# The 3rd IBRO-APRC Ulaanbaatar Associate School

## Basic Techniques in Neuroscience

- INTERNATIONAL BRAIN RESEARCH ORGANIZATION
- BRAIN SCIENCE INSTITUTE, GRADUATE SCHOOL MONGOLIAN NATIONAL UNIVERSITY OF MEDICAL SCIENCES
- MONGOLIAN NEUROSCIENCE SOCIETY

**August 10-15, 2020**
**Ulaanbaatar, Mongolia**

# PROGRAM AT A GLANCE

| | Monday, 8/10/2020 | Tuesday, 8/11/2020 | Wednesday, 8/12/2020 | Thursday, 8/13/2020 | Friday, 8/14/2020 | Saturday, 8/15/2020 |
|---|---|---|---|---|---|---|
| **Titles** | Cellular Neuroscience | Molecular Neuroscience | Systems Neuroscience | Clinical Neuroscience | Multidisciplinary brain science 2020 | Multidisciplinary brain science 2020 |
| **09:00** | L1: Neuronal cell signaling | T3: Neuroanatomy | T9: Brain dissection/ Histology Immuno-histochemistry | G3: Neurotics/ Bioethics | Keynote lecture I | International Symposium on Frontiers of Neuroscience (part 1) |
| **10:00** | L2: Neuro-inflammation | T4: DNA extracting protocols | H1: Perfusion/ Cryostat sectioning (part 1) | | Plenary lectures | |
| **11:00** | Coffee break | | | | | |
| **11:15** | L3: Sensory circuits | T5: RT-PCR analysis | H1: Perfusion/ Cryostat sectioning (part 2) | G4: Case-based journal club | IBRO lectures I | Public Lectures on Brain Science (part 1) |
| **12:00** | L4: Stress-related disorders | T6: Immunohistochemistry | | | | |
| **13:00** | Lunch break | | | | | |
| **14:00** | T1: Cell culture techniques | T7: Stereotaxic surgery/ Tracing | H2: Stereotaxic ICV injection method | H4: Immunoblotting (part 1) | Keynote lecture II | International Symposium on Frontiers of Neuroscience (part 2) |
| **15:00** | T2: Cell viability assay | T8: Behavioral testing | | | IBRO lectures II | |
| **16:00** | Coffee break | | | | | |
| **16:15** | G1: Poster presentation tutorial | G2: Oral presentation tutorial | H3: Microscopy techniques | H4: Immunoblotting (part 2) | Neurology & Neuroimaging / Psychiatry & Social Psychology | Public Lectures on Brain Science (part 2) |
| | **L: Lecture, T: Tech-Talk, H: Hands-on session, G: Group discussion** | | | | | |

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**AUGUST 10-15, 2020**
**Ulaanbaatar, Mongolia**

# ORGANIZING COMMITTEE

## International Brain Research Organization

Asia/Pacific Regional Committee (IBRO-APRC)

Bong-Kiun Kaang (Chair, 2018)
Seoul National University, Seoul, South Korea

Battuvshin Lkhagvasuren (2019)
Mongolian National University of Medical Sciences
Ulaanbaatar, Mongolia

Melinda Fitzgerald (2016)
Curtin University and Perron Institute, Western Australia

Cheah Pike-See (2016)
Universiti Putra Malaysia (UPM) Puchong, Selangor, Malaysia

Aurnab Ghose (2019)
India Institute of Science Education and Research Pune, India

Yun Wang (2019)
Beijing University of Chinese Medicine and Pharmacology, Beijing, China

Tadashi Isa (2016)
Kyoto University, Kyoto, Japan

Wing-Ho Yung (2019)
Chinese University of Hong Kong, Hong Kong, China

## Brain Sciences Institute

Battuvshin L. MD., PhD.
Mandakhnaran D. MD., PhD.
Tumenjin E. MD., PhD.
Indra G. MD.
Enkhnaran T., MD.
Munkhjin M., MD.
Otgon Z. MBA.
Galindev B. PhD.
Chimeddulam E. PhD.
Enkhjin B. MD.
Purevjargal M. MD.

## Mongolian National University of Medical Sciences

Tsolmon J. Prof. President
Bayarmaa E. Prof
Tserenbat M. Ass. Prof
Damdindorj B. MD., PhD.
Darambazar G. MD., PhD.
Jambaldorj J. MD., PhD.
Erdenezaya O. MD., PhD.
Zesemdorj O. MD., PhD.
Choinyam B. MD, MSc.

## Volunteers

Khash-Erdene D, Ulemjjargal G, Batbayar M, Amarbayasgalant B, Uyanga A, Khorolsuren L, Khongorzul N, Enkhjin E, Jargalsaikhan G, Ulziikhuu T.


**Editors:**
Tsolmon J. Prof. President.
Battuvshin L. MD., PhD.
Damdindorj B. MD., PhD.

**Publication manuscript:**
Tumenjin E. MD., PhD.
Choinyam B. MD, MSc.
Enkhjin B. MD.
Khash-Erdene. D.

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# CONTENTS

# WELCOME MESSAGE FROM PRESIDENT OF THE MONGOLIAN NATIONAL UNIVERSITY OF MEDICAL SCIENCES

It is my pleasure to welcome you to Ulaanbaatar, Mongolia, for the 3rd IBRO/APRC Associate School that in co-organized by our university mongolian neuroscience society and the International Brain Research Organization (IBRO).

I would like to begin my messages by informing that there many delegates, participating in this associate school, including numerous new students. I feel very privileged to be among the brains of the Asian region, and the world, while you are focusing your attention on the incredible power of the human brain!

It is reassuring to note that, thanks to these associate schools over the years, you have gone above and beyond sharing good practices. In fact, you have also developed strong friendships, and created new opportunities for dialogue and connection. In today's world, where COVID-19 pandemic seems to be of a dangerous concern, especially within our region, this kind of relationship building and teaching practice is very essential. I would like to take this opportunity to urge all our authorities to ensure that the benefits of your work are made accessible to all their members of our associate school, irrespective of who they are, and where they come from. I am pleased to note that through your engagement, at this associate school, you are openly sharing and building upon profound scientific knowledge, by which, you are strengthening the global scientific community. When you, as scientists, experts, and academics, share your learning, you send a strong message, that cooperation is more powerful than any emergency situation, even worldwide pandemic. In this way, you are contributing to a culture of inclusive and participatory knowledge-building, which is a vital component of a healthy and sustainable culture of academics.

Therefore, I urge you to do more to encourage greater synergies, between our Brain Science Institute, Mongolian National University of Medical Sciences, and worldwide research centers, and well-known academic institutes in doing so, we can be secure, in the knowledge that we are working together, for the greater good of all. These should be the values that define us - values that represent our determination, to be of service to others. Before concluding, I would like to send a few words with the students present at this associate school.

I am sure that this associate school will open up many opportunities for you. You will meet leading figures in the field of neuroscience. You will also have the chance to network with your peers and educators. This is how dialogue among professionals begins. It is important to make the most of these opportunities, even while you are in the begining of your career .

I truly believe that, by working together, you will continue to promote safe spaces for scientific disciplinary. I am convinced that your cooperation and collaboration can be a driving force, to move science to new pastures, for the benefit of our global society. I urge you to continue to commit yourselves to the wellbeing of all humanity, to ensure that the dignity of a human person will always be at the center of all endeavors. I urge you also to continue to value the lived experiences, and the specific narratives, of vulnerable individuals, through an inclusive and participative approach to healthcare.

*Thank you for your attention, and I look forward to the outcomes of this associate school.*

Tsolmon Jadamba DDS, PhD

President, Mongolian National University of Medical Sciences

# GREETINGS FROM THE PRESIDENT OF BRAIN SCIENCE INSTITUTE

Dear Participants,

It is a great pleasure and honor for me to write this welcome address. Understanding the activity of a healthy and a diseased brain is a major focus point of neurosciences research.

Any alteration is a motion, and neuronal dynamics are some of the most sophisticated examples of such, positioned between basic natural and social dynamics in their complexity. Making progress in the field of neuroscience is thus one of the most significant global challenges of our time, with a lot of remaining questions.

How can the field cooperate with basic sciences such as biology, medicine, or chemistry? Are there universal concepts in neuroscience? Are modern computer learning devices sufficiently developed to meet the demands of current neuroscience? Are there analogous dynamics in mechanics, physics, and chemistry to deepen our understanding of mental activity?

I trust that our knowledge of the human brain will continue to evolve as we seek to answer these questions in the near future.

I deeply believe that our this Associate School supported by the International Brain Research Organization or IBRO will contribute greatly to develop future neuroscientists in Mongolia who will solve all the remaining questions in the future; and I think that is the beauty of our joint school.

Here before my words end, I also would like to express my deepest gratitude to the executives and members of the IBRO and APRC who supported the Brain Science Institute and Mongolian Neuroscience Society from the very first moment. The IBRO and all of its members are people who deserved to have such honors from the current and future neuroscientists of Mongolia.

*Thank you very much and I wish the best academic achievements to the Associate School.*

Battuvshin Lkhagvasuren MD., PhD.
Director, Brain Science Institute, MNUMS
President, Mongolian Neuroscience Society

## GREETINGS FROM THE DIRECTOR, GRADUATE SCHOOL, MNUMS

Dear attendees of the 3rd IBRO/APRC Associate School,

It is indeed my great honor to warmly welcome you all to the the 3rd IBRO/APRC Associate School, jointly held by Mongolian Brain University of Medical Sciences, and International Brain Research Organization (IBRO); and sincerely thank you for all your commitments and efforts made in preparing and presenting your valuable lessons and presentations at this associate school.

I also extend a warm welcome and gratitude to those of you who have joined us at the school to support your colleagues and to learn from the other presenters.

This year is particularly tough globally due to COVID-19 pandemics, and it makes our annual associate school stronger and valuable. I am sure there will be many new and exciting collaborations emerge from this year associate school. I would like to take this opportunity to thank the gallant organizing committee for making this associate school possible and a pleasurable experience.

I wish you all great enjoyment of this school and much success with your presentations and forming of new collaborations. In passing, I kindly ask that you stay on where possible and support other presenters over all 6 days of this school, in particular those members of this associate school who will be making their international scientific presentation and lessons.

*Long-live neuroscience!*

*Thank you very much!*

Damdindorj Boldbaatar MD., PhD.

Director, Graduate School, MNUMS

# GREETINGS FROM THE HEAD OF DEPARTMENT OF PATHOLOGY AND FORENSIC MEDICINE SCHOOL OF BIOMEDICINE MNUMS

It is with great honor and pleasure to welcome all participants to the 3rd IBRO/APRC Associate School, organized by the Mongolian National University of Medical Sciences.

Between September 2-7th, 2019, Department of Pathology, MNUMS, organized the 2nd IBRO/APRC Ulaanbaatar Associate School. Under the guidance of L.Sayamaa MD, Ph.D. and technician B.Uranchimeg, our department hosted various seminar sessions including Perfusion of a mouse brain, Cryostat sectioning of mice brain, Cresyl violet staining, Open field microscopy, and DAPI fluorescence staining of the pituitary gland in Neuroscience at the Pathology Department of Mongolia Japan Teaching Hospital.

Among the various researches conducted at our department, one of our pathologists, O.Enkhee conducted an outstanding Ph.D. study with the title "The study of molecular pathology of brain diffuse glioma among Mongolians" in 2020 and had the privilege to publish her study in an International medical journal registered in SCOPUS. This research is one of the leading works in the field of neuropathology, and I believe there will be many more to look forward to.

I am the General Specialist of Pathology at the Ministry of Health, Mongolia, and have been the President of the Mongolian Division of the International Academy of Pathology since 2019. My colleagues and I will actively partake in the activities and assist the Brain Science Institute by providing technical support for the histopathological reagent and human resource for training.

I express my deepest gratitude towards the organizing teams, faculties, and participants who worked towards the same goal of education and have continued making significant progress over the past years. I invite all selected participants with a warm welcome and hope this experience may enrich your sea of knowledge and later benefit your future research and career.

