioma cell growth. *Molecular Neurobiology*, 53(6):3528–39. (SCI)

INVITED SPEAKERS

BIOGRAPHICAL SKETCH

Name: PO-SEE CHEN MD, PhD

Business Address: Professor, National Cheng Kung University, Taiwan



EDUCATION:

1987–1991	National Taiwan University	Biotechnology	B.A.
1993–1998	Kaohsiung Medical University	Medicine	M.D.
2003–2008	National Cheng Kung University	Pharmacology	Ph.D.

ACADEMIC POSITION:

2015 – Present	Professor, Department of Psychiatry, College of Medicine, National Cheng Kung University, Taiwan
2011 – 2015	Associate Professor, Department of Psychiatry, College of Medicine, National Cheng Kung University
2008 – 2011	Assistant Professor, Department of Psychiatry, College of Medicine, National Cheng Kung University
2006 – 2008	Lecturer, Department of Psychiatry, College of Medicine, National Cheng Kung University
2004 – 2005	Visiting Research Fellow, Neuropharmacology Laboratory (NIEHS/NIH, USA)
2003 – 2004	Research scholar, Duke University Medical Center, Department of Psychiatry and Behavioral Sciences.N.C., USA.

PUBLIC AND ACADEMIC SERVICES:

2016–Present	Editorial Board of Scientific Reports
2015–Present	Department Head, Department of Psychiatry, National Cheng Kung University Hospital, Taiwan
2014–Present	Committee, Taiwan International Graduate Program–The Interdisciplinary Neuroscience graduate program (Academia Sinica–NCKU)
2012–2015	Director, Counseling and Wellness Services Division, Office of Student Affairs, National Cheng–Kung University, Taiwan
2010–2011	Secretary in Medical Affairs, National Cheng Kung University Hospital Dou–Liou Branch, Yunlin, Taiwan
2008–2011	Department Head, Department of Psychiatry, National Cheng Kung University Hospital Dou–Liou Branch, Yunlin, Taiwan

PUBLICATIONS

- Chen PS*, Chang HH*, Huang C–C, Lee CC, Lee S–Y, Chen S–L, Huang S–Y, Yang YK, Lu R–B: A longitudinal study of the association between the GNB3 C825T polymorphism and metabolic disturbance in bipolar II patients treated with valproate. *Pharmacogenomics Journal* (Accepted) (SCI)
- Tai YC, Chi MH, Chu C–L, Chiu NT, Yao WJ, Chen PS, Yang YK*: Availability of striatal dopamine transporter in healthy individuals with and without a family history of attention deficit hyperactivity disorder. *Journal of Attention Disorders* (Accepted) (SCI&SSCI)
- Wu H–F, Chen PS, Chen Y–J, Lee C–W, Chen I–T, Lin H–C*: Alleviation of N–Methyl–d–Aspartate receptor–dependent long–term depression via regulation of the glycogen synthase kinase–3 β pathway in the amygdala of a valproic acid– induced animal model of autism. *Molecular Neurobiology* (Accepted) (SCI)
- Chang WH, Lee IH, Chen WT, Chen PS, Yang YK, Chen KC*: Coexisting geriatric anxiety and depressive disorders may increase the risk of ischemic heart disease mortality – a nationwide longitudinal cohort study. *International Journal of Geriatric Psychiatry* (in press) (SCI&SSCI)
- Chu C–L, Lee IH, Chi MH*, Chen KC, Chen PS, Yao WJ, Chiu NT, Yang YK: Availability of dopamine transporters and auditory P300 abnormalities in adults with attention deficit hyperactivity disorder: preliminary results. *CNS Spectrums* (Accepted) (SCI)
- Kuo MF, Chen PS, Nitsche MA*: The application of tDCS for the treatment of psychiatric diseases. *International Review of Psychiatry* (Accepted) (SSCI)



INVITED SPEAKERS

BIOGRAPHICAL SKETCH

Name: IKUO TOOYAMA, MD, PhD

Business Address: Professor

Neurogene Unit, Molecular Neuroscience Research
Center Shiga University of Medical Science
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+81-77-548-2328 (office)
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E-mail: kinchan@belle.shiga-med.ac.jp

EDUCATION:

1975-1981 Faculty of Medicine, Kyoto University, Japan
1981 Award of the degree of M.D. (Kyoto University)
1984-1988 Graduate School in Faculty of Medicine, Kyoto University, Japan
1985 Japan Board of Neurology
1988 Award of the degree of Ph. D. (Kyoto University)

PROFESSIONAL APPOINTMENTS:

1988-1989 Research Associate at Department of Anatomy Shiga University of Medical Science
1989-1991 Research Associate at Institute of Molecular Neurobiology, Shiga University of Medical Science
1991-1992 Visiting Scientist at Kinsmen Laboratory of Neurological Research The University of British Columbia, Canada
1992-1995 Research Associate at Institute of Molecular Neurobiology, Shiga University of Medical Science
1995-1999 Associate Professor at Institute of Molecular Neurobiology, Shiga University of Medical Science
1999-Present Professor at Molecular Neuroscience Research Center
2010-Present Director of Molecular Neuroscience Research Center

MEMBERSHIPS:

Japanese Association of Anatomists (Councilor) □
Japan Society of Histochemistry and Cytochemistry (Executive Board Member, Auditor)
Japan Society of Brain Science (Executive Board Member)
Japanese Society of Internal Medicine (Councilor)
Japanese Society of Neurology
Japan Society for Dementia Research (Executive Board Member)
Japan Neuroscience Society
Society for Neuroscience (U.S.A.)

PUBLICATIONS

- Shiino A, Chen Y-W, Tanigaki K, Yamada A, Vigers P, Watanabe T, Tooyama I, Akiguchi I: Sex-related difference in human white matter volumes studied: Inspection of the corpus callosum and other white matter by VBM. *Sci Rep.* 3;7:39818, 2017.
- Yang M, Yang H, Guan H, Kato T, Mukaisho K, Sugihara H, Ogasawara K, Terada T, Tooyama I: Characterization of a Novel Monoclonal Antibody against Human Mitochondrial Ferritin and its Immunohistochemical Application in Human and Monkey Substantia Nigra. *Acta Histochem Cytochem.* 50: 49-55, 2017.
- Higaki S, Shimada M, Kawamoto K, Todo T, Kawasaki T, Tooyama I, Fujioka Y, Sakai N, Takada T: In vitro differentiation of fertile sperm from cryopreserved spermatogonia of the endangered endemic cyprinid honmoroko (*Gnathopogon caeruleus*). *Sci Rep.* 7:42852, DOI: 10.1038/srep42852.
- Beller JP, Xie Y, Farouk SM, Sakaue Y, Tooyama I, Kimura H: Immunohistochemical and biochemical evidence for the presence of serotonin-containing neurons and nerve fibers in the octopus arm. *Brain Struct Funct.* DOI 10.1007/s00429-017-1385-3.
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INVITED SPEAKERS

BIOGRAPHICAL SKETCH

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PROFESSIONAL EXPERIENCE:

- 2015–present National center of Neurosurgery, Professor–mentor, Astana, Kazakhstan.
- 2014– present Chief neurosurgeon of Health department JSC «Russian Railways»
- 2013– present Head and Professor, Irkutsk State Medical University; Neurosurgery Department, Irkutsk, Krasnogo Vosstaniya, 1.
- 2012–present Fukui University, Neurosurgery department, inviting professor Fukui, Japan.
- 2012– present Professor, Irkutsk State Academy of Postgraduate Education; [Orthopedics](#), Traumatology and Neurosurgery Department, Irkutsk, Yubileyniy, 100.
- 2008– present Head and Professor of Neurosurgical Department at Railroad Hospital, Irkutsk, 664055, Ulitsa Botkina 10
- 2007– present Judicial–Medical Expert, Irkutsk Oblast Bureau of the Judicial– Medical expertise, Irkutsk, Bul'var Gagarina 4.
- 2007– present Researcher, Irkutsk Research Institute of Reconstructive Surgery, Irkutsk, Ulitsa Bortsov Revolyutsii.

Education, Professional Training, Grants, Scientific degrees:

- 2017, Jan. MISONIX, Training course, Dusseldorf, Germany.
- 2016, July Editor of a series of monographs on microneurosurgery of the publishing house Thieme, New York, USA.
- 2016, May Microsurgical interventions for intracerebral neoplasms and cavernomas of functionally important brain zones, Training, Irkutsk, Russia
- 2016, Apr Implantation of temporary electrodes, Training, Irkutsk, Russia
- 2016, Feb Order №58/nk by the Ministry of Education and Science of the Russian Federation from 2nd of February, 2016 on awarding the title of professor in the "neurosurgery" specialty (N2 1311–3097 10.11.2015).

EDITORIAL BOARDS MEMBERSHIP:

- Since 2016 Russian Editor at the Journal of Neurosurgery and Neurology of Kazakhstan
- Since 2009 Higher Attestation Commission Clinical neurology refereed journal. Member of the Editorial Board
- 2013 RUSSIAN EDITOR at the Neurosurgical Science, AMERICAN SCIENTIFIC PUBLISHERS,
- 2013 Russian Editor at the Surgical Neurology International, Russian Supplement.

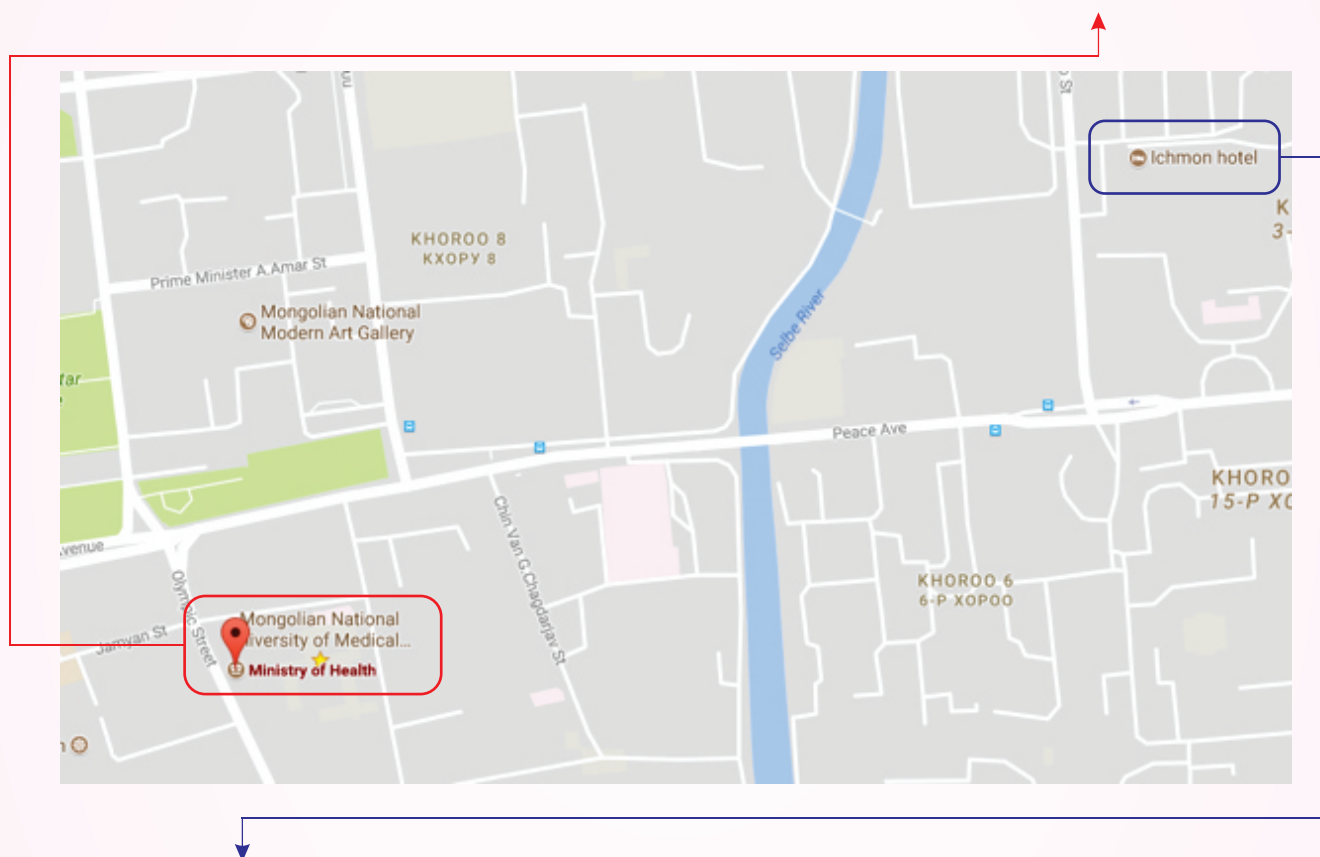
PUBLICATIONS

- More than 320 papers in Russian and International Journals.
- In Russian: Issues of Neurosurgery – 2000–2016 (10); Bulletin of Experimental Biology and Medicine – 2014; Annals of the Russian Academy of Medicine Science – 2016; Neurosurgery – 2007; Spine Surgery – 2008–2016 (5); Angiology and vascular surgery – 2015; Endoscopic Surgery – 2008–2014 (5); Journal Surgery named after N.I. Pirogov – 2015; Clinical medicine – 2015 (2); Surgery of Ukraine – 2008; Issues of Hyperbaric Medicine – 2007; Neurological Journal – 2009; Clinical Neurology – 2008, 2009, 2010, 2011; Practical Neurology and Neuro–rehabilitation – 2009; Laser medicine – 2013; Neurology of Bekhterev – 2008; Journal of Neurology and [psychiatry](#) of Korsakov S.S. – 2010, 2011; Annals of the Traumatology and Orthopedics. NN Priorov – 2014–2016; Vestnik Rantgenologii I Radiologii (1); Vestnik RAMS (5); Modern Medical Technologies (1).
- In English: Neurosurgery – 2010; Journal of Maxillofacial and Oral Surgery – 2007; Child's Nerv System – 2009; Acta Neurochir – 2010; World Neurosurgery – 2010–2017 (10); Neurosurgery Focus – 2016(1); Skeletal Radiol – 2009; Plos One (2017); Neurosurg. Sci. – 2013; New Armenian Journal – 2015–2017(10); Journal of Neurosurgery – 2016, 2017) – see appendix #1; Biomedical Engineering (1);

VENUE MAP

Day 1
15th Sept, 2017

*Ministry of Health, Mongolia
Hall A and B*



Day 2
16th Sept, 2017

*"Ichmon" Hotel
Conference Hall
Reception: +976 7710 5500
7710 5533*

Mongolian Neuroscience Society

Zorig street 3, Ulaanbaatar 14210; Phone: +976 11-311561, +976 8998 1001;
E-mail: info@neuroscience.mn; Homepage: <http://www.neuroscience.mn>

Child Care Service – MN&2017

By the generous support from the Asian-Pacific Regional Committee of International Brain Research Organization (IBRO-APRC), we are providing a Child Care Service for our society members and participants of the 4th Annual Meeting of Mongolian Neuroscience Society which will be held on September 15 and 16, 2017, in Ulaanbaatar.