Professor Bayarmaa Enkhbat MD., PhD

Head of Department of Pathology and Forensic Medicine

School of Biomedicine MNUMS

President of Mongolian Laboratory Animal Science Association

## GREETINGS FROM THE COORDINATOR OF 3rd IBRO/APRC, BRAIN SCIENCE INSTITUTE

I am very thankful for working as a coordinator of 3rd IBRO/APRC. I am grateful for helping participants who wanted to improve their knowledge of neuroscience and brain science of world's latest updates. I wanted to show respect to professors who are becoming role-model to their next generation.

I extremely pleased to my hard-working faculties of Brain Science Institute and volunteers.

In nowadays, brain science has been developing with a high-speed in high-developed countries of the world. It is a great honor to be part of 7th International Brain Science Conference and 3rd IBRO/APRC7Associate School. It is new experiences to all participants, professors and my teammates of BSI during COVID-19 pandemic.

Eventually, I am glad to the all employees and medical doctors for collaborating with us to organize this conference and school successfully.

*I wish you all the best in your future endeavors.*

Tumenjin Enkhbat. MD., PhD.
Coordinator, Brain Science Institute, MNUMS
Lecturer, Department of Anatomy, Bio-Medical school, MNUMS

## FROM HOST ORGANIZER INSTITUTE

It is my great pleasure to express my appreciation to distinguished scientists, doctors, and invited speakers for involving the third IBRO-APRC Associate School on Mongolian National University of Medical Sciences.

The first IBRO-APRC Associate School at Mongolia was our first opportunity for educating and improving our knowledge and ability and giving a great motivation to new generation scientists. Now the third IBRO-APRC Associate School is giving us more and more chances for improving our experience and building our tight relationships.

Mongolian Brain Science Institute was established in 2019 which is one of important parts of MNUMS. Our mission is to develop brain science by translating up-to-date knowledge and fundamental technologies of neuroscience to the country by establishing a research platform for multidisciplinary studies to strengthen the health, productivity, and creativity of the population.

We are very grateful to be a host organizer of IBRO-APRC Associate School 2020. I hope that the third IBRO-APRC Associate School will be wider range based on last year experience. We once again warm heartedly welcome our participants to of IBRO-APRC Associate School 2020.

Galindev Batnasan, PhD
Principle investigator, Brain Science Institute, MNUMS
President of Mongolian Laboratory Animal Science Association

# MONGOLIAN NATIONAL UNIVERSITY OF MEDICAL SCIENCE

The Mongolian National University of Medical Sciences is a gem of an institution that has been a pioneer in medical education in Mongolia. The institution was known as the Mongolian National University of Medical Sciences was founded in 1942 as the Medical Faculty of the Mongolian State University. This marked the beginning of the history of modern medical science and practice in Mongolia.

In 1961, the Medical Faculty became independent of the Mongolian State University and was re-named as the Mongolian State Medical Institute. Soon after the Democratic Revolution of 1989, its mission was broadened, and it was reorganized as the National Medical University of Mongolia (NMUM). In 2003, the NMUM was restructured and organized as a multidisciplinary training and research center called The Health Sciences University of Mongolia (HSUM). On 1 Jun, 2014 our university changed its name from Health Sciences University to Mongolian National University of Medical Sciences.

The University supports excellence and innovation in academic programs, promotes excellence in research, scholarship, and teaching and is committed to attracting and supporting the best students and faculty who excel at teaching and research. With approximately 13,000 alumni who occupy over 90% of the medical professionals in the health care service across the country, the Mongolian National University of Medical Sciences continues to be a leader in providing an environment that empowers physicians and medical professionals to contribute to the development of the society. It has been recognized by the state in so many areas that reflect our commitment to excellence in education and health care.

**University overview:** MNUMS currently comprises of 11 colleges, 2 research institutions, 3 hospitals, and 2 resorts. Together with 650 faculties, more than 300 staffs.

Over 13,000 degree seeking students are enrolled in the Mongolian National University of Medical Sciences across our eleven schools – the School of Medicine, the School of Biomedicine, the School of Dentistry, the School of Public Health, the School of Nursing, the International School of Mongolian Medicine, the School of Pharmacy, the Graduate School, the Darkhan-Uul Medical School, the Dornogobi Medical School, and the Gobi-Altai Medical School in four different locations including the capital Ulaanbaatar city, Darkhan, Gobi-Altai, and Dornogobi provinces.

We founded Cyber University as the first of the Distance Education Centers in the higher education system of Mongolia in 2015. The main dimensions of education equity in Mongolia are geographical (urban versus rural) and demographic (nomads versus settled population). Overcoming the barriers, any physician or medical professional of all prefectures as well as international students can study online for Master Degree at Cyber University.

To improve the health coverage, we established the Infirmary Center for Students and Faculties that covers annual health check-up, annual dental examination, and vaccinations. Another role of the center is to educate those with up-to-date knowledge on addiction, infectious diseases, stress-related mental disorders, and air-pollution related disorders, so that they could prevent from suffering from such common health issues.

**Research and Innovation:** The Mongolian National University of Medical Sciences aims to become a research-based university through world-class research, establishment of advanced research institutes to implement international joint research projects and programs, introduction of advanced technologies, improvement of education-science-production cooperation, promotion of start-up companies and development innovation systems. There are 63 projects, 7 start-up companies and 28 laboratory research productions active within MNUMS. The University Core Laboratory was founded in 2015 with modern research and analysis tools and equipments. With the establishment of cell culture, molecular biology, protein chemistry, pathology and experimental animal laboratories, it has become possible for the academics, teachers and researchers of the university to publish their research and innovation works in prestigious international journals.

**International exchange programs:** MNUMS offers international exchange programs

For our students various ways to study, not only as degree-seeking students but also as short-term students such as academic exchange, visiting students as well as internships. A large number of international students in the past have enjoyed studying at Mongolia's most renown medical university and attended various programs including cultural, professional and social activities. Since the first student exchange agreement, MNUMS has signed a large number of academic exchange agreements with institutions all around the world. Such as: Montana State University, USA; Jichi Medical University, Japan; University of Tokushima, Japan; Yonsei University Health System, Korea; Seoul National University, Korea; Irkutsk State Medical University, Russia; Inner Mongolia University for Nationalities, PRC; Khuh Khot Medical University, Shanghai Jai Tong University PRC.

Concluding, in the final words, Mongolian National University of Medical Science is an academically charged progressive environment, having every element desired for the academic and professional excellence.

# INTERNATIONAL BRAIN RESEARCH ORGANIZATION

**History**

The International Brain Research Organization (IBRO) was founded in 1961 in response to the growing demand from neuroscientists in many countries for the creation of a central organization that would cut across world boundaries and improve communication and collaboration among brain researchers.

The origin of IBRO can be traced back to a meeting of electroencephalographers in London in 1947, which led to the establishment of an International Federation of EEG and Clinical Neurophysiology. At a conference of this group and others in Moscow in 1958, there was unanimous support for a resolution proposing the creation of an International Organization representing brain research worldwide.

IBRO was established as an independent, non-governmental organization, regulated by a Governing Council, which is now made up of over 80 neuroscience societies. The organization represents the interests of more than 75,000 neuroscientists around the globe.

**Mission**

IBRO (the International Brain Research Organization) is a union of neuroscience organizations with the aim to promote and support neuroscience training and collaborative research around the world. More than 80 international, national and regional scientific organizations constitute IBRO's Governing Council, which together with the six IBRO Regional Committees launch the educational programs that reach young neuroscientists in need of support and assistance. In addition, IBRO has partnerships with like-minded federations of scientific societies to identify priorities and help bridge gaps in knowledge, investment and resources in the field of the brain and related diseases, from development to aging.

The mission of IBRO is to:

- Develop, support, coordinate and promote scientific research in all fields concerning the brain;
- Promote international collaboration and interchange of scientific information on brain research throughout the world;
- Provide for and assist in education and dissemination of information relating to brain research by all available

BRAIN
SCIENCE
INSTITUTE

# BRAIN SCIENCE INSTITUTE

The Brain Science Institute (BSI) was founded in 2019 as a neuroscience research center in the Mongolian National University of Medical Sciences.

The mission of the BSI is to develop brain science by translating up-to-date knowledge and fundamental technologies of neuroscience to the country by establishing a research plat form for multidisciplinary studies to strengthen the health, productivity, and creativity of the population.

Our objectives are:

- Providing a platform for interdisciplinary interaction to understand nervous systems, including behavior
- Supporting the establishment of collaborative research programs
- Translating advances in neuroscience to enhance mental, physical, and social well-being of the population
- Promote education in the neurosciences to general public to develop teaching concepts that strengthen the personality collectivism, and creativity of the population
- Promote other activities that will contribute to the development of neuroscience

The institute is currently striving to partner with renowned institutions in Japan, Korea, China, and Taiwan with regard to agreements on research collaborations and exchanges so as to increase its international visibility and reputation.

BRI is able to work to full capacity with a strategic approach to win more grants to enhance the institute's research, to meet its mission. We appreciate your continues support and cooperation.

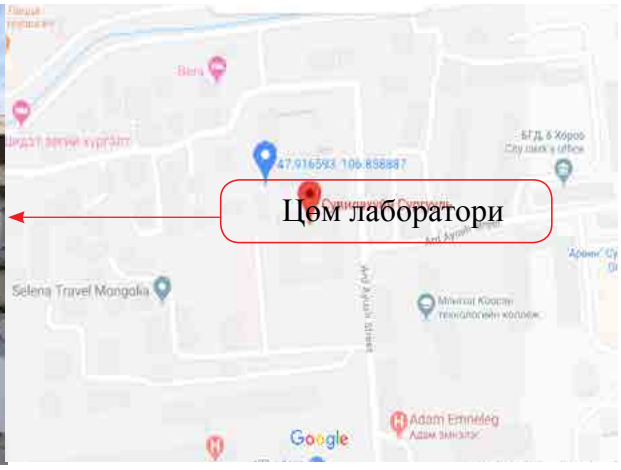
# ACCESS GUIDE

## LECTURE AND SEMINAR

*August 10th, 11th, 12th, 13th and 14th, 2020*
*Lecture Hall of Graduate school, MNUMS*


## HANDS ON SESSION

*Core laboratory*



# IBRO-APRC ASSOCIATE SCHOOL ON BASIC TECHNIQUES IN NEUROSCIENCE – THE 3rd ULAANBAATAR SCHOOL

PROGRAM (day by day activities)

IBRO-APRC Associate School on Basic Techniques in Neuroscience – The 3rd Ulaanbaatar School 2020 will provide a 6-day program including lectures, technical talks, interactive discussions (neuroethics), and hands-on techniques. All lectures will be conducted at the Mongolian National University of Medical Sciences.