We hired a specialized child care facility, Ukhaan-Dalai Kindergarten (Bayanzurkh - 8, 107-103), which offers the following services:

- Professional child care for children with an age range of 2 years to 6 years old
- 8 hours per day on September 15 (Friday) and 16 (Saturday).
- 5 times per day meal arrangement for the children
- A spacious room with play ground
- 2 bedrooms for 15 children
- Tables, chairs, trash cans
- Safe environment protected by security services.

Please order your request by mail to info@neuroscience.mn or bring your children directly to the registration desk at any time during the meeting.

Enjoy your comfortable and safe meeting with us!



PROGRAM IN DETAIL	
DAY 1	SEPTEMBER 15, 2017 (Friday)
	THE MINISTRY OF HEALTH (09:00-17:00)
Time	Hall A
	IBRO LECTURES (09:00-10:20)
	Chairs: Darambazar G, Jambaldorj J.
	Speakers: Muzaimi Mustapha, Hyungju Park
9:00	Muzaimi Mustapha , Department of Neurosciences, Integrated Neuroscience Program, Malaysia Asymptomatic cerebral small vessel disease: Pursuing novel biomarkers
9.40	Hyungju Park , Department of Structure & Function of Neural Networks, Korea Brain Research Institute, Korea Long-term synaptic plasticity regulated by presynaptic NMDARs and BDNF secretion
10:20	Coffee break
	CELL SIGNALING (10:40-12:00)
	Chairs: Bilegtsaikhan Ts, Sevjidmaa B.
	Speakers: Bilegtsaikhan Ts, Dolgorsuren S, Munkhsoyol E, Ulziisaikhan J.
10:40	Bilegtsaikhan Ts , Core laboratory, Mongolian National University of Medical Sciences (MNUMS) The enhancing effect of TLR9 ligand CPG DNA on the interferon gamma signal transduction in the endothelial cells
11:00	Dolgorsuren S , School of Biomedicine, MNUMS The determination study to regulating action of hepatitis C virus <i>in vitro</i> infection on type II interferon induced interferon stimulating genes
11:20	Munkhsoyol E , School of Biomedicine, MNUMS Lysosomal Ca ⁺² signaling is essential for osteoclastogenesis and bone remodeling
11:40	Ulziisaikhan J , School of Biomedicine, MNUMS Inhibitory action of lipopolysaccharide-induced proinflammatory cytokines production by valproic acid
12:00	Lunch Break
	OPENING CEREMONY (13:00-13:30)
13:00	Boldbaatar Damdindorj MD, PhD President, Mongolian Neuroscience Society Professor Ayush Tsogtsetseg MD, PhD Minister, Ministry of Health, Mongolia Academician Tserenkhuu Lkhagvasuren, MD, PhD, ScD President, Mongolian Academy of Medical Science Academician Tudev Gan-Erdene ScD Secretary of State, Ministry of Education, Culture, Science, and Sports Academician Gunchin Batbaatar MD, PhD President, Mongolian National University of Medical Sciences, Professor Lkhagvasuren Nasantsengel MD, PhD Director, National Center of Mental Health
13:25	Event Photography

	INTRODUCTORY LECTURES (13:30–14:20)	
	Chairs: Tsolmon J, Damdindorj B.	
	Speakers: Nasantsengel L, Sukhbat G, Enkhbold N	
13:30	Sukhbat G , Department of Physiology, MNUMS	
	The historical review of neurophysiological science in Mongolia	
13:50	Nasantsengel L , Director, National Institute of Mental Health	
	Mental health care in Mongolia	
14:10	Enkhbold N , Department of Neurosurgery, The Shastin 3 rd Central Hospital	
	The history of neurosurgery in Mongolia	
14:30	Coffee break	
	PLENARY LECTURES I (14:50–16:20)	
	Chairs: Battuvshin L, Damdindorj B.	
	Speakers: Yu-Min Kuo, Shun-Fen Tzeng, Po-See Chen	
14:50	Yu-Min Kuo , Vice Dean, College of Medicine, National Cheng Kung University, Taiwan	
	Stress aggravates high-fat diet-induced metabolic disorders	
15:20	Shun-Fen Tzeng , Distinguished Professor and Chair, Department of Life Sciences, College of Bio-science and Biotechnology, National Cheng Kung University, Taiwan	
	Involvement of hypothalamic glia in obesity-associated mood disorders	
15:50	Po-See Chen , Professor and Chair, Department of Psychiatry, College of Medicine, National Cheng Kung University, Taiwan	
	Metabolic abnormalities in patients with mood disorders in Taiwan: from genetics to management	
16:20	Coffee break	
	Hall A	Hall B
	PUBLIC EVENT I (16:40–17:20)	PUBLIC EVENT II (16:40–17:20)
	Chairs: Sevjidmaa B, Sukhbat G.	Chairs: Enkhsaikhan L, Darambazar G.
	Speakers: Zava Damdin Rinpoche, Munkhtuvshin N.	Speaker: Tamir O.
16:40	Zava Damdin Rinpoche , Founder of Zava Damdin Sutra and Scripture Institute	Tamir O , Graduate School of Business, Mongolian University of Science and Technology
	The anatomy of the human body on our plane of existence, the Jambudvipa, as written in Buddhist philosophy	Designing advertisement: An application of neuromarketing
17:00	Munkhtuvshin N , CSRL, NIH, Mongolia	BOARD MEETING (16:40–17:20)
	Astral health concepts in supports to gravitational waves	

DAY 2	SEPTEMBER 16, 2017 (Saturday)
Time	ICHMON HOTEL
	Main Meeting Hall (09:00–18:00)
9:00	PUBLIC EVENT III: BRAIN BEE (9:00–9:50)
	Speakers: Darambazar G, Muzaimi Mustapha
9:50	Coffee break
	NEUROSCIENCE (10:10–12:00)
	Chairs: Enkhsaikhan L, Uurtuya Sh.
	Speakers: Gereltsetseg G, Khongorzul B, Naranchimeg B, Zesemdorj O.
10:10	Gereltsetseg G , Civil servant hospital, Mongolia
	Delay in the onset of puberty of intrauterine growth retarded female rats cannot be rescued with hypernutrition after birth
10:30	Khongorzul B , Core laboratory, MNUMS
	T-cadherin: Possible regulator of progenitor cells in the rat anterior pituitary gland
10:50	Naranchimeg B , School of Biomedicine, MNUMS
	Mutation in c12orf57 causes a syndromic form of mental retardation
11:10	Zesemdorj O , School of Biomedicine, MNUMS
	The role of GABAergic neurons in dorsomedial hypothalamus in feeding regulation
11:30	Introduction to new products - Denkpharma LLC
12:00	Lunch Break
	PLENARY LECTURE II (13:00–14:00)
	Chairs: Munkhbat B, Enkhbold N.
	Speakers: Tooyama Ikuo, Byvaltsev VA.
13:00	Tooyama Ikuo , Shiga University of Medical Science Otsu, Japan
	F-methyl-curcumin-1 is a potential diagnostic and therapeutic agent for Alzheimer's disease
13:30	Byvaltsev VA , Irkutsk State Medical University, Irkutsk, Russia
	Tumors of the spine and spinal cord: Surgical treatment and 10 years outcome
	PSYCHIATRY & SOCIAL PSYCHOLOGY (14:00–15:40)
	Chairs: Bayarmaa V, Bayarmaa Ts.
	Speakers: Bayarmaa V, Egshiglen Kh, Mandkhai T, Nasanjargal L, Oyunchimeg N
14:00	Bayarmaa V , National Center for Mental Health National Center for Mental Health
	Using the strengths and difficulties questionnaire self's report to screen for adolescence mental health status in Mongolia
14:20	Egshiglen Kh , Mongolian National University of Education
	Study on psychological well being of adults
14:40	Mandkhai T , National Center for Mental Health

	Study of postpartum depression among urban women and some risk factors
15:00	Nasanjargal L , National Center for Mental Health
	In clinical issue of alcohol abuse
15:20	Oyunchimeg N , National Center for Mental Health
	Use of event related potentials in the study of schizophrenia
15:40	Coffee break
	NEUROLOGY (16:00–17:00)
	Chairs: Tovvudorj A, Altantsetseg P.
	Speakers: Stepanov I, Amarjargal M, Solongo Ts
16:00	Stepanov IA , Irkutsk State Medical University, Irkutsk, Russia
	Apparent diffusion coefficient maps in the assessment of surgical patients with lumbar spine degeneration
16:20	Amarjargal M , Department of Neurology, MNUMS
	Clinical features of temporal lobe seizure
16:40	Solongo Ts , University hospital, MNUMS
	Treating epilepsy with ketogenic diet in Mongolia
	NEUROIMAGING (17:00–18:00)
	Chairs: Munkhbaatar D, Tuvshinjargal D.
	Speakers: Delgerdalai Kh, Badamsed Ts, Nasanbayar E.
17:00	Delgerdalai Kh , LuxMed hospital
	Correlation of 3D Arterial Spin Labeling and Multi-Parametric Dynamic Susceptibility Contrast Perfusion MRI in Brain Tumors
17:20	Badamsed Ts , School of Medicine, MNUMS
	Computed tomography in diagnosis of acoustic neuroma
17:40	Nasanbayar E , GrandMed Hospital
	Diagnostic Imaging of the Pituitary and Parasellar Region
18:00	CLOSING REMARKS & AWARDS (18:00–18:20)

DAY 3 SEPTEMBER 17, 2017 (Sunday)		
Cultural Programs (11:00–19:00)		
Time	Full day program (11:00–19:00)	Half day program (14:00–19:00)
	Terelj National Park Tour	Ulaanbaatar City Tour
11:00	Hotel->Genghis Khaan Statue->Lunch->Terelj National Park->Dinner-> Hotel	Hotel->Sukhbaatar Square->Gandan Monastery->Zaisan Statue
19:00-	DEPARTURE	

	CHILD CARE SERVICE (9:00-18:00; Sep 15-16)
	Ukhaan-Dalai Kindergarten (Bayanzurkh-8, 107-103)

	SATELLITE EVENT (10:00–12:00; Sep 15)
	MEETING WITH POLICY MAKERS
	Participants: Yu-Min Kuo, Shun-Fen Tzeng, Po-See Chen, Muzaimi Mustapha, Byvaltsev V, and MNS representatives
09:00	Ministry of Health, Mongolia

IL-01

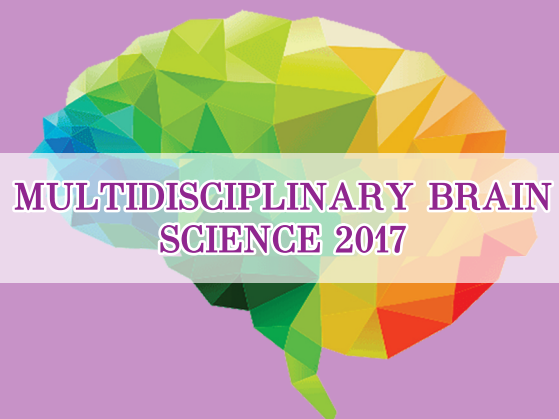
Asymptomatic cerebral small vessel disease: pursuing novel biomarkers

IL-02

Long-term synaptic plasticity regulated by presynaptic NMDARS and BDNF secretion



**INTERNATIONAL
BRAIN
RESEARCH
ORGANIZATION**



**MULTIDISCIPLINARY BRAIN
SCIENCE 2017**



ASYMPTOMATIC CEREBRAL SMALL VESSEL DISEASE: PURSUING NOVEL BIOMAKERS

**M Muzaimi¹, CMN Nassir¹, NS Idris², S Win Mar³, WZ Abdullah⁴, MF Pasha⁵,
M Rajeswari⁵, IS Isa⁶, SN Sulaiman⁶, MF Abdullah⁶, HM Shetty⁷**

¹Department of Neurosciences, Integrated Neuroscience Programme (INP);

²Department of Family Medicine; ³Department of Radiology;

⁴Department of Haematology, School of Medical Sciences, Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan, Malaysia; ⁵School of Computer Sciences, Universiti Sains Malaysia, Penang, Malaysia; ⁶Faculty of Electrical Engineering, Universiti Teknologi Mara, Penang, Malaysia; ⁷University

Hospital of Wales, School of Medicine, Cardiff University, United Kingdom

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On neuroimaging, ischaemic demyelination of the white matter is a part of cerebral small vessel disease (CSVD). It is known to progress either after lacunar stroke or in "silent or asymptomatic", notably prevalent with the global trend of ageing society, and posed as precursors to cognitive impairment, dementia, gait and mood disturbances. On magnetic resonance imaging (MRI), these microchanges are seen as white matter hyperintensities (WMH) or leuco-araiosis that represent discrete lacunar infarcts and/or more diffuse areas of WMH. CSVD progression is also influenced by the severity of microvascular damage mediated by the micro-

and/or macro-thrombus forming microparticles in the microvessels.

Current conventional MRI findings offer limited correlations to clinical parameters such cognitive impairment or large vessel stroke, and much remains obscure. This calls for more concise biomarkers and reliable lesion surrogates to improve the assessment and prognosis of CSVD – such as longitudinal data on MR-diffusion tensor imaging (DTI) of the white matter changes, neurocognitive assessment and combination of micro-/macro-thrombogenic assays.



LONG-TERM SYNAPTIC PLASTICITY REGULATED BY PRESYNAPTIC NMDARS AND BDNF SECRETION

Hyungju Park¹

¹Korea Brain Research Institute (KBRI)

*Correspondence: phj2@kbri.re.kr

Brain-derived neurotrophic factor (BDNF) has been known to regulate diverse neural functions including neuronal differentiation and growth, synapse formation and plasticity, and higher cognitive functions. Activity-dependent BDNF secretion is required for mediating induction of long-term potentiation (LTP), a cellular substrate of learning and memory, but how LTP-inducing neural activity triggers BDNF secretion has been unknown. On the other hand, activation of N-methyl-D-aspartate subtype of glutamate receptors (NMDARs) in postsynaptic dendrites is required for long-term potentiation (LTP) of many excitatory synapses, but the precise role of presynaptic axonal NMDARs in synaptic plasticity remains to be clarified.

Our study demonstrated that presynaptic NMDARs play an essential role in triggering BDNF secretion from axons and inducing BD-

NF-dependent LTP at central synapses. By utilizing mouse corticostriatal synapses as a model system, we found that LTP-inducing stimuli can activate presynaptic NMDARs, which is able to produce sustained axonal Ca^{2+} elevation and trigger BDNF secretion from axon terminals. To address whether presynaptic NMDAR activation and resulted BDNF secretion is required for LTP induction, we combined the cell type-specific gene deletion method with optogenetic induction of LTP. We found that genetic depletion of either BDNF or the NMDAR subunit GluN1 specifically in cortical axons abolished corticostriatal LTP in response to theta burst stimulation (TBS) of cortical axons through activating channelrhodopsin-2 (ChR2) in the same axons. These results suggest that long-term synaptic plasticity can also be regulated by presynaptic NMDARs in addition to the action of postsynaptic NMDARs, through mediating activity-induced presynaptic BDNF secretion during induction of synaptic plasticity.

INTRODUCTORY LECTURE

- InL-01 | The historical review of neurophysiological Science in Mongolia
- InL-02 | Mental health care in Mongolia
- InL-03 | The history of neurosurgery in Mongolia



**MULTIDISCIPLINARY BRAIN
SCIENCE 2017**



THE HISTORICAL REVIEW OF NEUROPHYSIOLOGICAL SCIENCE IN MONGOLIA

Sukhbat Galsan-Yondon¹

¹Department Physiology of MNUMS

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History of modern neurophysiological science in Mongolia directly linked to The founder of the Russian physiology J. M. Sechenov, the first Nobel Laureate of Physiology I. P. Pavlov, founder of functional system's theory of organism P. K. Anokhin, a well-known academician, who developed the Anokhin's theory K.B. Sudakov and others. In 1957, the first physiologist, E. Dongindoo studied "Neurophysiological mechanisms between dairy cows and cow's milk secretion" and graduated Ph.D degree in biology (Moscow), in 1962. Ts. Dugarnyam "Characteristics of Inverse refraction reflexology" graduated Ph.D .degree of Medicine (Moscow) and they became first neurophysiologists of Mongolia. At the University of Sechenov's Medical University In the K.P. Anokhin's Institute, Medical academy Russia, Mongolian physiologists have graduated a series of three doctoral degrees in Moscow: In 1965, L. Badamkhand, " Electric physiological analysis of the activation effect of hypothalamus on the surface of the brain"; in 1974 Dashzeveg " Dynamics of somatic and vegetative change during the of emotional stress by hypothalamus originality, " In 1986 Sukhbat "Participation of Delta-sleep inducing peptides in the central mechanisms of negative emotion". Mongolian physiologists have been working on neuroscience studies in our country and have graduated several doctoral and master's degree. For example in 1982, Ts.Erdenesambuu studies "Some issues in the subjective imaging of philosophy and neurophysiology" (Ph.D.degree of philosophy), In 2008 Baasanjargal.B "The

disorder of the nervous and humoral system during the stress and its pathogenic disorders. (Ph.D degree of medicine). Since 1990, our young physiologists have mastered the degree of neurophysiology and neuropsychology. As well as O.Amartsengel have studies "Psychological physiology of Mongolian student-(1994); N.Khurelbaatar "Human intellectual capacity" (1996,) B.Boldbaatar "Behavioral types" (1996), M.Erdenetuya "Student's memory" (1997) , N.Barzul "The anxious and personal types" (1998), B.Tsatsralt-Od "Spectacular features of personal types" (1999),. H.Chinzorig "The ultrasound dopplerography analysis of the circulatory system of the brain" H.Ulziimaa Treatment of susceptible brain-(2009); Choinyam.B "Some physiological indicators during the meditation course (2016). The Mongolian Neuroscience Society was established (2014) by the initiative of Damdindorj.B (Head, Department of Physiology MNUMS) and 4 times successfully have organized International seminar so called "Multidisciplinary brain science" and they carry out "Neuroscience project" at MNUMS. I think so that it is new period of development of neuroscience in Mongolia. Thus, neurophysiology in Mongolia is continuously developing in a timely manner.



MENTAL HEALTH CARE IN MONGOLIA

Nasantsengel L^{1,2}

¹National Mental Health Center for Mongolia

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Abstract: Currently every 4th person in the world suffers from some mental disorder at some time of his life and the mental disorders (depression, chronic psychosis, bipolar disorder, alcohol abuse and obsessive disorders) are the cause of five of every ten cases of disability. In 2005 mental and behavioral disorders constituted 10% of total registered diseases worldwide and as was reported by WHO (World Health Organization) in all probability this number will increase up to 15% in 2020.

In Western Pacific countries, mental and behavioral disorders are 27% in developed and 15% in developing countries. By health statistic information of National Mental Health Center of Mongolia, in 2000 prevalence of mental and behavioral disorder was 77.4 per 10.000 populations, but in 2015 it was increased to 109.8 per 10.000 populations. As for 2008, more than 22,000 people were registered with mental health services, and 15 percent of all persons with disabilities had mental and behavioral disorders.

Current situation: The mental health system is still largely hospital based. The National Mental Health Center of Mongolia (NMHC) has 570 beds, voluntary facility for alcoholic patients (50 beds), and involuntary facility for alcoholic patients (100 beds) and 21 smaller psychiatric inpatient units with 2-35 beds each in the provincial general hospitals. According to WHO-AIMS report on Mental Health system in Mongolia (2006), there are 17.7 psychiatric beds, 0.5 psychiatrists (135), 4.7 medical doc-

tors, 7.6 nurses, 0.2 psychologists, 0.8 occupational therapists per 100 000 population. The Mongolian mental health system operates at the primary, secondary and tertiary care levels. Mongolia has a Mental Health Law (adopted in 2000, 2013), a National Mental Health First Program 2002-2007 (formulated in 2002), a National Mental Health Second Program from 2010-2019 (formulated in 2009). Both the plan and policy include the same components including the development of community mental health services, development of a mental health components in primary health care, human resources, advocacy and promotion, human rights protection of users, financing, quality improvement and monitoring system.

For diagnoses, using criterions by ICD 10. The NCMH is educational, clinical and research basis hospital of School of Medicine, Mongolian National University of Medical Science and there is located Department of Mental Health. The NMHC is an only resource for training, clinical practice, and research in both clinical and forensic psychiatry of MNUHS and other law schools, the training basis hospital.

At present, mental health financing is mainly directed towards mental hospitals, which account for 64% of total mental health expenditures. All severe and some mild mental disorders are covered in social insurance schemes. Totally, admitted 6000 inpatients or provided treatment for 45000 patients in outpatients services per a year. Use biological (psychotropic) treatments, psychotherapy, psychosocial rehabilitation treat-

ments. Overcome these challenges: The Mental Health system in Mongolia has a range of mental health facilities. However, the existing mental health system is still largely hospital based. A move towards community care will require a change in direction of mental health funding towards community mental health facilities and promotion of mental health in the community. Options in the psychosocial rehabilitation of those with mental illness could include day care centres and community residential homes. To deliver such programs extensively, the development of training programs would be needed for various professionals, including medical stu-

dents, nurses, psychologists, social workers and psychiatrists. Furthermore, the intersectoral collaboration among social welfare, housing, legal, employment and education sectors should be improved. Assisting mental health planners and evaluators and planning, providing and evaluating mental health services. Also Increasing the allocation of resources for mental health is very important.

Key words: Mental and behavioral disorders, Mental Health Law, National Mental Health Program, National Mental Health Center, psychosocial rehabilitation



THE HISTORY OF NEUROSURGERY IN MONGOLIA

Dulam.E¹, Khairulla.J¹, Batchuluun.B¹, Altan-Ochir.S¹, Sodchimeg.Ch², Enkhbold.D¹

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Although there is evidence of applications of cranial surgery in ancient times, it is commonly accepted that modern surgery started in the late 19th century. Surgery of the nervous system, however, has a relatively shorter history than surgery of other systems. (<https://en.wikipedia.org/wiki/Neurosurgery>) The victories of the Great October Socialist Revolution (1917) and of the Mongolian People's Revolution (1921) have changed fundamentally the role and the place of medical science and public health in the Mongolian People's Republic. From its inception, the young Mongolian state made fundamental changes in all spheres of life, particularly in public health. The development of neurosurgery was connected closely with the general advance of culture and science that took place in the Mongolian People's Republic after the Revolution. (*International neurosurgery Vol.6, No.6, 1980*)

In 1965 medical school teacher Khairulla.J finished his neurosurgical fellow course in Czechoslovakia and the first neurosurgical operation in Mongolia was performed successfully on a patient with brain tumor in 1966. Also at that time, spinal tumor removal operation was done in patient who was admitted in Mongolian Railway Central Hospital. It was the beginning of brain and spinal surgery, then neurosurgical service has started in Mongolia. The generous assistance of neurosurgical specialists from the Soviet Union, Czechoslovakia, and other countries of the Socialist community played a decisive role. Doctor Khairulla.J and Rachkov.B.M

perform intracranial aneurysm clipping procedure first time, in 1971.

Mongolian first neurosurgeons' Dr. Javzmaa.D, Dondov.P, Oyun.B have studied neurosurgery in Soviet Union as a result in 1971, the first neurosurgical unit in the Mongolian People's Republic was established, with 25 beds at the Third Central Hospital. A 10-bed neurosurgical section has been set up at the military hospital in Ulanbator. In 1976, at the Trauma Center, a 30-bed head trauma section was organized and staffed with highly qualified medical personnel. During 1966-1980 anamnesis, neurological tests, x-ray, eye test, CSF test, pneumoencephalography, cerebral angiography etc, were useful for neurosurgery diagnosis. Until 1980, only occasional neurosurgical procedures were performed. Annual number of operation was about 80-90. First computed tomography (CT) scan (Hitachi) was introduced in December, 1986 at the Third Central Hospital, in Mongolia. It could help diagnose of brain and spinal disorders. After 1990, the number of patients who need neurosurgical service is increasing year by year. Probably it concerned to rapid developments in diagnostic medical technology in neurosurgery departments, nonetheless, in the last fifteen years the incidence of stroke in Mongolia has increased steadily then cerebrovascular disease and surgical rates are increasing quickly. Since the first magnetic-resonance imaging (MRI) scan was introduced in 2006, over ten MRI scan machines are placed in Mongolia now. In 2013, biplane angiography equipment

from Philips (ALLURA X-per FD 20/20) was set up at the Shastin Central Hospital. It contribute to improve cerebrovascular disease diagnosis and endovascular treatment, particularly, embolization of aneurysm, arteriovenous malformation (AVM), arteriovenous fistula (AVF), carotid cavernous fistula (CCF), tumor feeding artery.

At present, there is about 30 neurosurgeons in Mongolia. More than 90% of all neurosurgical procedures perform at the Shastin Central Hospital except trauma. Some spinal surgeries are performed in some private hospitals. Our multi-specialty neurosurgeons' team provides medical and surgical care for wide range of neurological based concerns in adults and pediatrics, including cerebrovascular disease (stroke, aneurysm, arteriovenous malformation and fistula), brain tumor, pituitary disorders, spinal disease, neuroendovascular procedures, neurosurgical emergencies and peripheral nerve diseases etc. Nowadays, at the Shastin Central Hospital, the annual number of surgeries was 1060; number of intracranial aneurysm clipping was about 240, brain tumor removal 200, spinal surgery 300 and other surgeries (result in 2016).

In the future, we need some neurosurgery service improvement. Even now most of the surgeries what we perform are same as the other developed countries, there is a need to expand the neurosurgical services all over the Mongolia. With a view toward further improvement of neurosurgical care of population, four new neurosurgical branches are have to being organized in some aimag. The pressing task, facing us is not only the provision of qualified neurosurgical team for the newly developing and expanding neurosurgical sections, but also the need to equip these units with the necessary diagnostic and surgical instruments.