| **Monday, August 10th, 2020: Registration** | |
|---|---|
| **Day 1: Monday, August 10th** | |
| 8:00-8:30 | Registration |
| 8:30-9:00 | a) Opening ceremony<br>b) School Memorial Photography<br>c) Interactions between school faculties and students |
| 9:00-10:00 | Lecture 1: Neuroinflammation |
| 10:00-11:00 | Lecture 2: Neuronal cell signaling |
| 11:00-11:15 | Coffee Break |
| 11:15-12:00 | Lecture 3: Sensory circuits |
| 12:00-13:00 | Lecture 4: Stress related disorder |
| 13:00-14:00 | Lunch |
| 14:00-15:00 | Tech-talk 1: Cell culture techniques |
| 15:00-16:00 | Tech-talk 2: Cell viability assay |
| 16:00-16:15 | Coffee Break |
| 16:15-17:00 | Group discussion 1: Poster presentation |
| **Day 2: Tuesday, August 11th** | |
| 9:00-10:00 | Tech-talk 3: Neuroanatomy |
| 10:00-11:00 | Tech-talk 4: DNA extracting protocols |
| 11:00-11:15 | Coffee Break |
| 11:15-12:00 | Tech-talk 5: Essentials in RT-qPCR |
| 12:00-13:00 | Tech-talk 6: Immuno-histochemistry |
| 13:00-14:00 | Lunch |
| 14:00-15:00 | Tech-talk 7: Stereotaxic ICV injection method |
| 15:00-16:00 | Tech-talk 8: Behavioral testing |
| 16:00-16:15 | Coffee Break |
| 16:15-17:00 | Group discussion 2: Oral presentation |

| Day 3: Wednesday, August 12th | |
|---|---|
| 9:00-10:00 | Tech-talk 9: Brain dissection/Histology |
| 10:00-11:00 | Hands-on session 1: Perfusion/Cryostat sectioning (part 1) |
| 11:00-11:15 | Coffee Break |
| 11:15-13:00 | Hands-on session 1: Perfusion/Cryostat sectioning (part 2) |
| 13:00-14:00 | Lunch |
| 14:00-16:00 | Hands-on session 2: Stereotaxic surgery/ Tracing |
| 16:00-16:15 | Coffee Break |
| 16:15-17:00 | Hands-on session 3: Microscope techniques |
| **Day 4: Thursday, August 13th** | |
| 9:00-11:00 | Group discussion 3: Neurotics/ Bioethics |
| 10:00-11:00 | Group discussion 4: Journal club |
| 11:00-11:15 | Coffee Break |
| 11:15-13:00 | Group discussion 5: Case-based journal club |
| 13:00-14:00 | Lunch |
| 14:00-16:00 | Hands-on session 4: Immunoblotting (part 1) |
| 16:00-16:15 | Coffee Break |
| 16:15-17:00 | Hands-on session 4: Immunoblotting (part 2) |
| **Day 5: Friday, August 14th** | |
| 08:00-08:30 | Registration |
| 08:30-09:00 | Opening Ceremony |
| 09:30-10:20 | Keynote lecture |
| 10:20-11:20 | Plenary lectures |
| 11:20-11:30 | Coffee Break |
| 11:30-13:00 | IBRO lecture |
| 13:00-14:00 | Lunch |
| 14:00-15:10 | Keynote lecture |
| 15:10-15:50 | IBRO lecture |
| 15:50-16:00 | Coffee Break |
| 16:00-16:30 | Neurology & Neuroimaging |
| 16:30-17:00 | Psychiatry & Social Psychology |
| **Day 6: Saturday, August 15th- The 8th Annual Meeting of MNS** | |
| 08:30-09:00 | Registration |
| 09:00-10:40 | International Symposium on Frontiers in Neuroscience (part 1) |
| 10:40-10:50 | Coffee Break |
| 10:50-13:00 | Public Lectures on Brain Science (part 1) |
| 13:00-14:00 | Lunch |
| 14:00-15:20 | International Symposium on Frontiers in Neuroscience (part 2) |
| 15:20-15:30 | Coffee Break |
| 15:30-16:30 | Public Lectures on Brain Science (part 2) |
| 16:30-16:40 | Closing Ceremony |
| 18:00-21:00 | After party event |

# IBRO-APRC ASSOCIATE SCHOOL ON BASIC TECHNIQUES IN NEUROSCIENCE – THE 3rd ULAANBAATAR SCHOOL

## FACULTY LIST

| № | Name | Position | Affiliation |
|---|---|---|---|
| 1 | Battuvshin Lkhagvasuren | Head, Brain Science Institute | Mongolian National University of Medical Sciences |
| 2 | Damdindorj Boldbaatar | Dean, Graduate School | Mongolian National University of Medical Sciences |
| 3 | Darambazar Gantulga | Dean, High School | Mongolian National University of Medical Sciences |
| 4 | Tserenbat Minjuur | Director, Institute of Medical law | Mongolian National University of Medical Sciences |
| 5 | Jambaldorj Jamiyansuren | Lecturer, Department of Molecular Biology | Mongolian National University of Medical Sciences |
| 6 | Erdenezaya Odkhuu | Lecturer, Department of Anatomy | Mongolian National University of Medical Sciences |
| 7 | Zesemdorj Otgon-Uul | Lecturer, Department of Pathophysiology | Mongolian National University of Medical Sciences |
| 8 | Mandakhnaran Davaadorj | Researcher, Brain Science Institute | Mongolian National University of Medical Sciences |
| 9 | Tumenjin Enkhbat | Lecturer, Department of Anatomy | Mongolian National University of Medical Sciences |
| 10 | Galindev Batnasan | Researcher, Department of Science and Technology | Mongolian National University of Medical Sciences |
| 11 | Tungalag Ser-Od | Specialist, Department of Administration, Monitoring and Evaluation | Mongolian National University of Medical Sciences |
| 12 | Tetsuya Hiramoto | Head, Department of Psychosomatic Medicine | Fukuoka National Hospital, Japan |
| 13 | Anurag Kuhad | Professor, University lnstitute of Pharmaceutical Sciences | Panjab University, Chandigarh, India |

# LECTURES, EXPERIMENTAL TALKS, AND INTERACTIVE DISCUSSIONS

- Lectures and technical talks:

Lecture 1: Neuroinflammation
(Tetsuya Hiramoto, Fukuoka National Hospital, Kyushu University, Japan)
Lecture 2: Pharmacological investigations beyond monoamines to discover new ther apeutic strategies for depression
(Anurag Kuhad, Professor, University lnstitute of Pharmaceutical Sciences, Panjab University, Chandigarh, India)
Lecture 3: Sensory circuits
(Battuvshin L, MNUMS)
Lecture 4: Stress related disorder
(Damdindorj B, MNUMS)
IBRO Lectures: (The 7th Annual Meeting of MNS)

Technical talk 1: Cell culturing (Tumenjin E, MNUMS)
Technical talk 2: Cell viability assay (Zesemdorj O, MNUMS)
Technical talk 3: Neuroanatomy (Erdenezaya O, MNUMS)
Technical talk 4: DNA extracting protocols (Jambaldorj J, MNUMS)
Technical talk 5: Essentials in RT-qPCR (Jambaldorj J, MNUMS)
Technical talk 6: Immuno-histochemistry (Tungalag S, MNUMS)
Technical talk 7: Stereotaxic ICV injections (Darambazar G, MNUMS)
Technical talk 8: Behavioural testing (Darambazar G, MNUMS)
Technical talk 9: Brain dissection/Histology (Mandakhnaran D, MNUMS)

- Experimental modules:

Hands-on session 1: Perfusion/ Cryostat sectioning (Galindev B, MNUMS)
Hands-on session 2: Stereotaxic ICV injection (Galindev B, MNUMS)
Hands-on session 3: Microscopy techniques (Tumenjin E, MNUMS)
Hands-on session 4: Western Blotting (Galindev B, MNUMS)

- Discussions

Interactive Discussion 1: Poster presentation tutorial (Erdenezaya O, MNUMS)
Interactive Discussion 2: Oral presentation tutorial (Mandakhnaran D, MNUMS)
Interactive Discussion 3: Neuroethics and Bioethics (Tserenbat M, MNUMS)
Interactive Discussion 4: Journal club (Tumenjin E, MNUMS)

# INFORMATION FOR PARTICIPANTS

**On-site Registration**:

The registration Desk will be opened during the following hours at the venue.
Location: Lecture hall of MNUMS, Graduate School
Aug.10 (Mon) 08:00-08:30

**Name Budgets**

Please wear your name tag during the meeting for identification and security purposes. Those who are registering will receive their name badges and other materials at the Registration Desk.

**No Smoking**

Smoking is prohibited in all areas of the venue.

**Cellular Phones**

Using cellular phones during the session is prohibited. Cellular phones must be turned off or set to silent mode during the session.

**Drink and Food service**

For participants in afternoon lectures, beverages and light meals are served during the following time.

**Refreshment time: 11:00-11:15**
**16:00-16:15**

**Lunch time: 13:00-14:00**

**Place: Lecture hall of MNUMS, Graduate School**

## BATTUVSHIN LKHAGVASUREN

Director, Brain Science Institute,
Mongolian National University of Medical Sciences
Phone: +976-99192738
E-mail: battuvshin@mnums.edu.mn

**Education**

2013 PhD in Medicine, Graduate School of Medical Sciences, Kyushu University, Japan
Thesis: Social defeat stress induces hyperthermia through activation of thermoregulatory sympathetic premotor neurons in the medullary raphe region (Supervisor: Prof.OkaT.)

2009 Internship in Psychosomatic Medicine, Kyushu University hospital, KyushuUniversity, Japan (Supervisor: Prof. KuboC.)

2006 Residency in Psychiatry, National Center of Mental Health, Mongolia Clinical psychiatry (Supervisor: Prof. Sandag B.)

**Award**

- 2014 Cousins Center Global Outreach Awards – by American Psychosomatic Society
- 2014 IBRO Return Home Program Grant - by International Brain Research Organization
- 2012 Ikemi Memorial Award – by the Japanese Society of Psychosomatic Medicine
- 2008-2013 Japanese Government Academic Scholarship – by Japanese Government
- 2007 WHO Research Grant – This grant was supported by World Health Organization
- 1997 Hasebe Award – by MNUMS

**Professional Services**

- 2018 - ... Board Member of IBRO-APRC
- 2018 - ... President, Mongolian Neuroscience Society
- 2015 - ... President, Mongolian Society of Psychiatry
- 2014 - ... Expert Panel Member, Asian Federation of Psychiatric Associations
- 2013 - ... Board Member, Mongolian-Japanese Association for Medical Education

**Journal Review**

- 2015 - ... AdHoc Reviewer, Temperature
- 2013 - ... AdHoc Reviewer, Psychotherapy & Psychosomatics
- 2015 - ... AdHoc Reviewer, PloS One

**Publications**

- 2007 - ... Peer-reviewed academic articles in international journals:16, contributions to academic meetings: 31, textbooks and edited books: 2

## DAMDINDORJ BOLDBAATAR

Dean of the Graduate School, Mongolian National University of Medical Sciences
Phone: +976-99996522, 976-11-311561
E-mail: damdindorj@mnums.edu.mn

**Education**

| | |
|---|---|
| 2012 | Postdoctor (Neurophysiology), Graduate School, Jichi Medical University, Japan |
| 2010 | PhD in Medicine, Graduate School, Jichi Medical University, Japan |
| 2005 | Master in Medicine, Graduate School, Health Sciences University of Mongolia |
| 2003 | Medical Doctor, Health Sciences University of Mongolia |

**Publications:**

**Books:**

1. "Ghrelin Health and Desease". Library of Congress Control Number: 2012956723. Springer Science, Business Media New York 2012. Chapter 3: Ghrelin's Novel Signaling in Islet b-cells to Inhibit Insulin secretion and Its Blockade As a Promising Strategy to Treat Type 2 Diabetes. B.Damdindorjco-author
2. Interactive effects of ghrelin and GLP-1 on islet β-cell signaling, insulin releaseand glycemia. PhD dissertation 2010, Jichi Medical University, B.Damdindorj.
3. "Монголын физиологчдын түүхэн шастир" УБ 2013, 300х Г.Сүхбат, Г.Батмөнх, Ц.Лхагвасүрэн,Б.Дамдиндорж.

**Articles:**

1. "The Regulation of Energy Metabolism: An Important Facet of P53 Function" Marc Gilbert, Enkhsaikhan Lkhagvasuren, Damdindorj Boldbaatar, Christophe Magnan Cent Asian J Med Sci2017;3:106-115
2. Assessing risk of sleep apnea in obese and non obese adults, a hospital based case-control study. Renchindorj E, Norov T, Munkhtulga G, Adiyakhuu O, Damdindorj B. Divcovery-2015: 8; 20-22, Ulaanbaatar Mongolia
3. Postprandial insulinostatic ghrelin level in the serum for type 2 diabetic patients Battulga. Kh, Altanzul.A, Enkhchimeg.Ts, Enkhsaikhan.L, Bayasgalan.T, Damdindorj. B Mongolian Journal of Health Science 2016
4. Ghrelin signaling in β-cells regulates insulin secretion and blood glucose. Yada T, Damdindorj B et all Diabetes Obes Metab. 2014 Sep;16 Suppl 1:111-7.
5. Exogenous and endogenous ghrelin counteracts GLP-1 action to stimulate cAMP signaling and insulin secretion in islet b-cells. Boldbaatar Damdindorj et all. FEBS letters. 06/2012; 586(16):2555-62.

6. Ghrelin attenuates cAMP-PKA signaling to evoke insulinostatic cascade in isletb-cells. Katsuya Dezak, Boldbaatar Damdindorj et all. Diabetes. 07/2011;60(9):2315-24.
7. Lack of TRPM2 impaired insulin secretion and glucose metabolisms in mice. Kunitosh Uchida, Katsuya Dezaki, Boldbaatar Damdindorj et all. Diabetes.1/2011;60(1):119-26.
8. グレリンによるインスリン分泌制御と膵β細胞シグナル伝達機構の解明. Boldbaatar Damdindorj. Jichi Medical University (33): 201-202
9. Stressor-responsive central nesfatin-1 activates corticotropin-releasing hormone, noradrenaline and serotonin neurons and evokes hypothalamic-pituitary-adrenal axis. Natsu Yoshida, Yuko Maejima, Udval Sedbazar, Akihiro Ando, Hidahiru Kurita, Boldbaatar Damdindorj et all Aging (Albany NY). 2010Nov;2(11):775-84.
10. Reconstruction-dependent recovery from anorexia, ghrelin-refractory period, and compensatory ghrelin production in duodenum and pancreas in gastrectomized rats. Masaru Koizumi, Katsuya Dezaki, Hiroshi Hosoda, Boldbaatar Damdindorj et all. Int J Pept.2010;2010
11. 食欲制御における視床下部, 幹脳の役割. 前島裕子, Darambazar Gantulga, Boldbaatar Damdindorj, 矢田俊彦. 肥満研究2010.16(3):125-130.
12. Ghrelin regulates insulin release and glycemia: Physiological role and therapeutic potential.ToshihikoYada, Katsuya Dezaki, Hideyuki Sone,Masaru Koizumi, Boldbaatar Damdindorj et all. Curr. Diab. Rev. Feb;4(1):18-23, 2008

## DARAMBAZAR GANTULGA

Dean of high School, Mongolian National University of Medical Sciences
Phone: +976-99193543
E-mail: darambazar@mnums.edu.mn

### Education

| | |
|---|---|
| 2013 | Ph.D. Dept. of Physiology, Graduate School of Medicine, Jichi Medical University, Japan. Thesis titled "Nucleobindin-2/nesfatin-1 in the hypothalamic paraventricular nucleus: regulation by metabolic factors and role in energy homeostasis". (Mentor: Toshihiko Yada) |
| 2005 | M.S., Dept. of Medical Biology, School of Biomedicine, Health Sciences University, Mongolia. Thesis titled "Seroepidemiological study on Taenasis in Mongolian adult population". (Mentor: TemuulenDorjsuren) |
| 2003 | B.S., Medical Doctor and Bachelor degree, School of Medicine, Health Sciences University of Mongolia |

### Research Experience

1. Research Assistant on research project titled "Hypothalamic nesfatin system in maintaining homeostasis" which supported by Strategic Research Program for Brain Sciences (BrainPro), MEXT at Dept. of Physiology, Jichi Medical University, Japan, 2009-2013.
2. Participant of the Lab Course titled "Molecular biology and Confocal microscopy" at Department of Biomedical Sciences, University of Copenhagen, Denmark, in September, 2008
3. Yonsei Scholarship Program 2005, I completed six months training course in Molecular Biology techniques in the Dept. of Parasitology, Yonsei University, Korea.

### Work Experience

| | |
|---|---|
| 2009 | Biology and Parasitology lecture Teaching Assistant, Department of Medical Biology, School of Biomedicine, Health Sciences University, Mongolia |
| 2014 | Biology instructor, Department of Biology, School of Bio-medicine, School of Biomedicine, National University of Medical Sciences, Ulaanbaatar, Mongolia |
| 2014 | Principal, University High School, National University of Medical Sciences, Ulaanbaatar, Mongolia |

### Scholarships and awards

1. Research Encouragement Award 2011, this grant is given by Jichi Medical University for graduate student with excellent research projects.
2. Research Grant for Young Scientists 2007, this grant is given by Ministry of Education, Culture and Science of Mongolia on competitive basis.

**Laboratory experience**

| | |
|---|---|
| Neuroscience | Single neuron preparation, calcium imaging in single neuron, cannulations and microinjections in rodent brain, brain fixation, sectioning and immunohistochemistry |
| Physiology | Lab animal handling, breading, GTT, ITT, calorimetry measurements. |
| Molecular biology | DNA/RNA extraction, PCR amplification, gelelectrophoresis,Western Blotting, ELISA |

**Publications**


1. Ando A, Gantulga D, Nakata M, Maekawa F, Dezaki K, Ishibashi S, Yada T.Weaning stage hyperglycemia induces glucose-insensitivity in arcuate POMC neuronsand hyperphagia in type 2 diabetic GK rats. Neuropeptides. 2018 Apr;68:49-56.
2. Nakata M, Gantulga D, Santoso P, Zhang B, Masuda C, Mori M, Okada T, Yada T. Paraventricular NUCB2/Nesfatin-1 Supports Oxytocin and Vasopressin Neurons to Control Feeding Behavior and Fluid Balance in Male Mice. Endocrinology. 157(6):2322-32. 2016
3. Kurita H, Xu KY, Maejima Y, Nakata M, Dezaki K, Santoso P, Yang Y, Arai T, Gantulga D,Muroya S, Lefor AK, Kakei M, Watanabe E, Yada T. Arcuate Na+,K+-ATPase senses systemic energy states and regulates feeding behavior through glucose-inhibited neurons. Am J PhysiolEndocrinolMetab. 309(4):E320-33, 2015
4. Maejima Y, Rita RS, Santoso P, Aoyama M, Hiraoka Y, Nishimori K, Gantulga D, Shimomura K, Yada T. Nasal oxytocin administration reduces food intake without affecting locomotor activity and glycemia with c-Fos induction in limited brain areas. Neuroendocrinology. 101(1):35-44, 2015
5. Darambazar G, Nakata M, Okada T, Wang L, Li E, Shinozaki A, Motoshima M, Mori M, Yada T. Paraventricular NUCB2/nesfatin-1 is directly targeted by leptin and mediates its anorexigenic effect. BiochemBiophys Res Commun. 456(4):913-8, 2015
6. Aoki H, Nakata M, Dezaki K, Lu M, Gantulga D, Yamamoto K, Shimada K, Kario K, Yada T. Ghrelin counteracts salt-induced hypertension via promoting diuresis and renal nitric oxide production in Dahl rats. Endocrine Journal. (Epub ahead of print http://dx.doi.org/10.1507/endocrj.EJ12-0371)
7. Gantulga D, Maejima Y, Nakata M, Yada T. Glucose and insulin induce Ca2+ signaling in nesfatin-1 neurons in the hypothalamic paraventricular nucleus. BiochemBiophys Res Commun. 420(4), 811-815, 2012
8. Kohno D, Sone H, Tanaka S, Kurita H, Gantulga D, Yada T. AMP-activated protein kinase activates neuropeptide Y neurons in the hypothalamic arcuate nucleus to increase food intake in rats. Neurosci Lett. 499(3):194-8, 2011
9. Yoshida N, Maejima Y, Sedbazar U, Ando A, Kurita H, Damdindorj B, Takano E, Gantulga D, Iwasaki Y, Kurashina T, Onaka T, Dezaki K, Nakata M, Mori M, Yada T. Stressor responsive central nesfatin-1 activates corticotropin-releasing hormone, noradrenaline and serotonin neurons and evokes hypothalamic pituitary adrenal axis. Aging 2(10): 775-784, 2010
10. Lee H, Jeong KY, Shin KH, Yi MH, Gantulga D, Hong CS, Yong TS. Reactivity of German cockroach allergen, Bla g 2, peptide fragments to IgE antibodies in patients' sera. Korean J Parasitol. 46(4):243-6, 2008
11. LeeJW,Gantulga D,YongTS. PCRidentificationofAnophelesspeciesusingspecies-specificprimersdesignedfromITS2.Mongolian Journal of Health Science,2:64, 2006
12. Gantulga D,Temuulen.D,Gurbadam.A. IndirectELISAtestfordiagnosisontaeniasisandcysticercosis.J

## TSERENBAT MINJUUR

Head, Institute of medical law, Mongolian National University of Medical Sciences
Phone: +976 - 99999013
Email: tserenbat@mnums.edu.mn

**Education**

2018 Mongolian National University of Medical Sciences, Associate professor
2012 School of Law, National University of Mongolia, Master degree in Law
2010 Postdoctoral study, Vienna University, Austria
2008 Health Sciences University of Mongolia, PhD in Medicine
2007 Medical law courses, Yonsei University, South Korea
2006 Forensic DNA typing, Nagoya University, Japan

**Employment Record**

- Lecturer, Health Sciences University of Mongolia 2004-2012
- Head of Department Forensic medicine, National Institute of Forensic Science, Ministry of Justice 2013-2014
- Senior Lecturer, Mongolian National University of Medical Sciences 2014-2019
- Director, Institute of Medical law, Mongolian National University of Medical Sciences 2019

**Membership in Professional Association**

- Chairman, Ethics committee, Ministry of Health
- Member of Mongolian Bar Association
- President, Law education &Health center of Mongolia
- Director, Institute of Medical law, MNUMS
- Executive director, Law and Compliance, partnership
- Member of Ethics committee, Mongolian National University of Medical Sciences
- Member of IRB, Mongolian National University of Medical Sciences

**Assignments that Best Illustrate Capability to Handle the Assigned Tasks**

1. Legal consultant, *Legal assistance*, Assistance in all the legal matters and advise in legal documentation, negotiations, contracts, 2014
2. Lecturer, *Forensic medicine courses*, Development of local capacity in Forensic medicine, 2014
3. Lecturer, *Health sciences courses*, Development of local capacity in health science, 2004
4. Legal consultant, *Vitamin D in TB Prevention in School Age*, *Assessment of health problems, 2015*
5. Legal consultant, *Reform of the Social Health Insurance*, Development of services and management strengthening, 2012

## JAMBALDORJ JAMYANSUREN

Lecturer at Department of Molecular Biology and Genetics,
School of Biomedicine, Mongolian National University of
Medical Sciences
Phone: +976-89894417
E-mail: jambaldorj@mnums.edu.mn

**Education**

| | |
|---|---|
| 2013 | PhD. in Medicine, Department of Neurology, Division of Molecular Biology, Institute of Health Biosciences,The University of Tokushima |
| 2005 | Residency in Laboratory Medicine, Postgraduate Institute, Health Sciences University of Mongolia |
| 2003 | Medical Doctor, School of Medicine, Health Sciences University of Mongolia |

**Laboratory experience**

- SNP genotyping using Illumina systems (HD Infinium and Goldengate assay)
- Karyotyping using Illumina systems (HumanSentrix-12)
- Polymerase chain reaction (nested, cloning, real time, PCR-RFLP andetc)
- TaqMan SNPgenotyping
- Cloning (screening, amplification andconfirmation)
- Animal experiments with rat andmouse
- Blotting (Southern and Western)
- Sanger sequencing and Genescan
- General Laboratory Protocols
- Data mining andanalyzing
- Cell culture (HeLa and B95)
- SEM and live cellimaging
- Gene expression and developmental experiment
- Recombinant molecule

**Past Research Experience**

- Research of Charcaot Marie Toothdisease.
- GWAS on QTL: body height in Mongolians.
- Genetics on Cranio cervical dystonia.
- TAF1 on XDP dystonia, developmental study
- Research on SMA.
- Yamagata University Genomic Cohort Consortium, Cohort study on Takahata population.
- GWAS on COPD and epilepsy.