Keywords: neurosurgery, operation, aneurysm, Shastin central hospital, Mongolia

PLENARY LECTURE

- PL-01 Stress aggravates high-fat diet-induced metabolic disorders
- PL-02 Involvement of hypothalamic glia in obesity-associated mood disorders
- PL-03 Metabolic abnormalities in patients with mood disorders in taiwan: from genetics to management
- PL-04 F-methyl-curcumin-1 is a potential diagnostic and therapeutic agent for alzheimer's disease
- PL-05 Tumors of the spine and spinal cord: surgical treatment and 10 years outcomes

**MULTIDISCIPLINARY BRAIN
SCIENCE 2017**



STRESS AGGRAVATES HIGH-FAT DIET-INDUCED METABOLIC DISORDERS

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A mutual interaction exists between metabolic and mood disorders, suggesting that these two diseases may share similar pathogenesis pathways. Chronic stress is one of the common risk factors for both disorders. However, the mechanisms underlying how stress impacts metabolic disorders still remain unclear. Stress activates the amygdale relaying signals to the hypothalamus to regulate systemic metabolism. Accordingly, we hypothesized that long-term stress induces neuroplasticity in the amygdala, which in turn affect the signs of metabolic disorders. Chronic social defeat (SD) and high-fat diet (HFD) were adopted to induce stress responses and metabolic abnormalities in mice, respectively. Our results showed that SD aggravated the HFD-induced insulin resistance and upregulated the neuroplasticity-related protein, TrkB, in the amygdala. Bilateral lesions of the central amygdalae diminished the stress-exerted enhancement of insulin resistance. Glucocorticoids released upon stress stimulus are known to contribute to the developments of obesity and insulin resistance. Thus, we examined the

SD effects on the expression of corticosterone, the dominant glucocorticoid in rodents. Results revealed that SD did not change the circulating corticosterone levels in the HFD mice, however, HFD alone effectively increased the corticosterone expression. To further characterize the role of this increased corticosterone in the HFD-induced metabolic disorders, we removed bilateral adrenal glands from mice before the HFD regimen, and found that adrenalectomy alleviated the HFD-induced obesity, insulin resistance and steatosis. In the white adipose tissue, adrenalectomy eased the HFD-induced adipogenesis by restoring the level of Pref-1, a major inhibitor of adipogenesis. Excessive glucocorticoids down regulated the Pref-1 and induced adipogenesis both in vitro and in vivo. Our results suggested that chronic stress aggravates the HFD-induced insulin resistance by inducing neuroplasticity in the amygdala, and that HFD-increased glucocorticoids may be essential for the adipogenesis induced by high-fat feeding.



INVOLVEMENT OF HYPOTHALAMIC GLIA IN OBESITY-ASSOCIATED MOOD DISORDERS

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Gliosis, a reactive change of astrocytes and microglia, occurs in the hypothalamus of obese rodents and humans. An increase in microglia and hypertrophic astrocytes can be observed in the ARC upon exposure to HFD, suggesting that gliosis is involved in HFD-induced leptin and insulin resistance and disturbance of energy homeostasis. Besides, abnormalities of the white matter and oligodendrocytes (OLGs) have been observed in patients with major depressive disorder, as well as other neuropsychiatric disorders. Loss of myelin-enriched white matter (WM) integrity in individuals with high body mass index (BMI) has been reported through the assessment of diffusion tensor imaging, indicating that myelin damage is a critical factor in obesity-related cognitive and sensorimotor defect. To study hypothalamic glia as the potential targets for obesity-associated mood disorders, we used an animal model of obesity by feeding male C57BL/6 mice at 8 week old with HFD. Activated microglia with an amoeboid form were significantly observed in median eminence (ME) of the hypothalamus after HFD feeding for 2 months.

Transmission electron microscope (TEM) analysis indicated that the integrity of myelin in the posterior hypothalamus was impaired after HFD feeding for 4 and 6 months. The hyper-fused and the damaged cristae of mitochondria was also detected in the posterior hypothalamus of HFD-fed mice. Given the fact that prolonged inflammation can be induced by obesity combined with immune challenge, we established a mouse model of chronic HFD feeding for 8 months combined with intermittent peripheral lipopolysaccharide (LPS) challenge. These HFD-fed mice receiving LPS injections developed anxiety-like and social impairing behaviors when compared to chow-fed mice receiving LPS injections. Thus, HFD induced hypothalamic gliosis and impaired OLG function, which could lead to imbalance of hypothalamic neurotransmission. Moreover, chronic HFD feeding combined with repeated peripheral LPS injection developed in anxiety and impaired social interaction in mice.



METABOLIC ABNORMALITIES IN PATIENTS WITH MOOD DISORDERS IN TAIWAN: FROM GENETICS TO MANAGEMENT

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The prevalence of mood disorders (MoD) as well as metabolic disorders (MetD) is concurrently growing worldwide, and both represent substantial risk factors for multiple medical complications. Moreover, they are the key factors that impact negatively in the prognosis for each other. Although MoDs and MetDs appear tightly interrelated, however, the underlying mechanisms have not been well characterized. The MoD and MetD covariance might be explained by environmental factors through biological mediators including monoamine transmitters, neu-

ropeptides, cortisol or pro-inflammatory factors. In recent decades, increasingly studies revealed that oxytocin interacts with dopamine to play an important role in emotional regulation and multiple social behaviors, corresponding with the cortical-amygdala projections.

In addition to the role in emotion regulation, the systems are targets for regulating metabolic homeostasis. Hence, we hypothesize that in chronic social stressed condition the abnormalities in oxytocinergic and dopaminergic signaling in the amygdala that result in impaired emotional salience processing might link both disorders.



F-METHYL-CURCUMIN-1 IS A POTENTIAL DIAGNOSTIC AND THERAPEUTIC AGENT FOR ALZHEIMER'S DISEASE

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Recent experiments have reported that curcumin can pass through the blood brain barrier and bind to amyloid plaques as well as display anti-oxidant and anti-amyloid properties. The aim of this study is to find curcumin derivatives that have diagnostic and therapeutic potential for Alzheimer's disease (AD).

More than 30 of curcumin derivatives were screened by binding ability to senile plaques in human brain sections and in vitro analysis. We selected two candidates, f-methyl-curcumin1 (FMeC1; Shiga-Y5) and FMeC2 (Shiga-Y6). For MRI, FMeC1 or FMeC2 (200 mg/kg) was injected into the tail vein of six Tg2576, three APP/PS1 and six control mice. Then, amyloid imaging was employed using a 7.0 T MR scanner. For therapeutic experiments, 36 model mice and 12 wild mice were divided into four groups; control diet, curcumin, FMeC1 or FMeC2 group. Mice were fed with a standard chow diet with or without curcumin, FMeC1, or FMeC2 (500 ppm) for 6 months from 9-month-old. Behavioral

tests were conducted from 14.5 months of age, and mice were sacrificed at 15 months of age for pathological analyses. All procedures were approved by the Animal Care and Use Committee and Ethical Committee of Shiga University of Medical Science.

FMeC1 but not FMeC2 showed marked ¹⁹F-MRI signals in AD-mouse brain but not in controls. Under fluorescence microscopy, AD model mice injected with FMeC1 showed massive fluorescence co-localized with amyloid plaques. Quartz crystal microbalance (QCM) analysis showed that FMeC1 bound to not only A β aggregates (with β -sheet) but also A β oligomers, which are responsible for neuronal and synaptic dysfunction in AD. In the Morris water maze test, only FMeC1 showed a significant improvement on cognitive function compared to control group ($p < 0.05$). In addition, FMeC1 reduced A β aggregation and glial cell activity ($p < 0.05$). The results indicate that FMeC1 is a potential diagnostic and therapeutic agent for AD.



TUMORS OF THE SPINE AND SPINAL CORD: SURGICAL TREATMENT AND 10 YEARS OUTCOMES

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Background. Nowadays it became possible to combine the minimization of approach and preservation of orthopedic stability with oncological radical intervention of the tumors in and around the spinal cord..

Objective. Evaluate the clinical and neuroimaging outcomes of surgical treatment of spine and spinal tumors in 10 year old follow up.

Material and Methods. For the period from 2007 to 2017. More than 1,500 neurooncology interventions were performed on the clinical basis of the neurosurgery course Irkutsk State Medical University at the Department of Neurosurgery of the Irkutsk Railway Clinical Hospital, of which 241 patients were treated for extramedullary tumors, 92 - intramedullary and 113 - spinal tumors. All patients were operated with decompressive (n = 202), decompressive-stabilizing (n = 156) and puncture (n = 88) methods using modern fixation systems and high-tech synthetic materials. The results of treatment were assessed on the scales McCormick and Macnab, postoperative complications and the frequency of relapses of the disease.

Results. In the late postoperative period, 76% of respondents corresponded to the McCormick I and II degree, excellent and good outcomes on the Macnab scale were revealed in 69% of the operated patients, relapses of the tumor process were diagnosed in 8% of cases, postoperative complications in 5% of cases. Also, as a result

of the study, a direct dependence of the outcome of the disease on the stage ($p < 0.05$, $R > 0.6$) and the initial neurologic deficit ($p < 0.05$; $R > 0.6$) was revealed, and the use of modern high-tech methods of spinal neuronology, neuroimaging allowed significantly increasing the efficiency of operations even with low-grade tumors, in which the degree of malignancy of the operated tumor did not influence the clinical outcome of the treatment.

Conclusion. Precision preoperative planning of surgical access based on neuroimaging data, integrated use of microsurgical instruments, endoscopic technique, laser, minimally invasive ultrasound destructors in a routine manner significantly alleviates surgical aggression, avoiding iatrogenic neural injuries with a low number of postoperative complications. But at the same time, clinical diagnostics with the definition of exact localization of the pathological process with the help of modern neuroimaging methods and timely surgical removal of the tumor before the development of a severe neurologic deficit are the most significant factors affecting the outcome of treatment.

Key words: spinal cord, extramedullary tumors, intramedullary tumors, tumors of the spine, surgical treatment

THE 4th ANNUAL MEETING OF THE MONGOLIAN NEUROSCIENCE SOCIETY

ORAL PRESENTATION

- OP-01 The enhancing effect of *tlr9* ligand CpG DNA on the interferon gamma signal transduction in the endothelial cells
- OP-02 The determination study to regulating action of hepatitis C virus in vitro infection on type II interferon-induced interferon stimulating genes
- OP-03 Lysosomal Ca^{2+} signaling is essential for osteoclastogenesis and bone remodeling
- OP-04 Inhibitory action of lipopolysaccharide-induced proinflammatory cytokines production by valproic acid
- OP-05 The anatomy of the human body on our plane of existence, the Jambudvīpa, as written in Buddhist philosophy
- OP-06 Astral health concepts in supports to gravitational waves
- OP-07 Designing advertisement: an application of neuromarketing
- OP-08 Delay in the onset of puberty of intrauterine growth retarded female rats cannot be rescued with hypernutrition after birth
- OP-09 T-cadherin: possible regulator of progenitor cells in the rat anterior pituitary gland
- OP-10 Mutation in *C12orf57* cause a syndromic form of mental retardation
- OP-11 The role of GABAergic neurons in dorsomedial hypothalamus in feeding regulation
- OP-12 Using the strengths and difficulties questionnaire teacher's form to screen for child mental health status in Mongolia
- OP-13 Study on psychological well being of adults
- OP-14 Study of postpartum depression among urban women and some risk factors
- OP-15 In clinical issue of alcohol abuse
- OP-16 Use of event-related potentials in the study of schizophrenia
- OP-17 Apparent diffusion coefficient maps in the assessment of surgical patients with lumbar spine degeneration
- OP-18 Clinical features of temporal lobe seizure
- OP-19 Treating epilepsy with ketogenic diet in Mongolia, cases
- OP-20 Correlation of 3D arterial spin labeling and multi-parametric dynamic susceptibility contrast perfusion MRI in brain tumors
- OP-21 Computed tomography in diagnosis of acoustic neuroma
- OP-22 Diagnostic imaging of the pituitary and parasellar region



THE ENHANCING EFFECT OF TLR9 LIGAND CPG DNA ON THE INTERFERON GAMMA SIGNAL TRANSDUCTION IN THE ENDOTHELIAL CELLS

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Introduction: The aim of this research project is to elucidate the crosstalk of innate- and adaptive immune reactions against the DNA containing bacteria.

Material and methods: This study was held in the Core Laboratory, Science Technology Center, Mongolian National University of Medical Sciences (MNUMS). Murine aortal endothelial cells, END-D were cultured and the cell viability was checked by MTT assay. In addition, the NO production, mRNA, and protein expression were studied by Griess Reagent assay, qRT-PCR and immunoblotting, respectively.

Results: TLR9 ligand at 0.1μM, 1μM, and 10μM exhibited no cytotoxic action against the cells by MTT assay. IFN-γ alone induced NO production in END-D cells. In the other hand,

TLR9 ligand at 0.1μM, 1μM, and 10μM up-regulated IFN-γ induced NO production up to 12μM, 16μM, and 17μM, respectively. TLR9 ligand, CpG DNA enhanced IFN-γ induced NO production in dose dependent fashion.

qRT-PCR and immunoblotting analysis showed the enhanced iNOS mRNA and protein expression in cells pre-treated with TLR9 ligand and treated with IFN-γ. TLR9 ligand increased IFN-γ induced pY701-STAT1, pS727-STAT1, and IRF1 expression.

Conclusion: TLR9 ligand, CpG DNA up-regulates IFN-γ induced NO production in time and dose dependent manner. TLR9 ligand augments the expression of iNOS mRNA and protein in response to IFN-γ. TLR9 ligand potentiates STAT1/IRF1/iNOS signaling in endothelial cells.



THE DETERMINATION STUDY TO REGULATING ACTION OF HEPATITIS C VIRUS *IN VITRO* INFECTION ON TYPE II INTERFERON-INDUCED INTERFERON STIMULATING GENES

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Objectives: To determine the regulating effect of *in vitro* in hepatitis C virus (HCV) infection on interferon stimulating genes (ISGs) stimulated by IFN- γ and TLR7 ligand.

Methods: Murine RAW 264.7 cells, endothelial cell line ENDD and human hepatocyte cell line Huh7 were maintained in Dulbecco's modified Eagle's medium or RPMI medium containing 10% inactivated fetal calf serum and antibiotic cocktail (penicillin G, streptomycin) were cultured at 37°C in 5% CO₂. Cells were infected by HCV serum from Mongolian patients with HCV1b genotype, and stimulated with IFN- γ and TLR7 ligand. ISGs such as iNOS and phosphorylated STAT1 and its production nitric oxide were studied in the levels of final production, gene, and protein expression by Griess Reagent Assay, RT-PCR, and IB, respectively.

Results: In order to measure intracellular virus RNA, we used RT-PCR method. The virus RNA detected in the RAW264.7 cell on day 4 which is showing heterogenic property of HCV. On the other hand, the virus RNA detected in HUH. 7 cell line on day 2 that is presenting species-specific property of the virus. HCV positive serum treatment with PEG8000 were performed on the RAW264.7 and HUH.7 cell line. Our results showed that HCV infected serum significantly reduced IFN- γ induced ISGs (iNOS mRNA, iNOS protein, s727-STAT1, tyr729-STAT1) and its final production (NO).