## ERDENEZAYA ODKHUU

Senior lecturer, Department of Anatomy, School of Biomedicine, MNUMS, Ulaanbaatar 14210
Phone: 976-9916-9798
E-mail: erdenezaya@mnums.edu.mn

### Education and Qualification

| | |
|---|---|
| 2010 | PhD Aichi Medical University, Nagakute, Aichi, Nagakute, Japan<br>Thema: Inhibition of receptor activator of nuclear factor-κB ligand (RANKL)-induced osteoclast formation by pyrroloquinoline quinine (PQQ) |
| 2007 | MS Health Sciences University of Mongolia, Ulaanbaatar<br>Major: Human Anatomy, Thema: The specificity of thymus gland vascularization in human fetus and child in Mongolia |
| 2005 | MD Health Sciences University of Mongolia, Ulaanbaatar |

### Award:

- 2019 Publication award, MNUMS
- 2019, 2018 Best poster presentation award, MNUMS
- 2018 Best poster presentation award, IBRO-APRC associate school 2018
- 2015 "Best researcher of 2005" Alumni award
- 2012 "Nan'en" scholarship award for foreign researchers, Aichi Medical University
- 2008 Grant for Foreign Researchers of Aichi Medical University

### Professional Services:

- 2015 - Secretariat, Mongolian Society for Human Anatomy
- 2005 - 2015 - Member, Mongolian Association of Anatomists

### Leading research project

- 2020 - Molecular mechanism of effect on RANKL-induced osteoclastogenesis by salidroside from Rhodiola rosea, The Foundation of Science and Technology Development, MNUMS
- 2014-2015 - The study of B cell development and differentiation, "AiKeiKai" Foundation, Aichi Medical University

### Laboratory experience

- Cell culture: Cell line culture (RAW264.7, ENDD, WEHI, HEI-OC1, HELA, and others), primary cell culture (peritoneal macrophage cell, spleen B cell, bone marrow derived DC and macrophage), cell survival and proliferation assay (MTT, 3H-thymidine incorporation), Greas reaction
- Protein analysis: Isolation, nuclear extraction, immunoblotting, immunoprecipitation

- Molecular biology: RNA extraction, PCR amplification, gel electrophoresis, real time PCR (SYBR green), ELISA
- Animal laboratory: Lab mice handling, injection, isolation primary cell (peritoneal cell, bone marrow cell, spleen B cell, Kupffer cell), KO mice handling, typing,
- Virology:Senday virus propagation, Cytopathic effect of virus infection on tissue culture cells, Plaque assay

**Publications**

1. Odkhuu E, Komatsu T, Koide N, Naiki Y, Takeuchi K, Tanaka Y, Tsolmongyn B, Jambalganiin U, Morita N, Yoshida T, Gotoh B, Yokochi T. Sendai virus C protein limits NO production in infected RAW264.7 macrophages. Innate Immun. 2018 Sep 6 epub.
2. Odkhuu E, Koide N, Haque A, Tsolmongyn B, Naiki Y, Hashimoto S, Komatsu T, Yoshida T, Yokochi T. Inhibition of receptor activator of nuclear factor-κB ligand (RANKL)-induced osteoclast formation by pyrroloquinoline quinine (PQQ). Immunol Lett. 2012 Feb 29;142(1-2):34-40. PubMed PMID: 22193059.
3. Odkhuu E, Komatsu T, Naiki Y, Koide N, Yokochi T. Sendai virus C protein inhibits lipopolysaccharide-induced nitric oxide production through impairing interferon-β signaling. Int Immunopharmacol. 2014 Nov;23(1):267-72. PubMed PMID: 25242386.
4. Odkhuu E, Mendjargal A, Koide N, Naiki Y, Komatsu T, Yokochi T. Lipopolysaccharide downregulates the expression of p53 through activation of MDM2 and enhances activation of nuclear factor-kappa B. Immunobiology. 2015 Jan;220(1):136-41. PubMed PMID: 25172547.
5. Odkhuu E, Koide N, Tsolmongyn B, Jambalganiin U, Naiki Y, Komatsu T, Yoshida T, Yokochi T. Involvement of redox balance in in vitro osteoclast formation of RAW 2647 macrophage cells in response to LPS. Innate Immun. 2015 Feb;21(2):194-202. PubMed PMID: 24595208.

## ZESEMDORJ OTGON-UUL

Lecturer at Department of Pathophysiology,
School of BioMedicine, Mongolian National
University of Medical Sciences
Phone: +976-99225977
E-mail: zesemdorj@mnums.edu.mn

**Education**

2008 B.S., in Biomedical Engineering, Health Sciences University of Mongolia
2010 Residency for Laboratory Medicine, Health Sciences University of Mongolia
2012 M.S., Department of Pathophysiology, Health Sciences University of Mongolia
2017 Ph.D., Division of Integrative Physiology, Department of Physiology, Jichi Medical University School of Medicine

**Award**

- 2018 One of the chosen for the Lindau Nobel Laureate Meeting
- Research Encouragement Award 2016, this grant is given by Jichi Medical University for graduate student with excellent research projects.
- 2013-2017 Awarded with fully funded scholarship based on outstanding academic excellence, Japan

**Society and**

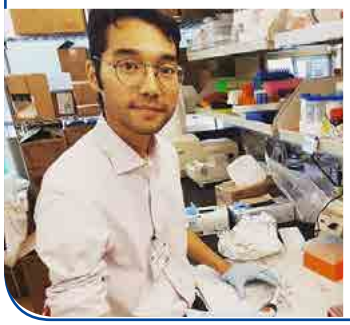
- 2017 - ... Member of The Mongolian Neuroscience Society
- 2017- … Member of Mongolian Young Scientist's Association
- 2019- … Leader of Mongolian Assocition of Medical Young Researchers

**Publications**

1. Otgon-Uul Z, Suyama S, Onodera H, Yada T, Optogenetic activation of leptin- and glucose- regulated GABAergic neurons in dorsomedial hypothalamus promotes food intake via inhibitory synaptic transmission to paraventricular nucleus of hypothalamus Molecular Metabolism 5(8):709-715, 2016.
2. Kumari P, Nakata M, Zhang BY, Otgon-Uul Z, Yada T, GLP-1 receptor agonist liraglutide exerts central action to induce β-cell proliferation through medulla to vagal pathway in mice. Biochem Biophys Res Commun. 2018 May 15;499(3):618-625. 2018
3. Putra Santoso, Masanori Nakata, Kazuhiro Shiizakai, Zhang Boyang, Kumari Parmila, Zesemdorj Otgon Uul, Koshi Hashimoto, Tetsuro Satoh, Masatomo Mori, Makoto Kuro-o and Toshihiko Yada Fibroblast growth factor 21, assisted by elevated glucose, activates paraventricular nucleus NUCB/Nesfatin-1 neurons to produce satiety under fed satates Nature Scientific Reports 2017; 7: 45819

4. Suyama S, Kodaira-Hirano M, Otgon-Uul Z, Ueta Y, Nakata M, Yada T: Fasted/fed states regulate postsynaptic hub protein DYNLL2 and glutamatergic transmission in oxytocin neurons in the hypothalamic paraventricular nucleus. Neuropeptides 56: 115-123. 2016,
5. Uramura K, Maejima Y, Shimomura K, Santoso P, Katsuda S, Kobayashi D, Jodo E, Kodaira M, Otgon-Uul Z, Yang Y, Sakuma K, Takigawa M, Hazama A, Yada T: Chronic phencyclidine treatment induces long-lasting glutamatergic activation of VTA dopamine neurons. Neuroscience Letters 564C:72-77, 2014.
6. Yanagida K, Maejima Y, Santoso P, Otgon-Uul Z, Yang Y, Sakuma K, Shimomura K, Yada T: Hexosamine pathway but not interstitial changes mediate glucotoxicity in pancreatic b-cells as assessed by cytosolic Ca2+ response to glucose. Aging (Albany NY) 6(3):207-214, 2014.

## MANDAKHNARAN DAVAADORJ



Brain Science Institute
Graduate School
Mongolian National University of Medical Sciences
Zorig street, Ulaanbaatar 14210, Mongolia
Phone: +976-99052876
E-mail: mandakhnarandavaadorj@gmail.com

**Education**

2017 Ph.D. Department of Digestive Surgery and Transplantation University of Tokushima Concentrations: Immunology, Cancer study Thesis title: *Loss of Secreted Frizzled-Related Protein 1 expression is associated with poor prognosis in intrahepatic cholangiocarcinoma*

2011 Department of Orthopaedic Surgery Gyeong-Sang National University Hospital

2012 Department of Surgery Mongolian National University of Medical Sciences(formerly Health Sciences University of Mongolia)

2010 M.D., B.A., Mongolian National University of Medical Sciences (formerly Health Sciences University of Mongolia)

**Award**

- 2014, 2015 - Nakayama Cancer Research Institute Scholarship
- Otsuka-Toshimi Scholarship

**Research experience**

**Postdoctoral Fellow**

2018-2019 - Laboratory of Molecular Biology and Immunology
National Institute on Aging, National Institute of Health
Principal Investigator: Arya Bira, Ph.D.

Revealed deposition patterns of Amyloid-Beta plaques in the brains of transgenic mice with different genetic backgrounds of Alzheimer's Disease (AD) by immunofluorescent confocal imaging

Identified size-related activation patterns of Microglia (with Ionized Calcium Binding Adaptor Molecule 1 - Iba1) and Astrocytes (with Glial Fibrilliary Acidic Protein - GFAP) in the brains of transgenic mice with different genetic backgrounds of Alzheimer's Disease (AD) through fluorescent immunohistochemistry

**Doctoral Student Researcher**

2013-2017 - Department of Digestive Surgery and Transplantation

University of Tokushima

Supervisor: Mitsuo Shimada, M.D., Ph.D.

- Revealed the expression of SFRP1 protein in tumor tissues was related to poor survival prognosis in patients with intrahepatic cholangiocarcinoma by immunohistochemistry
- Showed the expression of SFRP1 gene was downregulated in tumor tissues and it was related to poor survival prognosis in patients with hepatocellular carcinoma through Real-time polymerase chain reaction (RT-PCR)
- Found that SIRT1 gene has no significant role in survival prognosis in patients with hepatocellular carcinoma by immunohistochemistry
- Participated in research project that revealed Tr1 and Foxp3 Treg cells as markers of recurrent cancers in patients with hepatocellular carcinoma by Flow cytometry (FACS)

**Publications**

1. Davaadorj, M. et al. Loss of Secreted Frizzled-Related Protein-1 expression is associated with poor prognosis in intrahepatic cholangiocarcinoma. European Journal of Surgical Oncology, February 2017, Volume 43, Issue 2, 344-350. https://www.ncbi.nlm.nih.gov/pubmed/28062160
2. Davaadorj, M. et al. Loss of Secreted Frizzled-Related Protein-1 expression is associated with poor prognosis in hepatocellular carcinoma. Anticancer Research, February 2016, 36 (2) 659-664. https://www.ncbi.nlm.nih.gov/pubmed/26851021

## TUMENJIN ENKHBAT

Lecturer of Anatomy department, Bio-medical school
Mongolian National University of Medical Sciences
Zorig street, Ulaanbaatar 14210, Mongolia
Phone: +976 80608088
E-mail: tumenjin@mnums.edu.mn

**Education**

2019 Ph.D. Department of Digestive Surgery and Transplantation, Tokushima City, Japan University of Tokushima
Concentrations: Immunology, Cancer study Thesis title: *Epigallocatechin-3-gallate Enhances Radiation Sensitivity in Colorectal Cancer Cells Though Nrf2 Activation and Autophagy*

2011 M.S., Health Sciences University of Mongolia

2009 B.A., Mongolian National University of Medical Sciences

**Award**

- 2015-2019 Tokushima University Fujii-Otsuka Scholarship, Tokushima, Japan

**Journal review**

- 2020 – Medical and Health Science Journal, Indonesia

**Society**

- 2009 - ... Member, Mongolian Association of Anatomists
- 2019 - ... Member of The Mongolian Neuroscience Society
- 2019- … Member of Mongolian Young Scientist's Association
- 2019- … *Leader of Mongolian Assocition of Medical Young Researchers*

**Text Books**

1. Human Anatomy. 2020
2. Bone and Joint Color Atlas. 2016
3. Human Anatomy (brief). 2020
4. Human Body Anatomy Color Atlas II. 2020

**Publications**

1. "Electron microscope studies of epidermal melanocytes on the Mongolian blue spotic region in infants" Anatomy and cell biology in South Korea, 2011
2. Folia Morphol (Warsz). 2012 May;71(2):93-9. Morphometry of the coronary artery and heart microcirculation in infants. Avirmed A, Auyrzana A, Nyamsurendejid D, *Tumenjin E*, Enebish S, Amgalanbaatar D.
3. Anticancer Res. 2018 Nov;38(11):6247-6252. doi: 10.21873/anticanres.12980. Epigallocatechin-3-gallate Enhances Radiation Sensitivity in Colorectal Cancer Cells Through Nrf2 Activation and Autophagy. *Enkhbat Tumenjin*, Nishi M, Yoshikawa K, Jun H, Tokunaga T, Takasu C, Kashihara H, Ishikawa D, Tominaga M, Shimada M.
4. Anticancer Res. 2018 Jun;38(6):3367-3373. doi: 10.21873/anticanres.12603. Programmed Cell Death Ligand 1 Expression Is an Independent Prognostic Factor in Colorectal Cancer. *Enkhbat Tumenjin*, Nishi M2, Takasu C1, Yoshikawa K1, Jun H1, Tokunaga T1, Kashihara H1, Ishikawa D1, Shimada M1.

## GALINDEV BATNASAN

Researcher, Brain Science Institute, Mongolian National University of Medical Sciences
Phone: +976-89822648
E-mail: galindev@mnums.edu.mn

**Education**

2015 PhD in Technology, Department of Vaccinology and Immunology, Inner Mongolia Agriculture University, China
Title: The Purification and Quantification of Inactivated Foot-and-Mouth Disease Virus
Mentor: Prof. Han Runlin

2002 M.Sc. (Vaccine), Mongolian State University of Agriculture
Title: Clostridium Perfringens Type A Toxoid Cattle Vaccine
Mentor: Prof. Erdenetsogt.N

1999 B.Sc.(Veterinarian, microbiologist), Mongolian State University of Agriculture

**Professional Services:**

- 2018 - ... President, Mongolian Laboratory Animal Science Association
- 2018 - ... Member, Mongolian Neuroscience Society

**Publications**

1. 2007 - ... Textbooks: 5, manual: 1, national standards: 4
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## TUNGALAG SER-OD

Specialist, Department of Administration,
Monitoring and Evaluation
Phone: +976 86185215
E-mail: tungaa.serod@gmail.com

**Education**

- Tokyo Dental College, T2013-Mar/2017
- Ph.D in Dental Sciences
- Tokyo Dental College, Tokyo, Japan Oct/2012-Mar/2013
- Research Intern
- Health Sciences University of Mongolia, Ulaanbaatar, Mongolia Sep/2004-Jun/2009
- Bachelor of Dental Surgery

**Work experience**

- 2019 - Mongolian National University of Medical Sciences (MNUMS)
  Research Quality Assurance Officer
- 2017 - 2019 - Tokyo Dental College
  Postdoctoral Fellow
- 2015 - 2017 - Tokyo Dental College
  Teaching assistant
- 2009 - 2012 - Chunelmi Dental Clinic & Bayangol Hospital
  General Dentist

**Skills**

- Technical: Cellular and molecular biology
- Cell culture: Primary culture of dental pulp cells of rat, cell lines of MC3T3, fibroblasts, miPS cells
- Microscopy: Confocal, fluorescence, light and electron microscopy
- Cloning: RNA extraction, reverse transcription, RT-PCR, DNA purification, quantification, extraction.
- Animal experiment: Handling animals (rat, mice, dog)
- Others:
- IT: Standard office software (Microsoft excel, Word, Power Point), Photoshop, Prism

**Publications**


1. Inoue K, Ser-Od T*, Al-Wahabi A, Nakajima K, Kokubun K, Murakami S, Inoue T (2020) Sox11 regulates Dentin Sialoprotein in outgrowth cells derived from Induced Pluripotent Stem Cells. The Bulletin of Tokyo Dental College. In press.
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Corresponding author

## TETSUYA HIRAMOTO

Chief, Department of Psychosomatic Medicine, National Hospital Organization, Fukuoka Hospital, Fukuoka, Japan (since 04/2013)
E-mail: tetsuhcephalmed@yahoo.co.jp

**Board Certification**

- Board Certified Specialist of the Japanese Society of Internal Medicine
- Board Certified Specialist of the Japanese Society of Psychosomatic Medicine
- Board Certified Specialist of the Japanese Society of Oriental Medicine

**Education**

- Graduate School of Medical Sciences, Kyushu University, Fukuoka, Japan: PhD 2009
- Medical Sciences Hiroshima University, Hiroshima, Japan: BA 1994, MA 1996 Medical Sciences

**Publications:**

1. Hiramoto T, Yoshihara K, Asano Y, Sudo N. (2017) Protective Role of the Hepatic Vagus Nerve against Liver Metastasis in Mice. Neuroimmunomodulation. 24:341-7.
2. Sawamoto R, Nagano J, Kajiwara E, Sonoda J, Hiramoto T, Sudo N. (2016) Inhibition of emotional needs and emotional wellbeing predict disease progression of chronic hepatitis C patients: an 8-year prospective study. Biopsychosoc Med. 10:24.
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## ANURAG KUHAD

Dr Anurag Kuhad M. Pharm., PhD., MNASc, MNAMS
Assistant Professor of Pharmacology University
Institute of Pharmaceutical Sciences, UGC-CAS Panjab University, Chandigarh – 160 014
E-mail: anurag_pu@yahoo.com
Lab Phone:: 09915173064

Dr Anurag Kuhad is currently working as Assistant Professor of Pharmacology at University Institute of Pharmaceutical Sciences, Panjab University, Chandigarh. Dr Kuhad is a B. Pharm (2002) Gold Medalist from Guru Jambheshwar University, Hisar He secured 98.91 percentile in GATE, 2002. Dr Anurag has completed his M. Pharm (Pharmacology-2004) & Ph.D (Pharmacology-2010) from University Institute of Pharmaceutical Sciences, Panjab University, Chandigarh.

Dr Kuhad did an excellent work in the area of diabetic neuropathy and associated cognitive decline. He is also working in the field of depression, antipsychotics induced weight gain, autism, stress, Alzheimer's disease, diabetic nephropathy, drug-induced nephrotoxicity and chronic fatigue syndrome. He has published more than 49 research paper in most prestigious, peer-reviewed and high impact value International Journals. He has also published 31 review articles, 8 book chapters and one article on social awareness. Recently, he published 1 Book entitled "Diabetic Neuropathy & Encephalopathy" with International publisher LAP LAMBERT Academic Publishing, Germany. As per Google Scholar, his research work has 3557 citations with h-index 32. He has an industrial experience of 2.5 years at Ranbaxy Research Laboratories Ltd. Gurgaon as a Research Scientist (RS) in the area of New Drug Discovery Research (NDDR).

Dr Kuhad worked on ICMR funded clinical research Project "Metabolic risk associated with antipsychotic drugs: A cross Sectional Study". He has completed three research project sanctioned by Ayush Herbs Inc. USA; Chemical Resources, Panchkula and Dr Dozo Laboratory, Mohali. Recently, He has been awarded UGC Start-up Grant for Newly Recruited Faculty by UGC, New Delhi and Fast Track Project from DST, New Delhi. He has been awarded with a highly prestigious "AICTE Career Award for Young Teachers (CAYT) 2013-14" by All India Council for Technical Education, New Delhi. Recently, he awarded with UGC Research Award by UGC, New Delhi. He is Program Coordinator of DST Inspire Internship Program at Panjab University, Chandigarh. Very recently, Department of Science & Technology, Government of Haryana awarded "Yuva Vigyan Ratan Award".

Dr Kuhad is regularly organizing International Brain Research Organization (IBRO) funded activities for promotion of Neuroscience research in India. He has organized four IBRO/ APRC Chandigarh Neuroscience Schools and two IBRO/APRC Chandigarh Neuroscience symposia.

Dr Kuhad has been a recipient of various prestigious international recognitions as Rafaelsen Young Investigators Award 2012 at CINP, Stockholm, Sweden, International Association for Study on Pain (IASP) Travel Award, International Brain Research Organization (IBRO) Travel Award, IBRO Young Investigator Training Fellowship and Young Investigator Award at ICPH-2007, Japan & ICPH 2009, England.

**Publications:**


1. "Kumar, B., Arora, V., Kuhad, A., and Chopra, K. (2012). Vaccinium myrtillus ameliorates u npredictable chronic mild stress induced depression: possible involvement of nitric oxide pathway. Phytotherapy Research 26 , 488 - 497."
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3. "Kuhad, A., Singh, P., and Chopra, K. (2015). Matrix metalloproteinases: potential therapeutic target for diabetic neuropathic pain. Expert opinion on therapeutic targets 19, 177 - 185."
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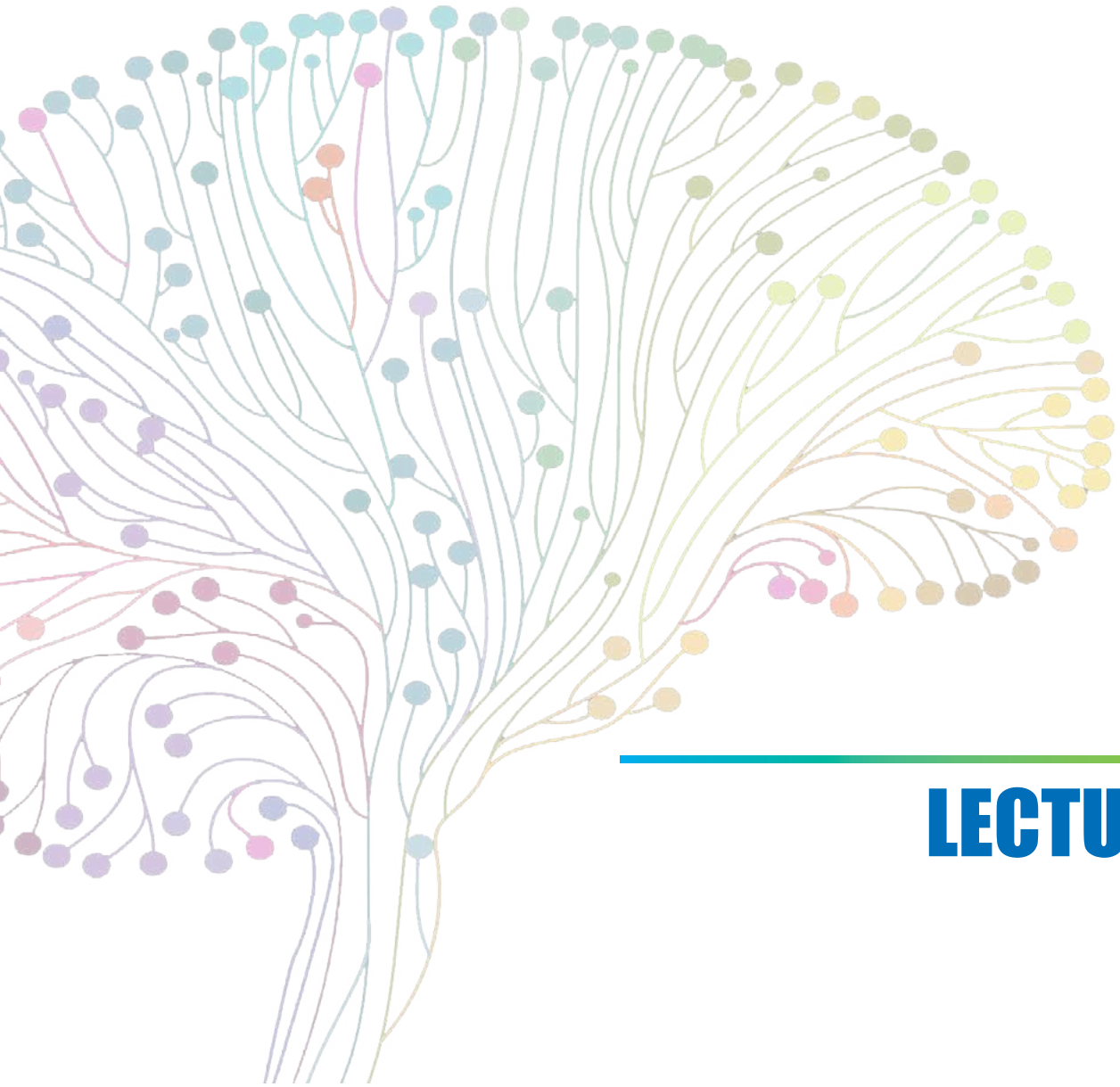
7. Raghunath Sing, Yashika Bansal, Rupinder Kaur Sodhia, Pragyanshu Khare, Mahendra Bishnoi, Kanthi Kiran, Kondepudi, Bikash Medhi, Anurag Kuhad Role of TRPV1/ TRPV3 channels in olanzapine-induced metabolic alteration: Possible involvement in hypothalamic energy-sensing, appetite regulation, inflammation and mesolimbic pathway doi.org/10.1016/j.taap.2020.115124