Conclusion: These results indicate that *in vitro* hepatitis C virus infection could be involve in the regulation of type II IFN induced ISGs in the levels of gene and protein expression of iNOS and STAT1 transcription factors.



LYSOSOMAL Ca^{+2} SIGNALING IS ESSENTIAL FOR OSTEOCLASTOGENESIS AND BONE REMODELING

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Lysosomal Ca^{+2} emerges as a critical component of receptor-evoked Ca^{+2} signaling and plays a crucial role in many lysosomal and physiological functions. Lysosomal Ca^{+2} release is mediated by the transient receptor potential (TRP) family member TRPML1, mutations that cause the lysosomal storage disease mucopolidosis type 4. Lysosomes play a key role in osteoclast function. However, nothing is known about the role of lysosomal Ca^{+2} signaling in osteoclastogenesis and bone metabolism. In this study, we addressed this knowledge gap by studying the role of lysosomal Ca^{+2} signaling in osteoclastogenesis, osteoclast and osteoblast functions, and bone homeostasis in vivo. We manipulated lysosomal Ca^{+2} signaling by acute knockdown of TRPML1, deletion of TRPML1 in mice, pharmacological inhibition of lysosomal Ca^{+2} influx, and depletion of lysosomal Ca^{+2} storage using the TRPML agonist ML-SA1. We found that knockdown and deletion of TRPML1, although it did not have an apparent effect on osteoblast differentiation and bone formation, markedly attenuated osteoclast

function, RANKL-induced cytosolic Ca^{+2} oscillations, inhibited activation of NFATc1 and osteoclastogenesis-controlling genes, suppressed the formation of tartrate-resistant acid phosphatase (TRAP)-positive multinucleated cells (MNCs), and markedly reduced the differentiation of bone marrow-derived macrophages into osteoclasts. Moreover, deletion of TRPML1 resulted in enlarged lysosomes, inhibition of lysosomal secretion, and attenuated the resorptive activity of mature osteoclasts. Notably, depletion of lysosomal Ca^{+2} with ML-SA1 similarly abrogated RANKL-induced Ca^{+2} oscillations and MNC formation. Deletion of TRPML1 in mice reduced the TRAP-positive bone surfaces and impaired bone remodeling, resulting in prominent osteopetrosis. These findings demonstrate the essential role of lysosomal Ca^{+2} signaling in osteoclast differentiation and mature osteoclast function, which play key roles in bone homeostasis.



INHIBITORY ACTION OF LIPOPOLYSACCHARIDE-INDUCED PROINFLAMMATORY CYTOKINES PRODUCTION BY VALPROIC ACID

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The inhibitory mechanism of valproic acid (VPA) on lipopolysaccharide (LPS)-induced inflammatory response was studied by using mouse RAW 264.7 macrophage-like cells. VPA pretreatment attenuated LPS-induced phosphorylation of phosphatidylinositol 3-kinase (PI3K) and Akt, but not nuclear factor (NF)- κ B and mitogen-activated protein kinases. VPA reduced phosphorylation of MDM2, an ubiquitin ligase and then prevented LPS-induced p53 degradation, followed by enhanced p53 expression. Moreover, p53 small interfering RNA (siRNA)

abolished the inhibitory action of VPA on LPS-induced NF- κ B p65 transcriptional activation and further LPS-induced tumor necrosis factor (TNF)- α and interleukin (IL)-6 production.

VPA prevented LPS-induced degradation of phosphatase and tensin homologue deleted on chromosome ten (PTEN) and up-regulated the PTEN expression. Taken together, VPA was suggested to down-regulate LPS-induced NF- κ B-dependent transcriptional activity via impaired PI3K/Akt/MDM2 activation and enhanced p53 expression.



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Thusly, classifying the human body into

gross body and subtle body, of which the subtle body is regarded as the "most sacred body" and further classified into meridians, winds and the causal body which describes the white and red dews. Dews represent cells. The mental energy is divided into gross, subtle and very subtle subgroups. Subtle mental energy represents micro matter and very subtle mental energy represents nano matter. This nano matter is christened as very subtle wind, very subtle mind, natural mind and divine light ethereal will. This existence of nano mind within the white and red cells of mothers and fathers and how as a result of the formation of the channels that sustain it, the human body is formed will be further examined.

[illegible]



ASTRAL HEALTH CONCEPTS IN SUPPORTS TO GRAVITATIONAL WAVES

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In 1287, The Emperor of the Great Mongolian Empire, Khubilai Tsetsen Khan established first Academy of Sciences (Ocean of the Intellect). His Excellency Mr.Shatmus, was the key person of science for foods and herbal medicine to the great khan and his family members. His 7th generation, the respectful old male healer have decided to send one of his student Mr.Jamyanjandag from Daidu (Pekin) to the North, the land of ancestors (Mongolia) to set up the place for Holy Eight Manala. He followed by eight generation of great teachers of the Gobi. His 9th generation Mr.Tserendorj Kh. together with his friends created Holy Otochi-Odi Clinic, to eliminate the pain and suffers of patients. The clinic developed new concepts so called "Astral Health Theory" that help to achieve perfect healing of certain health conditions, including cancers and diseases of oxidative stress.

The Theory is based on correction of windy seven meridians of the body. Correction requires contribution of the several life-sustaining therapies, including herbal medicine, physical exercises, water, diets, solar and moon therapy, treat-

ment by gravitational waves, psychological and cognitive therapy, precise wind circulation, and influence of sounds and waves of the universe on both physical and wind-spiritual body.

For the first time, scientists have observed gravitational waves, arriving at the earth from a cataclysmic event in the distant universe caused by collision of two black holes. This confirms a major prediction of Albert Einstein's 1915 general theory of relativity. The gravitational waves were detected on September 14, 2015 at 5:51 a.m. Eastern Daylight Time by both of the twin Laser Interferometer Gravitational-wave Observatory (LIGO) detectors, located in Livingston, Louisiana, and Hanford, Washington, USA. Based on the observed signals, LIGO scientists estimate that the black holes for this event were about 29 and 36 times the mass of the sun, and the event took place 1.3 billion years ago. At each observatory, the two-and-a-half-mile (4-km) long L-shaped LIGO interferometer uses laser light split into two beams that travel back and forth down the arms (four-foot diameter tubes kept under a near-perfect vacuum).



DESIGNING ADVERTISEMENT: AN APPLICATION OF NEUROMARKETING

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Adopting something radically new is always a challenge, but marketers have begun to take neuroscience more seriously. Neuroscience attempts to collect knowledge about the structure and function of the brain. Marketing researchers can have important data about consumer brain's response to marketing stimuli beyond the subjective reports given by the participant by using tremendous progression of neuroscience (P. Renvoisñ and Morin 2007; Hubert and Kenning 2008). Theoretical evidence exists that (1) neuroscientific methods can provide marketers with information that is not obtainable through traditional marketing research tools, (2) such neural markers can be reliably obtained from a relatively small sample of participants, and (3) these neural markers are actually predictive of commercial success (Boksem and Smidts, 2015). 138 participants were registered but 34 of them were really participated in the current experiment who matched the basic requirements. This study follows the same experimental procedure used by Telpaz et al. (2015)

and Levy et al. (2011). In Stage 1, participants received a general description of the study procedure. In Stage 2, neural activity was measured with EEG while participants viewed poster advertisement of ice cream 10 times. The power-point file for each EEG recording was like in figure-1. The aim of this stage was to acquire independent measurements of neural activity for each advertisement in isolation. In Stage 3, participants were presented with questionnaire, answering some question about the ice cream, and made binary choices between the main ice-cream and other ice-cream they already familiar with. To analyze the EEG data, well-established method - ERP (Nunez and Srinivasan 2006) was used, the general waveform for each electrode is averaged across all repeated presentations of the same product, time-locked to the stimulus presentation. We export the BDF data file for each participant from the EEG lab experiment. In figure-2, there are some EEG signals of the participants in the experiment which were recorded on the frontal electrode Fz.

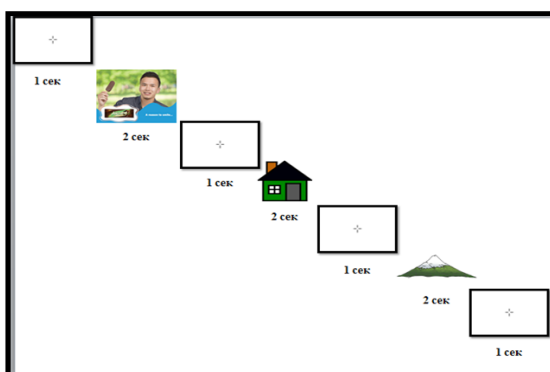


Figure-1. ppt-file for each EEG recording

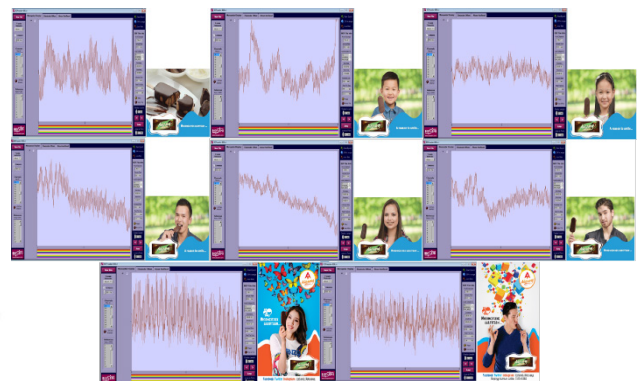


Figure-2. some EEG signals on the electrode Fz



DELAY IN THE ONSET OF PUBERTY OF INTRAUTERINE GROWTH RETARDED FEMALE RATS CANNOT BE RESCUED WITH HYPERNUTRITION AFTER BIRTH

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Perinatal undernutrition is known to disturb reproductive development, in particular by delaying the onset of puberty in certain species. Using a rat model, we studied whether hypernutrition after birth can rescue the delayed onset of puberty in intrauterine undernourished female rats. Pregnant rats were divided into two groups: the maternal normal nutrition (mNN, n = 8) and maternal undernutrition (mUN, n = 9) groups. In the mUN group, dams received 50% of the daily food intake of the mNN group from day 15 of pregnancy until delivery. Pups from both the mNN and mUN dams were then separated into two groups, based on their postnatal feeding conditions: control-normal nutrition (control-NN), control-hypernutrition (control-HN), Intrauterine growth retardation (IUGR)-normal nutrition (IUGR-NN), and IU-

GR-hypernutrition (IUGR-HN). Litter sizes of the hypernutrition groups were controlled to five pups per dam, and normal nutrition groups to 12-13 pups per dam. From postnatal day 30, pups were inspected daily for vaginal opening (VO). The age of VO in the IUGR-NN group was 35.7 ± 2.4 days (mean \pm SD), which was significantly delayed compared to that of the control-NN group (33.8 ± 0.8 days). The age of VO in the IUGR-HN group was 35.5 ± 2.3 days, which was significantly delayed compared to that of the control-HN group (33.5 ± 0.8 days). Interestingly, the age of VO did not differ between the IUGR-NN and IUGR-HN groups. In conclusion, maternal undernutrition delays puberty in female offspring, and this delay in puberty cannot be rescued with hypernutrition after birth.



T-CADHERIN: POSSIBLE REGULATOR OF PROGENITOR CELLS IN THE RAT ANTERIOR PITUITARY GLAND

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Adult progenitor cells are committed to replace cells after specific lesion and to supply specific types of cells on physiological demands. Rat anterior pituitary consists of hormone-producing cells and S100b-positive cells, which is known to act as progenitor cells. Our group previously reported that embryonic progenitor cells of anterior pituitary gland construct homophilic cell aggregates in tissue by expressing E-cadherin, which switches into N-cadherin when differentiate into hormone producing cells. Moreover, self-renewal of the stem/progenitor cell is regulated by Notch signaling, which belongs to the juxtacrine signaling that requires specific cell-to-cell adhesion by E-cadherin. In the present study, we investigated genes that are functionally associated with Notch signaling.

S100b-positive cells were isolated from transgenic rats (S100b-GFP rats) by utilizing FACS and cultured with or without Notch signal inhibitor, DAPT (50 μ M). By DNA microarray, we found expression of 108 genes were upregulated and 469 genes were downregulated by DAPT-treatment, including genes of T-cadherin, a unique protein of cadherin family that lacks intercellular domain. When we treated S100b-positive cells with DAPT, the percentage of BrdU-positive cells decreased to about a half. Simultaneously, expression of T-cadherin decreased by the same level. Immunohistochemically, we found that subpopulation of S100b-positive cells were positive for T-cadherin.



MUTATION IN *C12orf57* CAUSE A SYNDROMIC FORM OF MENTAL RETARDATION

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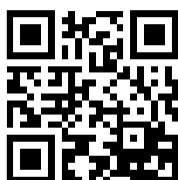
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Severe psychomotor retardation, absent speech, small stature, thin skeleton, delayed puberty, variable eye and heart anomalies were observed in nine patients from 3 consanguineous sibships of single tribal origin. Postnatal growth retardation with microcephaly for age was apparent from the age of 6 months old. However, all patients were normocephalic for their body size because of small stature. Brain imaging revealed variable features, included mild hypoplasia of corpus callosum, cerebellum and thickened frontal cortex. In 3 patients congenital cardiac defects were coupled with microphthalmia and eye colobomata. In remaining 6 patients had no eye or heart malformations. Described patients did not fit into diagnostic criteria of WARBM and could be a new mental retardation syndrome with variable phenotype.

We investigated *c12orf57* in the two-generation family, with 9 patients affected by a mental retardation, short stature, delay in walking, absent speech, microcephaly for age, macrocephaly for height, muscular hypotonia and double incontinence.

Our study found 2 functional mutations of *c12orf57* gene. A deleterious nucleotide change (c.155-166delAATTCGTGCTGC) in the *c12orf57* gene was in 6 patients and stop mutation (c.43C>T, p.Q15X) in the *c12orf57* gene was in 3 patients.