# IBRO-APRC ASSOCIATE SCHOOL ON BASIC TECHNIQUES IN NEUROSCIENCE – THE 3rd ULAANBAATAR SCHOOL

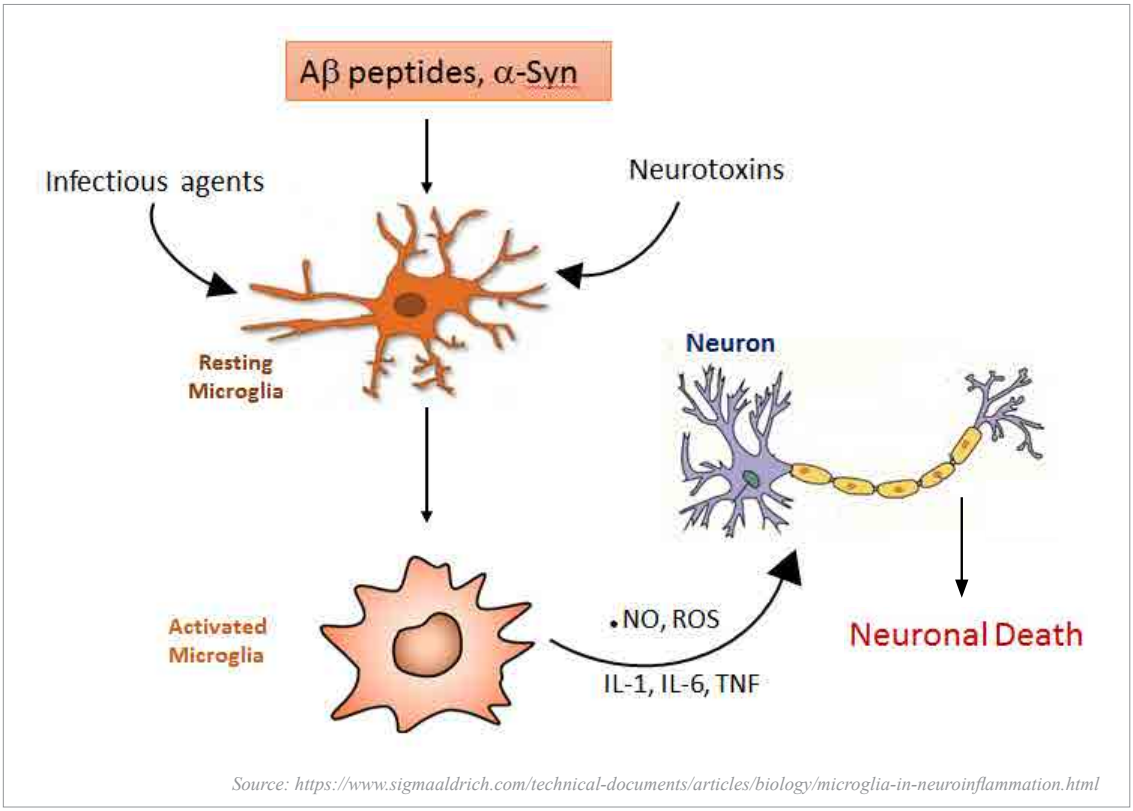


# LECTURES

# NEUROINFLAMMATION

*Tetsuya Hiramoto*
*Fukuoka National Hospital, Kyushu University, Japan*

Neuroinflammation (NI) is a critical pathophysiological factor of many CNS diseases, and regressing NI is considered to improve disease severity and has positive effects on patient outcome in the most cases. There are a lot of traditionally druggable targets for NI such as enzymes, receptors, and ion channels. Today, I will talk about some important pathologic mechanisms, biochemical pathways, and recent immunological discoveries related to NI. These aspects are also linked to biological mechanisms underlying NI and disease. Even though increased risk of infection is a potential issue for NI targets owing to immunomodulatory effects, there is significant opportunity to discover new molecules for the alleviation of NI in CNS diseases.




*Source: https://www.sigmaaldrich.com/technical-documents/articles/biology/microglia-in-neuroinflammation.html*

# PHARMACOLOGICAL INVESTIGATIONS BEYOND MONOAMINES TO DISCOVER NEW THERAPEUTIC STRATEGIES FOR DEPRESSION

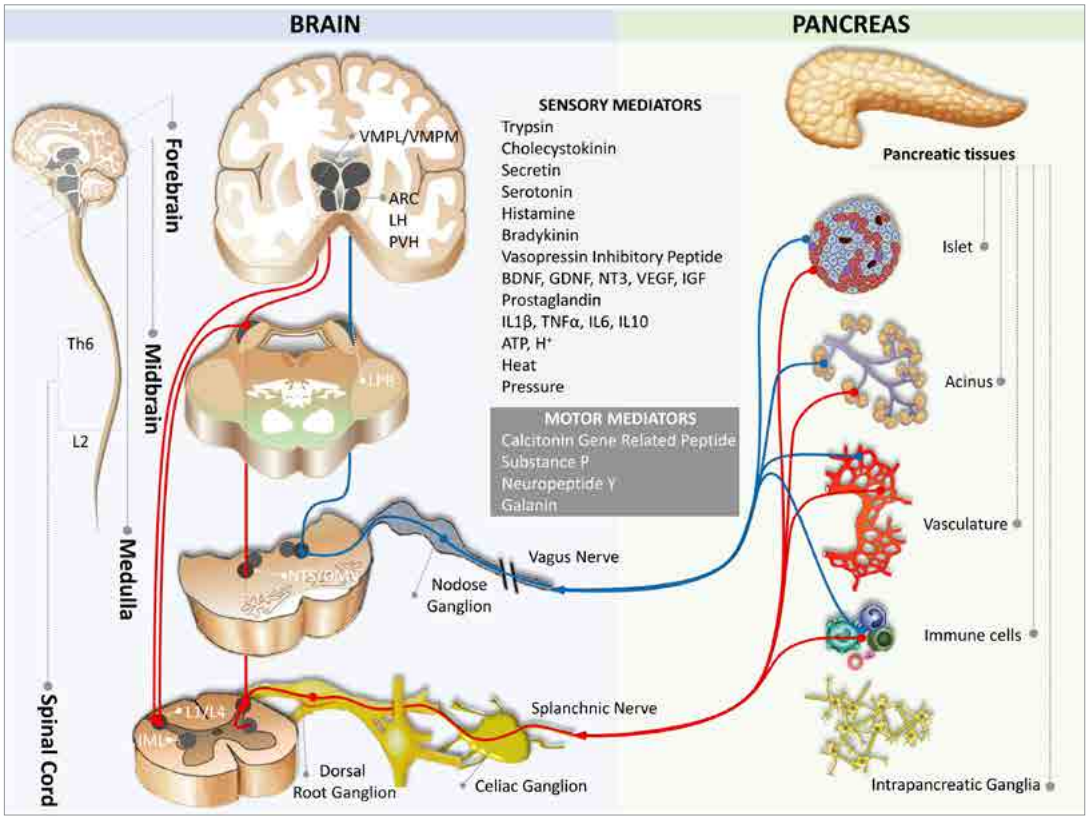
*Anurag Kuhad*
*University Institute Of Pharmaceutical Sciences*
*Panjab University, Chandigarh, India*

Depression is the heterogeneous disease; complete pathophysiology of which is not yet unveiled. The current drug therapy modulates monoamine system effectively but one third of the patients remain treatment refractory after adequate multiple trials with first line therapy of depression treatment. The treatment resistant patients show an increase level of inflammatory and oxidative stress parameters even after treatment as compared to those patients who get relief after treatment. Besides this, currently available antidepressant treatments have slow onset of action require weeks to months of treatment before patients report a diminishment of symptoms. There is also a higher risk of suicide and other deliberate acts of self-harm during the first month of treatment with antidepressants due to an improvement in physical energy that precedes improvements in depressive mood and negative thoughts. This indicates more insights are required beyond monoamine system and faster acting antidepressant for depression treatment. Recent studies reported that inflammatory, oxidative and nitrosative stress contributes to the neuroprogression that includes apoptosis, reduced neurogenesis, reduced neuronal plasticity and increased autoimmune responses, all of which can be recognized on clinical, structural and biochemical levels in MDD. The foremost pathway that gets modulated by increased inflammatory parameter mainly IFN-gamma, TNF-alpha and increase oxidative stress is kynurenine pathway. The levels of kynurenine pathway metabolites have been found to be increased in the brain and plasma of depressed patients. Therefore, targeting kynurenine pathway will provide new therapeutic strategies beyond monoamines for pharmacotherapeutics of depression.

# SENSORY CIRCUITS

*Battuvshin Lkhagvasuren*
*Head, Brain Science Institute*

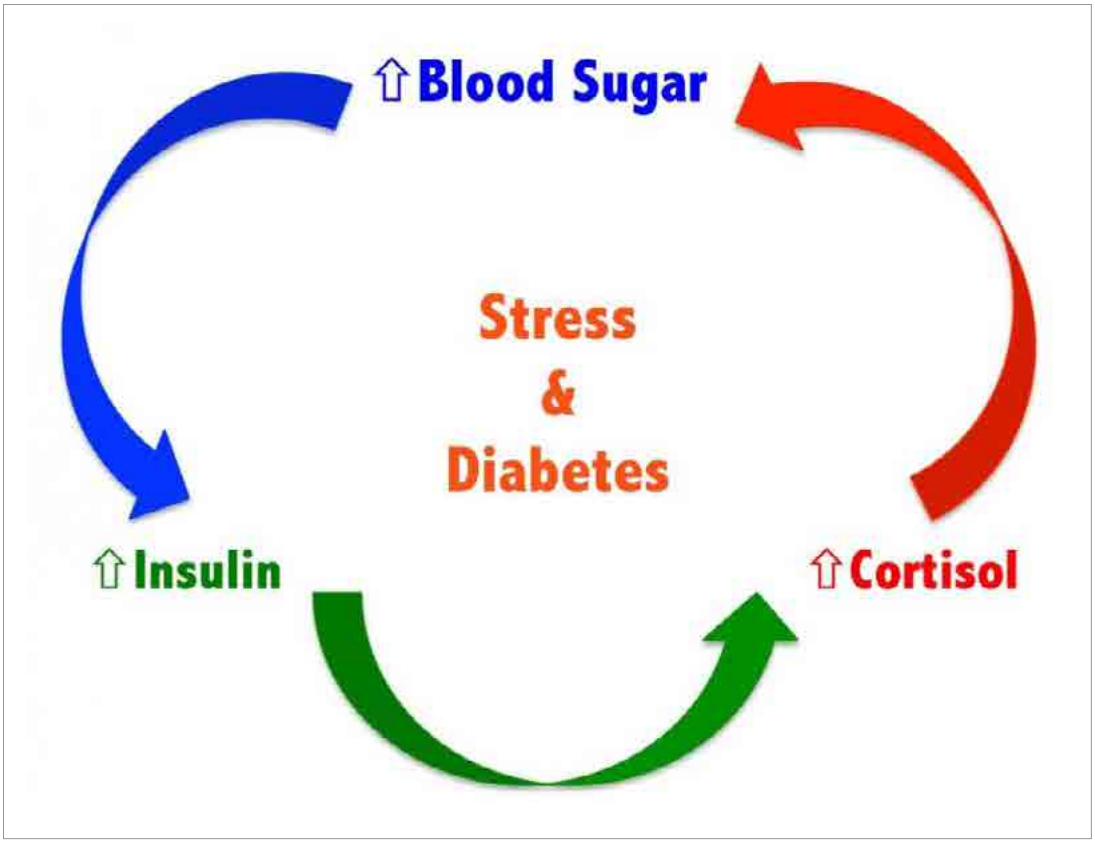
The neuron is the basic element of brain function. However, neurons do not act singly – rather, they act through complex yet coherent neural circuits and networks, in order to generate sensory perceptions, behaviors, memories and thoughts. Although the behavioral output of different neural circuits are highly diverse, the principles of their structure and function is often surprisingly similar across different brain regions and animal species. This suggests that understanding the common fundamental building blocks of neural circuits will allow us to decipher the function of the brain as a whole. Such elucidation requires a multi-level approach and benefits greatly from cooperation between experimentalists and theorists.