The described patients manifest a syndrome with phenotypic variability that include abnormal development of brain and eyes, delayed cognitive and motor milestone resulting from mutations in *c12orf57* gene.



THE ROLE OF GABAERGIC NEURONS IN DORSOMEDIAL HYPOTHALAMUS IN FEEDING REGULATION

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Background: Recent studies have shown the hypothalamic nucleus that regulate food intake, including Paraventricular nucleus (PVN) and Arcuate nucleus (ARC). Dorsomedial hypothalamus (DMH) has been known as an orexigenic center, since DMH lesion decreased food intake and body weight. However, the mechanism by which DMH promotes food intake is unclear. Particularly, the neuron that regulates food intake has not been characterized in this region. Aim of this study is to investigate the role of DMH GABAergic neurons in food intake and to elucidate the downstream neural pathway.

Methods: Channelrhodopsin (ChR) variant step function opsin (SFO) was used. Blue light (473 nm) stimulation opens the channel with longer duration than ChR. GAD1 is specifically expressed in GABAergic neuron. AAV2 vector was constructed for expressing YFP fused SFO channel under GAD1 promoter. Vector was injected to DMH bilaterally in wild type male mice (C57BL/6J). SFO was specifically expressed in GABAergic neuron. Food intake was measured

after optogenetical activation of DMH GABAergic neurons. Electrophysiological properties of DMH GABAergic neurons were measured using slice patch clamp.

Results: Optogenetical activation of DMH GABAergic neurons promoted food intake. DMH GABAergic neuron projected to PVN, where anorexigenic neurons are localized. Optical activation of axonal terminals of DMH GABAergic neurons at the PVN, increased inhibitory postsynaptic currents on PVN neurons and promoted food intake. Lowering glucose concentration depolarized half of DMH GABAergic neurons, while anorexigenic leptin hyperpolarized them. These results show orexigenic property of DMH GABAergic neurons.

Conclusion: DMH GABAergic neuron is activated by orexigenic signal and inactivated by anorexigenic signal. DMH GABAergic neuron projects to and inhibits satiety center PVN, and promotes food intake. These results indicate that DMH GABAergic neurons serve as orexigenic neurons.



USING THE STRENGTHS AND DIFFICULTIES QUESTIONNAIRE TEACHER'S FORM TO SCREEN FOR CHILD MENTAL HEALTH STATUS IN MONGOLIA

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Objectives: To determine emotional and behavioral problems among adolescents by teachers and to define risk factors for these emotional and behavioral problems. **Methods:** A cross-sectional study was conducted among selected and qualified middle and high school children's teachers. The "Strengths and Difficulties Questionnaire"(SDQ) was employed with the intention to measure psychosocial problems and strengths [prosocial behavior] in children between the ages 11-17, through a multi-informant methodology. The questionnaire consists of 25 items equally divided across five scales measuring: 1.) emotional symptoms; 2.) conduct problems; 3.) hyperactivity-inattention; 4.) peer problems; and 5.) prosocial behavior. Except for the prosocial scale, the combined scale [Total

Score] reflects total difficulties, indicating the severity and content of the psychosocial problems. The prosocial scale indicates the amount of prosocial characteristics a child displays. **Results:** In the SDQs answered by teachers, we obtained high scorings such as 8.9% for emotional symptoms, 20.2% for conduct problems, 13.4% for hyperactivity, 47.6% for interpersonal relationships, and a Total Score of 33.4%. **Conclusion:** Mongolian adolescents have emotional and behavioral problems as confirmed by the Total Scores by teachers 33.4%. The SDQ confirmed that an adolescent's age, gender will influence their emotional and behavioral well-being.

Keywords: Emotions, Adolescent, Mental Health, Adolescent behavior



STUDY ON PSYCHOLOGICAL WELL BEING OF ADULTS

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Psychological well-being and self care and lifestyle balance of adults are related with each other.

15 female participants between age of 20-25, 15 female participants between age of 26-40, 15 female participants between age of 41-65, 15 male participants were selected

Psychological well-being is based on comparative research within education, work year, child status, marital status, monthly income, age, sex. This study is based on comparison between sexes. For female participants, healthy lifestyle couldn't become a factor for psychological well-being. For male participants, psy-

chological well-being in terms of personal development or the will to develop further and to see their advantage, not to regret for their past is related to healthy lifestyle in certain amount.

To range in age, psychological well-being of 20-25 years old and 26-40 years old are significantly related to healthy lifestyle. However, participants between 41-65 years old, psychological well-being and healthy lifestyle have no related. Thus, shows that the source of satisfied life for participants ranging in this age is the well-being of their children.

Keyword: Psychological, well being, self care, lifestyle



STUDY OF POSTPARTUM DEPRESSION AMONG URBAN WOMEN AND SOME RISK FACTORS

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Background: Postpartum depression is a disorder which comes out with symptoms such as emotional distress, crying, mental instability, anger, anxiety and decrease of caring of newborn due to tiredness and frustration within one year after delivery. Postpartum depression is closely related with biological, social and psychological factors. **Purpose:** To diagnose postpartum depression on its early stages and to determine its impacts of family, society and economic factors. **Methods:** Survey conducted between Dec, 2016 to Feb, 2017 based on family clinics and vaccination cabinets of 6 districts in Ulaanbaatar. Totally 240 mothers who have 1-2 months newborns was randomly selected by cross-sectional design. Survey questionnaire was entered in to the "lime survey" web based software and filled by participants in internet environment using desktops, laptops, ipads, and smartphones. **Results:** 241 women aged 19-41 were involved and average age was 29 ± 5.2 . Referring to the age group there were 53 (22%) women under age of 24, 81 (33.6%) women at age of 25-29, 62 (25.7%) women at age of 30-34 and 45 (18.7%) women above age of 35. When we conducted Edinburgh test for depres-

sion, the reaction of depression was found in 131 (55.2%) of total participants and reaction of anxiety was found in 130 (53.9%) of total participants via GAD7 test for anxiety.

Comparing the average score of the tests with some indicators using Independent T test the average score of anxiety of married women was lower than single women with statistical significance ($p < 0.005$). It indicates that single women are more tend to be involved at anxiety reaction. Unwanted pregnancy affects to reaction of depression and anxiety but delivery complications affects to anxiety reaction more than unwanted pregnancy which has statistical significance ($p = 0.000$). Correlation method used for determining the depression and anxiety, strong correlation ($r = 0.891$) was found in as result. Anxiety lead to suicidal ideas more than depression which has statistical significance ($p = 0.000$). **Conclusion:** 55.2% of survey participants has reaction of depression and it was more significant in 25-29 aged women. Conditions of family, unwanted pregnancy and delivery complications lead to reaction of depression and anxiety. **Keywords:** anxiety, unwanted pregnancy, delivery complications



IN CLINICAL ISSUE OF ALCOHOL ABUSE

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Introduction: Currently, 2 billion people consume alcohol, 1.8 million deaths are reported due to the alcohol consumption worldwide every year which comprises 3.2% out of total death rate. It is estimated that there are 76.3 million people have alcohol abuse. From 1971 to 2000, among the mental disorders, alcohol abuse has 5 fold increase. In Mongolia, like other countries, alcohol abuse is tend to increase. According to review of 15 developed countries in last 40 years alcohol abuse is increased 10 to 20 times higher. In Mongolia, alcohol abuse has 2 fold increase for last 10 years. Numerous researchers consider that alcohol consumption, alcohol related consequences are urgent issue to public health and socio - economic situation in Mongolia.

Goal: To define clinical types and some influence factors of alcohol abuse of adults in Ulaanbaatar

Methodology: In total of 322 participants were selected by multi-stage random sampling

method with analytic model. In this study, 13 itemed-general population questionnaire and 12 questions to define clinical types of alcohol abuse were used. Ethical permission of this study was approved by Ethical Committee of MNUMS on 6th of June, 2016. SPSS 21 was used for statistical processing of this study.

Results: In total of 322 people, 295 males and 27 females whom were aged between 19 to 64 years, participated in our study. The mean age of participants was 42.18 ± 10.72 . According to their educational background, 143 (44.4%) participants had secondary education. Majority (45.47%, n=148) of participants has alcohol withdrawal state and it has significant correlation with their professions ($p=0.021$).

Conclusion: Majority (n=148) of participants has alcohol withdrawal state and it is like to be shown on people with professions ($p=0.021$).

Key words: Alcohol abuse, alcohol dependence, alcohol related psychosis, alcohol withdrawal state, delusion



USE OF EVENT-RELATED POTENTIALS IN THE STUDY OF SCHIZOPHRENIA

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Introduction: The use of electrophysiological endophenotypes is well established in schizophrenia research for genetic analysis as well as in more general neuroscience biomarker approaches. Electrophysiological markers include (inter alia) the Mismatch Negativity (MMN), P50 suppression ratio (P50), auditory oddball P300 (P300), and Antisaccade (AS) tasks.

This report details the validation of compatibility between the Western Australian Family Study of Schizophrenia (WAFSS) dataset (Perth, Australia), and a pilot dataset from the National Centre for Mental Health (NCMH) in Ulaanbaatar, Mongolia. The working hypothesis is that the psychiatric and endophenotype profiles in the two datasets are sufficiently similar to allow data compatibility for genetic analysis.

Materials and methods: To replicate the WAFSS ERP approach at NCMH, a new portable ERP recording system was deployed. Unfortunately the portable system inherently introduces several inconsistencies with the original system. This marks a variation from the original WAFSS processing. The relevant trace was used for each ERP (MMN, P50, P300). **Results:** Endophenotype values were each significantly “worse” in the proband group of the NCMH cohort, for MMN ($t=1.65$; $p=0.05$), P300 ($t=-2.02$; $p=0.02$) and AS ($t=2.12$; $p=0.02$). The comparable values from the WAFSS cohort showed the same behaviour for MMN ($t=4.52$; $p<0.01$), P300 ($t=-3.35$; $p<0.01$) and AS ($t=3.93$; $p<0.01$).

All significant endophenotype differences

were in the direction predicted from previous studies. Previous findings have defined “worse” values in Proband groups for MMN (less negative amplitude), P50 (less suppression, higher ratio value), P300 (lower amplitude) and AS (higher error rate value).

Discussion: This comparison has shown that there is not a significant difference ($\alpha=0.05$) between the NCMH and WAFSS populations (patient and control). This outcome is deemed sufficient to allow pooled analysis of genetic and electrophysiological data in future studies.

The absolute value of the electrophysiological endophenotypes was different between the two sites, but the relative values were the same. The control group showed “better” responses than the patient group.

The raw amplitude data for both ERP features (MMN, P300) is significantly lower from the Mongolian cohort in both Patient and Control groups.

The consistency in endophenotype behaviour between cohorts legitimizes the application of the genetic approach in Mongolia. DNA extraction and analysis for this cohort is continuing and, although for smaller numbers, preliminary results can be compared with the Australian cohort.

Conclusion: Results of ERP studies is deemed sufficient to allow analysis of genetic and electrophysiological data in future studies.

Key words: event-related potential, schizophrenia



APPARENT DIFFUSION COEFFICIENT MAPS IN THE ASSESSMENT OF SURGICAL PATIENTS WITH LUMBAR SPINE DEGENERATION

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Introduction. Low back pain is an important socioeconomic and health problem of the modern society and a major cause of disability in adults of working age. The most frequent causes of low back pain include various degenerative pathological conditions of the lumbar spine, for example lumbar disk herniations, spondylolisthesis, degenerative disk disease, many of which have indications for surgery when the conservative treatment fails to provide relief. Previous studies focused on the assessment of ADC maps in healthy IVDs or age and degeneration related ADC changes. Such studies were performed on healthy volunteers or patients seen in outpatient settings.

Purpose. To assess the utility of apparent diffusion coefficient (ADC) maps for the assessment of patients with advanced degenerative lumbar spine disease and describe characteristic features of ADC maps in various degenerative lumbar spinal conditions.

Materials and methods. T1-weighted, T2-weighted and diffusion weighted (DWI) MR images of 100 consecutive patients admitted to the spinal surgery service were assessed. ADC maps were generated from DWI images using Osyrix software. The ADC values and characteristic ADC maps were assessed in the regions of interest over the different pathological entities of the lumbar spine.

Results. The study included 452 lumbar vertebral segments available for analysis of ADCs. Characteristic ADC map features were identified for protrusion, extrusion and sequester types of

lumbar disk herniations, spondylolisthesis, reactive Modic endplate changes, Pfirrmann grades of IVD degeneration, and compromised spinal nerves. Compromised nerve roots had significantly higher mean ADC values than adjacent ($p < 0.001$), contralateral ($p < 0.001$) or adjacent contralateral ($p < 0.001$) nerve roots. Compared to the normal bone marrow, Modic I changes showed higher ADC values ($p = 0.01$) and Modic 2 changes showed lower ADC values ($p = 0.02$) respectively. ADC values correlated with the Pfirrmann grading, however differed from herniated and non-herniated disks of the matched Pfirrmann 3 and 4 grades.

Conclusions. Quantitative and qualitative evaluation of ADC mapping may provide additional useful information regarding the fluid dynamics of the degenerated spine and may complement standard MRI imaging protocol for the comprehensive assessment of surgical patients with lumbar spine pathology. ADC maps were advantageous in differentiating reactive bone marrow changes, and more precise assessment of the disk degeneration state. ADC mapping of compressed nerve roots showed promise but requires further investigation on a larger cohort of patients.

Keywords: diffusion-weighted imaging, apparent diffusion coefficient, lumbar spine, degenerative lumbar spine disease, disk herniations.



CLINICAL FEATURES OF TEMPORAL LOBE SEIZURE

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Temporal lobe epilepsy (TLE) represents the most common and likely to be medically refractory focal epilepsy in adults, with an estimated prevalence of 40% among epilepsy patients. The objectives of this study were to determine TLE seizure semiology. Hospital-based prospective, case study included 51 individuals with TLE aged 15-65. A questionnaire, clinical examination were performed to evaluate seizure semiology. Of the 51 patients, 27.45% presented with secondary generalized seizure (SGS), 56.86% complex partial (CPS), and 15.69% with simple partial seizure (SPS). The mean age at epilepsy onset was 19 ± 12 years. In 90.2% patients the latent

period of seizure was up to 5 years. Of the all patients, 92.16% presented seizure with aura commonly with complex aura (68.09%), 68.63% had more than 2 seizure per month, for 54.9% seizure lateralized in automatism. TLE semiology was presented as a CPS with orofacial, unilateral hand automatism with more than 2 seizure per month. The risk to progression of epilepsy decreases in patients without psychomotor automatism and increases in patients who have more than 2 seizure per month.

Keywords: Semiology, Temporal lobe epilepsy, Aura, Complex partial seizure



TREATING EPILEPSY WITH KETOGENIC DIET IN MONGOLIA, CASES

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A ketogenic diet(KD) which contains high amount of fat, low carbohydrate and protein is a dietary approach to treat intractable epilepsy and effective and feasible method which has been demonstrated by many previous studies. However the best of our knowledge, there are no reports of its application in Mongolia. The idea of initiating a ketogenic diet after seeing many intractable cases was discussed with my neurology department in Mongolia. Authors planned to perform KD for intractable epilepsies with regard to its low cost and simple procedure. By support of Severance Children's Hospital Prof. Heung Dong Kim donated some ketogenic diet milks and planned to perform ketogenic diet therapy in September 2016. Since September, 2016 we carried out KD, according to the protocol total of 4 patients, Lennox Gastaut Syndrome 2, Infantile spasms 1, Dravet

syndrome 1, 4:1ratio (75%), 3:1 ratio (25%). The first candidate is a 9 years-old girl with epilepsy with unknown etiology. Her seizures couldn't be controlled by more than 2 antiepileptic drugs.

The authors successfully applied ketogenic diet for her. Her seizures were completely controlled after 2 weeks therapy. Her health condition was improved after that. The authors get much experience from this case for further developing ketogenic diet in Mongolia. This is the first report that ketogenic diet was applied to control intractable epilepsy in Mongolia. All patients with KD and their caregivers are now under meal plan and taught meal preparation by dietician, have monthly medical follow-up regularly.

Key words

Ketogenic diet, intractable epilepsy, Mongolia



CORRELATION OF 3D ARTERIAL SPIN LABELING AND MULTI-PARAMETRIC DYNAMIC SUSCEPTIBILITY CONTRAST PERFUSION MRI IN BRAIN TUMORS

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Purpose: Arterial spin labeling (ASL) is an alternative method to Dynamic susceptibility contrast (DSC) perfusion MRI for brain tumors. However, ASL cerebral blood flow (CBF) can be easily affected by transit time. DSC MRI derived time to maximum of the residue function (Tmax) is possible to assess the transit time on ASL.

Materials and methods: Thirty patients with brain tumors were studied using ASL and DSC MRI. The relative cerebral blood flow (rCBF), relative cerebral blood volume (rCBV), Tmax, and mean transit time (MTT) were obtained from DSC MRI. The ratios of the parameters were estimated and analyzed.

Results: ASL CBF ratio correlated with the DSC rCBF ratio ($r = 0.78$, $p < 0.001$) and DSC rCBV ratio ($r = 0.74$, $p < 0.001$). There was a moderate correlation between ASL CBF ratio and Tmax ratio ($r = -0.43$, $p < 0.05$) in brain tumors.

Conclusions: ASL CBF strongly correlated with DSC rCBF and rCBV. In addition, a negative correlation was found between ASL CBF and Tmax in brain tumors, indicating that these parameters would be affected by transit time. This may explain why ASL CBF is different from DSC rCBF and rCBV. The decreased DSC Tmax value may suggest high vascularity in a tumor.



COMPUTED TOMOGRAPHY IN DIAGNOSIS OF ACOUSTIC NEUROMA

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Acoustic neuromas are relatively common benign tumors that usually arise from the vestibular division of the eighth cranial nerve and characteristically occur in the cerebellopontine angle and internal auditory canal (IAC). Conventional radiologic diagnosis depends on the use of plain radiographs, conventional tomography, contrast-enhanced computed tomography (CT). Abnormalities on plain radiographs and conventional tomograms depend on the development of bony changes that may be present when the tumor is small. Contrast-enhanced CT is accurate in the detection of acoustic neuromas greater than 1 cm in size, but false negatives may occur in small or purely intracanalicular tumors. Most vestibular schwannomas have an intracanalicular component, and often result in widening of the porus acusticus resulting in

the trumpeted IAM sign, which is present in up to 90% of cases. In a minority of cases (~20%) they are purely extra canalicular, only abutting the porus acusticus.

Usually, there is a small **CSF cap** between the intracanalicular portion and the cochlea; Occasionally, these tumours grow laterally through the cochlea (transmodiolar) or vestibule (transmacular) into the middle ear. Extracanalicular extension into the cerebellopontine angle can lead to "ice cream cone" appearance. CT findings; erosion and widening of the internal acoustic canal. The density of these tumours on non-contrast imaging is variable, and often they are hard to see, especially on account of beam hardening and streak artefact from the adjacent petrous temporal bone. Contrast enhancement is present but can be underwhelming, especially in larger lesions with cystic components.



DIAGNOSTIC IMAGING OF THE PITUITARY AND PARASELLAR REGION

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Introduction: Pituitary (hypophysis), the secreting gland located in the sellaturcica, has fascinated the scientists since ages. In 1543 the Belgian scientist Andreas Vesalius described the anatomy of pituitary gland for the first time. He believed that pituitary produces mucus, which is secreted from the brain into the nasal cavity. This is why pituitary was called the mucous gland (glandulapituitaria; pituita = mucus). Pituitary gland, also called as „master gland“ plays the special role in the body. There are plenty of pathological changes with different clinical and radiological appearances of lesions located in sellar and parasellar region. The knowledge of pituitary anatomy and function, as well as of the characteristic changes in size and shape of the pituitary throughout the life and special physiologic conditions, is mandatory for the correct diagnosis and therefore these factors have to be taken into account before assessing pituitary abnormalities.

Imaging of pituitary gland: Introduction of imaging modalities, especially magnetic resonance (MR), and of modern methods of neurosurgery and pharmacotherapy revolutionised diagnosis and therapy of pituitary tumours. Currently, MR is the method of choice for imaging of the pituitary gland and the parasellar area. MR imaging protocol of pituitary and sellar region should consist of T1W1+C enhancing dynamic images in coronal and sagittal planes (slice thickness 3mm). Paramagnetic contrast

medium is administrated intravenously at the standard dose of 0.1 ml/kg BM and post-contrast T1-weighted images are taken in coronal and sagittal planes. MR examination enables visualization of many anatomic details of pituitary gland, such as: the anterior lobe, the posterior lobe, pituitary infundibulum, parasellar structures (cavernous sinuses, sphenoid sinus, suprasellar cisterns) and optic chiasm. The normal pituitary gland shows the homogenous signal intensity, which is isointense compared to the white matter signal on T1-weighted as well as on T2-weighted images Pituitary Adenomas. After contrast administration pituitary gland presents the homogenous strong enhancement. The posterior lobe of the pituitary demonstrates the characteristic high signal intensity on T1- and T2-weighted images, seen just in front of the sellar dorsum and clearly differentiated from the anterior pituitary lobe. The high signal intensity of the posterior lobe is especially clearly visible on the sagittal planes and it is called “posterior pituitary bright spot”. This high intensity signal observed in the posterior lobe is believed to be related to intracellular droplets of lipid or lipid-like material in pituicytes (astrocytic glial cells). However, the recent studies using the sequences with fat suppression have not confirmed the presence of fat tissue within the neurohypophysis. Absence of this high intensity signal have been reported in patients with central diabetes insipidus. It has to be stressed that some normal

subjects lack this hyperintense.

The normal pituitary gland undergoes the characteristic changes in size and shape throughout the life, which have to be taken into account before assessing pituitary abnormalities. In neonates, the pituitary gland is typically convex and shows a higher signal intensity compared to the brain stem on T1-weighted images. This appearance persists for about 2 months, after which the pituitary will present with a flat superior surface and a signal intensity similar to the signal of the pons, what is typical for the older children. Throughout childhood, the pituitary reveals a slight but definite growth in all dimensions. The upper surface is flat or mildly concave and the height of the pituitary in the sagittal plane is about 2-6mm, there are no differences between girls and boys.

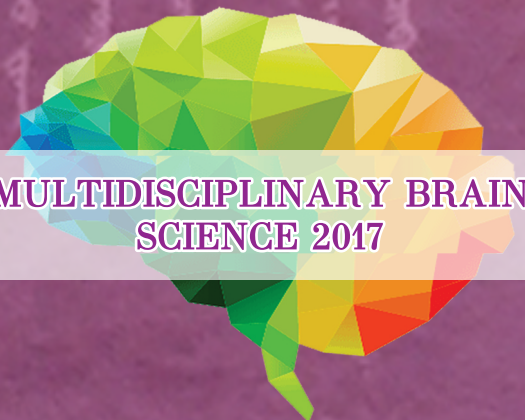
At puberty the pituitary gland demonstrates the huge changes in size and shape, becoming larger than at any other time of the whole life. In girls the gland can reach the height of 10mm, while in boys it may measure 7-8mm. Furthermore, in pubertal girls the gland can also proj-

ect above the sella and present with a marked convexity of its superior surface. Physiologic hypertrophy of the pituitary can be observed during pregnancy, when the gland may increase in weight by 30%-100%. By the third trimester the pituitary usually measures even 10mm of height and shows the typical convex superior surface. It has to be stressed that during pregnancy and the 1st postpartum week, the pituitary gland demonstrates the high signal intensity on T1-weighted images, like in the neonate period. From young adulthood until middle age, the pituitary glands of both sexes show usually stable appearance. Beyond age of 50 years, progressive involution of the gland is observed, what is probably related to the decrease in pituitary activity during menopause and andropause period. It has to be emphasized that in about 30% of this population the high signal intensity of the posterior pituitary lobe is not visible, as well as the empty sella syndrome is more commonly noted, but these changes are typical signs of normal aging process.

POSTER PRESENTATION

- PP-01 Minimally invasive techniques for the lumbar spine surgery: experience learned from more than 3500 cases
- PP-02 The study of the features of teens development
- PP-03 Bone morphogenetic proteins' influence on intervertebral disc cell proliferation in vitro
- PP-04 Study of some coronary atherosclerotic biomarkers
- PP-05 Research on the types and levels of thinking skills of 6 year-old learners
- PP-06 Diffusion-weighted imaging of intramedullary spinal cord tumors: prediction of tumor grade and association with histopathological parameters
- PP-07 Technical aspects of microsurgical vascular training in neurosurgery

**MULTIDISCIPLINARY BRAIN
SCIENCE 2017**





MINIMALLY INVASIVE TECHNIQUES FOR THE LUMBAR SPINE SURGERY: EXPERIENCE LEARNED FROM MORE THAN 3500 CASES

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Background. In modern spinal surgery, various kinds of decompressive-stabilizing interventions from the anterior, lateral and posterior approaches are used to treat degenerative diseases of the lumbar spine. At present, there is no single surgical tactic for their use, and the results of such interventions are controversial.

Objective. Conduct an analysis of the results of surgical treatment of patients with degenerative diseases of the lumbar spine of minimal invasive anterior, lateral and posterior approaches.

Material and Methods. For the period from 2007 to 2017 at clinical hospital of the Neurosurgery Department Irkutsk State Medical University of the Irkutsk Railway Clinical Hospital performed more than 5,000 spinal surgical procedures on the lumbar spine, of which 3512 decompression-stabilizing interventions were performed from the minimal invasive anterior (n=1052), lateral (n=436) and posterior (n=2024) of accesses using modern retractor systems, optical magnification and microtools. All patients (1946 men, 1566 women) at the age of 39 (29;47) carried out a comprehensive clinical and instrumental analysis, including a neurological examination, magnetic resonance tomography, multispiral computed tomography, functional spondylography, morphological and immunohistochemical analysis of postoperative material. The study examined the level of pain

on visual standard pain scale (VAS), quality of life Oswestry (ODI), clinical outcomes on scales Macnab as well as The results of additional tests: spondylography and neuroimaging (MRI, MSCT) data.

Results. In the postoperative period, there was a statistically significant decrease in the intensity of the pain syndrome ($p=0.002$), improvement in the functional state ($p=0.003$), with excellent and good outcomes accounting for 85%. In a long period of formation of a full-blown bone block, 91% of patients were noted, the incidence of postoperative complications (insufficiency of the fixing structure, pseudoarthrosis development, degeneration of adjacent segments) was 4% (n=140).

Conclusion. The complex clinical and instrumental examination with the isolation of the leading pathomorphological substrate, as well as the possession of any methods and methods of surgical interventions, allows the patient to choose objectively better surgical technology and optimize the long-term clinical and radiologic results of decompressive-stabilizing spine in patients with degenerative diseases. Key words: lumbar spine, degenerative disease, anterior lumbar interbody fusion, direct lateral interbody fusion, transforaminal lumbar interbody fusion, minimal invasive spine surgery.



THE STUDY OF THE FEATURES OF TEENS DEVELOPMENT

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Objectives: Study the features of teenage development

Objectives of the study:

- o Study parallels and concepts of adolescent children's social development
- o To translate the methodology for teens' development and prepare for the research
- o Collect and analyze data on the development of teenage social development features
- o Evaluate the findings of investigating the characteristics of adolescent children's social life with some of the results of the school's psychological features

Research hypothesis: Family and school environments are important for the development of teens' social development

Research methodology:

- 1) Methods of self-assessment (T.W.Dembo, S.Ya.Rubinshtein)
- 2) Comprehensive Express Diagnostic Testing for the Socio-Psychological Development of Children's Development (T.W.Dembo, S.Ya.Rubinshtein)
- 3) Color Diagnostic of Psychological Situation of Early Childhood School (A.O.Prokhorov, G.N.Gening)

Objectives: A total of 50 students from Ulaanbaatar secondary school 6-9,3-5

Practical importance of research: Adoption of adolescent survey results can be compared with other research findings



BONE MORPHOGENETIC PROTEINS' INFLUENCE ON INTERVERTEBRAL DISC CELL PROLIFERATION *IN VITRO*

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Introduction. Degeneration of the intervertebral disc (IVD) is a complex process involving: changes in IVD nutrition, decreased cell density and viability, qualitative and quantitative changes in extracellular matrix, as well as changes in disc biomechanics. Bone morphogenetic proteins (BMP) change the cellular expression of extracellular matrix components. In the early stages of IVD degeneration this can be the basis for biological treatments intending to regenerate the structure and function of the IVD. The success of this therapy depends on the presence of a sufficient number of viable cells.

Aim. To investigate the proliferation of IVD cells under the influence of bone morphogenetic proteins (BMP).

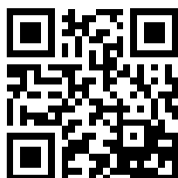
Material and methods. Healthy human annulus fibrosus and nucleus pulposus cells were cultured in 1) control medium, and 2) medium supplemented with BMP-2, 3) BMP-7, and 4) BMP-14. Medium was changed every two days. Daily cell counts were collected from phase contrast micrographs using the FIJI program. On the 4th day, cells were fixed and stained with phalloidin for F-actin and DAPI for nuclear DNA, and imaged using a laser confocal microscope. The growth rate for cells in each condition were calculated by mathematically modeling the cells

in their exponential growth phase. Statistical processing was performed in Microsoft Excel and Statistica 9.0 software.

Results. Growth rates of annulus fibrosus and nucleus pulposus cells were not significantly affected by the presence of BMPs. The growth rate was the same for both cell types. When performing histochemical staining for the actin cytoskeleton, NPCs and AFCs showed similar morphological forms. Cells were spindle shaped with long protrusions and cell morphology did not appear qualitatively different between cell types.

Conclusion. Bone morphogenetic proteins' potential as regenerative therapies are supported by their influence of extracellular matrix synthesis rather than their stimulation of cell proliferation. The changes in IVD cells' nutrient consumption under the influence of growth factors requires further investigation.

Acknowledgements. The authors thank the Russian Science Foundation, (Project no. 15-15-30037), for their financial support of this work. **Key words.** intervertebral disc, degeneration, bone morphogenetic protein, cell proliferation



STUDY OF SOME CORONARY ATHEROSCLEROTIC BIOMARKERS

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Myocardial ischemia disease is explained by atherosclerosis, structural and functional failure of lipid metabolism, blood circulation, endothelial cell and cytokines, complement system, adhesion molecules, growth factors. Today, in the world, There is no complete work on atheros pathogenesis. But it is still updating in different ways. Contemporary studies regarding to atherosclerosis are rarely found in Mongolia. Thus it was served as the background of the recent study.

Purpose: Determine the serum levels of some adhesive molecules and growth factors, estimate their pathogenetic roles in coronary atherosclerosis, and conduct correlation study on the structural changes of coronary walls.

Methods and materials: The study was conducted by the case control model. The serum of 354 persons served as the materials in DuoSet® ELISA Development Systems (*RandD, USA*) to determine the levels of biomarkers such as ICAM1, VCAM1, LOX1, VEGFA. A total of 54 cadavers' coronary artery tissues were used in the immunohistochemical study to detect Anti-VCAM, LOX, VEGFA antibody (*Abcam, UK*).

Results: We compared the case and control groups: the level of serum VCAM1 (1294.13 pg/ml, *CI 1282.88; 1301.99*, $p=0.001$), ICAM1 (2674.17 pg/ml, *CI-2570.52; 2749.7*, $p=0.001$), LOX1 (928.0 pg/ml, *CI-847.01; 965.41*, $p=0.001$), VEGFA (65.7 pg/ml, *CI-55.02; 93.99*, $p=0.004$) increased in the case group. According to the high occlusion level of vessels the serum level of VCAM1 ($p=0.041$),

LOX1 declined in the early stages, and the VEGFA ($p=0.022$) increased in the advanced atherosclerosis changes. According to the morphological study the intima was thickened, extracellular lipid accumulation formed, collagen fibers increased and the scarring process started robustly because of the infiltration of the inflammatory cells. After all fibro-atheroma, atheroma, and neovascularization were shaped. In this case the VCAM1 detection was VCAM1⁺⁺ (38.8%, $p=0.002$, medium). In the advanced case endothelial cells felt of the wall and it leads to the thrombosis while the plaque calcified. The ulceration was strongly detected. The periphery of the lesions demonstrated neovascularization and muscular layer. In this case VEGFA was VEGFA⁺ (3.61%, $p=0.001$, weakly).

Conclusion

1. In the coronary atherosclerosis the level of serum VCAM1 (1294.13 pg/ml, *CI 1282.88; 1301.99*, $p=0.001$), ICAM1 (2674.17 pg/ml, *CI-2570.52; 2749.7*, $p=0.001$), LOX1 (928.0 pg/ml, *CI-847.01; 965.41*, $p=0.001$), VEGFA (65.7 pg/ml, *CI-55.02; 93.99*, $p=0.004$) increased compared with the control group. The serum level of VCAM1 ($p=0.041$), LOX1 ($p=0.034$) decreased in the early changes accordingly with the high occlusion levels, but the VEGFA increased ($p=0.022$) in the advanced cases.
2. Immunohistochemical tests showed that in the early stage, the VCAM1 was determined as VCAM1⁺⁺ (38.8%, $p=0.002$, medium), and the VEGFA – VEGFA⁺ (3.61%,

p=0.001, weakly).

The number of VCAM1 positive cells decreased (p=0.025) in the early coronary atherosclerosis changes and 0-II occlusion levels. But the VEGFA positive cells increased (p=0.032) during the advanced changes and III-IV occlusion levels.

3. Serum and histological tests shows that VCAM1 and VEGFA expressions served as the biomarkers during the early and advanced atherosclerosis changes, respectively.

Key words: Coronary atherosclerosis, ICAM1, VCAM1, LOX1, VEGFA, occlusion



RESEARCH ON THE TYPES AND LEVELS OF THINKING SKILLS OF 6 YEAR-OLD LEARNERS

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Background: During the learning process the children make certain operations, develop their language communicative ability, and start making some simple mental operations on their own. At the age of 6-7, realistic imagery is more developed and they become able to understand simple phenomena, or concepts, and possess a simple thinking skills as finding similarities and differences, comparing, classifying and sorting out and analyzing. The abstract thinking is more challenging for them at this stage.

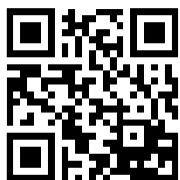
Aim of the Research: Aim of the current research is to conduct comparative study of the levels and types of thinking skills possessed by the first grade 6-year old learners of the general secondary school.

Conclusion: With the assistance from parents and teachers we conducted our experiment

using a certain number of activities such as classifying, comparing, summarizing, generalizing, and abstract thinking. The end results allowed us to conclude about the possibility of using these kind of tasks for developing thinking skills of 6-year old learners. The results were double checked and secured by other inquiries ($p \leq 0.05$; $p \leq 0.000$).

This indicates the possibility to improve the preparedness of 5-6 years old children for schooling by appropriately using linear and structured levels of thinking and activities like "understanding and intuitively think, understanding logical links and thinking, understanding and expressing verbally, understanding and describing, and abstract thinking".

Keywords: thinking, thinking skills,



DIFFUSION-WEIGHTED IMAGING OF INTRAMEDULLARY SPINAL CORD TUMORS: PREDICTION OF TUMOR GRADE AND ASSOCIATION WITH HISTOPATHOLOGICAL PARAMETERS

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Introduction. Diffusion-weighted imaging (DWI) is an imaging technique, which shows abnormalities of tissue structure by detecting changes in water mobility that is not available with other imaging techniques. DWI and apparent diffusion coefficient (ADC) measurements can be useful in determining tumor cell density and nucleus/cytoplasm ratio which are related to malign potential of the tumors.

Objectives. To analyze DWI findings of intramedullary spinal cord tumors (ISCTs) and to compare them with tumor grade, cell density, and proliferation index Ki-67 and to test a possibility of use of ADC to differentiate benign from atypical/malignant ISCTs.

Materials and methods. 37 ISCTs were analyzed. DWI was done using a multislice single-shot echo-planar imaging sequence. In all lesions, minimal ADC values (ADCmin) and mean ADC values (ADCmean) were estimated. Normalized ADC (NADC) was calculated in every case as a ratio ADCmean tumor/ADCmean white matter. All ISCTs were surgically resected and analyzed pathomorphologically. The tumor proliferation index was estimated on Ki-67 antigen-stained specimens. Cell density was calculated.

Results. The mean ADCmean value was higher in low grade ISCTs in comparison to high grade tumors (971 vs 856 $\times 10^{-3}$ mm²/s, $p = 0.006$). High grade ISCTs showed lower NADC

values in comparison to low grade tumors (1017 vs 1215, $p = 0.019$). There was no significant difference in ADCmin values between low grade and high grade ISCTs (745 vs 756 $\times 10^{-3}$ mm²/s, $p = 0.66$). There were no significant differences in cell density between low grade and high grade ISCTs (1274 vs 1215 cells, $P = 0.84$). The proliferation index was statistically significant higher in aggressive ISCTs in comparison to benign ISCTs (19.67% vs 3.19%, $P = 0.003$). Ki-67 was negatively associated with ADCmean ($r = -0.74$, $p < 0.001$) and NADC ($r = -0.63$, $p < 0.001$). No significant correlations between cell count and ADCmean ($r = -0.25$, $P = 0.26$) or NADC ($r = -0.36$, $p = 0.43$) were found. ADCmin correlated statistically significant with cell density ($r = -0.61$, $p = 0.006$) but not with Ki-67 ($r = -0.51$, $p = 0.421$). An ADCmean value of less than 853 $\times 10^{-3}$ mm²/s was determined as the threshold in differentiating between benign and malignant ISCTs (sensitivity 73.6%, specificity 74.6%, accuracy 72.1%).

Conclusions. High grade ISCTs had lower ADCmean values than low grade ISCTs. ADCmean correlated negatively with Ki-67 and ADCmin with tumor cell density. ADCmean can be used for distinguishing between benign and malignant ISCTs.

Keywords: diffusion-weighted imaging, apparent diffusion coefficient, intramedullary spinal cord tumors, index Ki-67, cell density.



TECHNICAL ASPECTS OF MICROSURGICAL VASCULAR TRAINING IN NEUROSURGERY

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Introduction. Microvascular anastomosis techniques are important for revascularization surgeries on brachiocephalic and carotid arteries, complex cerebral aneurysms, and even during resection of brain tumors that obstruct major cerebral arteries.

Objectives. Systematic analysis of models for the study and training of vascular microsurgery presented in the literature.

Materials and methods. We searched the literature for the bypass models using MEDLINE and EMBASE databases.

Results. In «dry» microsurgical training, various models created from artificial materials that simulate biological tissues are used. The next stage in training more experienced surgeons is to work with non-living tissue models. Microvascular training using live models is considered to be the most relevant due to presence of the blood flow. Training on laboratory animals has high indicators of face and constructive validity. Modern technologies allow access to highly accurate learning environments that are extremely similar to real environment.

Additionally, assessment of microsurgical skills should become an fundamental part of the current evaluation of competence within a micro-neurosurgical training program. Such an assessment tool could be utilized to ensure a constant level of surgical competence within the re-certification process. It is important that this evaluation be based on validated models.

We reviewed several models for the study and training of vascular microsurgery. Very few of these models have been validated. Validated simulation models become an increasingly important component of surgical education. Additionally, evaluation of microsurgical skills is becoming an important part of the current evaluation of the trainee's competence in a training program.

Conclusions. At more advanced levels, simulation models can be utilized to assess the level of competence of surgeons within the re-certification process. It is important that this evaluation be based on validated models.

Keywords: microvascular anastomosis, training, neurosurgery, «dry» training, «wet» training, live models.

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MULTIDISCIPLINARY BRAIN
SCIENCE 2017

*Altai Tavan Bogd mountain
in Mongolia*

Photography P. Boldbayar

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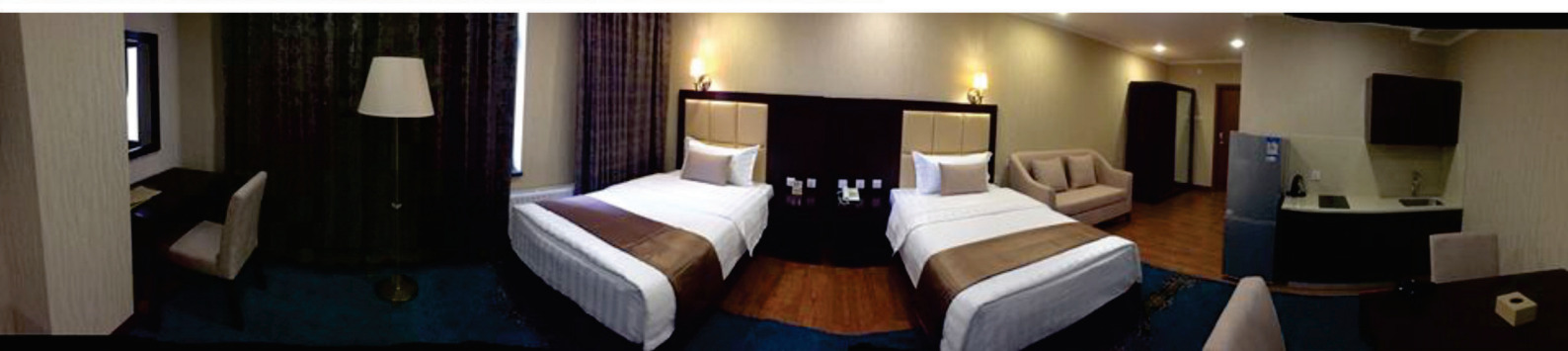
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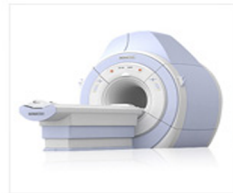
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