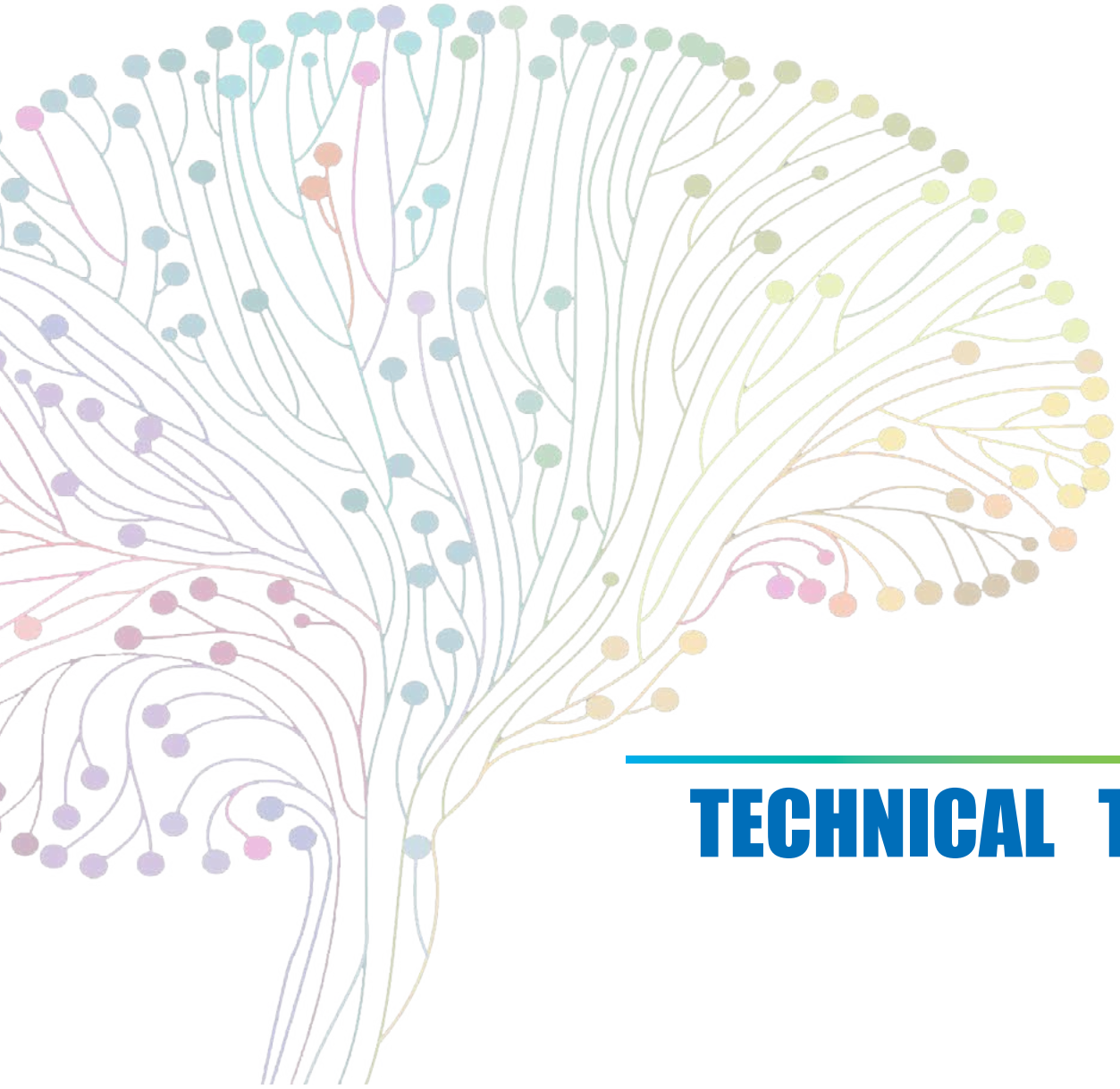
# STRESS RELATED DISORDERS

*Damdindorj Boldbaatar*
*Dean, Graduate School*

In recent years, we have learned a great deal about posttraumatic stress disorder (PTSD) and its public health implications. From many occasions, PTSD has been in the forefront of health concerns and public policy. Recent advances as well as emerging needs are leading us to new and exciting opportunities to provide better care and gain a better understanding of the complex nature of human responses to traumatic events. As we look to the future, we can be both reassured and concerned that it will, on one hand, be similar to the present and, on the other, provide new opportunities and challenges for care of those exposed to traumatic events-natural and human-made, large- and small-scale.



# IBRO-APRC ASSOCIATE SCHOOL ON BASIC TECHNIQUES IN NEUROSCIENCE – THE 3rd ULAANBAATAR SCHOOL



## TECHNICAL TALK

# CELL CULTURE TECHNIQUES

*Tumenjin Enkhbat*
*Lecturer, Department of Anatomy*

Cell culture is the process by which cells are grown under controlled conditions, generally outside their natural environment. After the cells of interest have been isolated from living tissue, they can subsequently be maintained under carefully controlled conditions. These conditions vary for each cell type, but generally consist of a suitable vessel with a substrate or medium that supplies the essential nutrients (amino acids, carbohydrates, vitamins, minerals), growth factors, hormones, and gases ($CO_2$, $O_2$), and regulates the physio-chemical environment (pH buffer, osmotic pressure, temperature). Most cells require a surface or an artificial substrate (adherent or monolayer culture) whereas others can be grown free floating in culture medium (suspension culture). The lifespan of most cells is genetically determined, but some cell culturing cells have been "transformed" into immortal cells which will reproduce indefinitely if the optimal conditions are provided.

In practice, the term "cell culture" now refers to the culturing of cells derived from multicellular eukaryotes, especially animal cells, in contrast with other types of culture that also grow cells, such as plant tissue culture, fungal culture, and microbiological culture (of microbes). The historical development and methods of cell culture are closely interrelated to those of tissue culture and organ culture. Viral culture is also related, with cells as hosts for the viruses.

# CELL VIABILITY ASSAY

*Zesemdorj Otgon-Uul*
*Lecturer, Department of Pathophysiology*

The measurement and monitoring of cell proliferation is an essential technique in any laboratory focused on cell-based research. This skill allows for the optimization of cell culture conditions as well as the determination of cytokine, growth factor, or hormone activity. More importantly, the cytostatic nature of anticancer compounds in toxicology testing, the efficacy of therapeutic chemicals in drug screening, and cell-mediated cytotoxicity can all be assessed through the quantification and monitoring of cell proliferation.

Cell Proliferation Assay is a colorimetric method for determining the number of viable cells in proliferation, cytotoxicity or chemosensitivity assays. When selecting the cytotoxicity and cell viability assay to be used in the study, different parameters have to be considered such as the availability in the laboratory where the study is to be performed, test compounds, detection mechanism, specificity, and sensitivity.

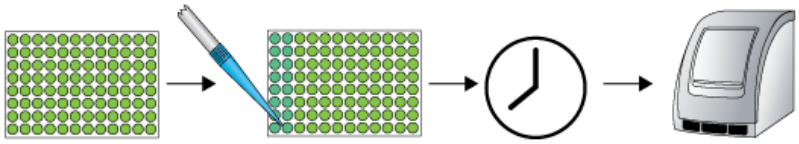
The MTS assay (5-(3-carboxymethoxyphenyl)-2-(4,5-dimethyl-thiazoly)-3-(4-sulfophenyl) tetrazolium, inner salt assay) is one of the most commonly used colorimeteric assay to assess cytotoxicity or cell viability. This assay is based on the conversion of a tetrazolium salt into a colored formazan by mitochondrial activity of living cells. The amount of produced formazan is depend on the viable cell number in culture and can be measured with spectrophotometer at 492 nm.

**Advantages:** Previous studies suggest that the MTS in vitro cytotoxicity assay combines all features of a good measurement system in terms of ease of use, precision, and rapid indication of toxicity. Performance of this assay is very competitive to other toxicological tests. This assay provides ideal properties for cytotoxicity measurement because it is easy to use, rapid, reliable, and inexpensive. Therefore, it can be used for onsite toxicological assessments.

**Disadvantages:** The level of absorbance measured at 492 nm is influenced by the incubation time, cell type, and cell number. The proportion of MTS detection reagents to cells in culture also influences the measured absorbance level. Previous studies suggested a linear relationship between incubation time and absorbance for short incubation times up to 5 hours. Therefore, proper incubation times for this assay are 1–3 hours.

Assays are performed by adding a small amount of the CellTiter 96® AQueous One Solution Reagent directly to culture wells, incubating for 1–3 hours and then recording the absorbance at 490nm with a 96-well plate reader.

**Schematic of the MTS Cell Proliferation Assay workflow.**



# HUMAN NEUROANATOMY

*Erdenezaya Odkhuu*
*Lecturer, Department of Anatomy*

Neuroanatomy is the study of the structure and organization of the nervous system. The delineation of distinct structures and regions of the nervous system has been critical in investigating how it works. For example, much of what neuroscientists have learned comes from observing how damage or "lesions" to specific brain areas affects behavior or other neural functions.

The nervous system has two main parts: the central nervous system (CNS), made up of the spinal cord and the brain; and the peripheral nervous system (PNS), the nerves and other types of supporting cells that branch throughout the rest of the body and communicate back to the CNS. Also, the nervous system divided into the somatic parts and autonomic parts (parasympathetic and sympathetic) as its function and structure. When a stimulus (internal or external) is encountered, the signal from that stimulus will travel up the sensory neuron to the CNS. After processing (simple or multiple), response signal down a motor neuron (somatic or autonomic) to the origin of the signal. Then, a contraction of the muscles or visceral function will occur. This is an interaction of the central and peripheral nervous system with other organs and the environment.

Neural cells: The nervous system consists of two main types of neural cells. A neuron is an electrically excitable cell that communicates with other cells via specialized connections called synapses. A typical neuron has a cell body and cell processes, axon, and dendrites. Another type of cell is the glial cell, maintain homeostasis, form myelin, and provide support and protection for neurons. In the central nervous system, glial cells include oligodendrocytes, astrocytes, ependymal cells, and microglia, and in the peripheral nervous system, glial cells include Schwann cells and satellite cells.

Developmental neuroanatomy: The nervous system develops from embryonal ectodermal tissue. CNS and PNS are differentiated from neural tube and neural crests, respectively.

Neuroanatomical terminology: There is a special term (dorsal, ventral, rostral and caudal) used to specify location in the CNS, because of understanding the human brain early development.

The main structure of the nervous system:

CNS consists of the brain and spinal cord. The human brain is divided into the hindbrain, the lower part of the brainstem; the midbrain, the central part of the brainstem; and the forebrain, which includes the diencephalon and cerebral hemispheres. Further, the term of hindbrain includes the medulla, pons, and cerebellum. But the CNS may also be discussed in terms of these three sections: the brain stem, the cerebellum, and the cerebral hemispheres.

PNS can be divided into cranial nerves and spinal nerves. Both include somatic and autonomic nerves.

External anatomy is the surface structure of CNS. The brainstem has simple and constant external structures. While the cerebellum and cerebral hemispheres have many grooves and gyri. There are landmark grooves and gyri such as central sulcus, however, hemispheric grooves and gyri are very variable and even asymmetric in the right and left side.

Internal anatomy: CNS tissue consists of white matter, axon and dendrite, and grey matter, neural body. White matter connects between the different sides of the brain or spinal cord by horizontal, sagittal, and longitudinal directions. The white matter existing longitudinal direction of CNS is also named neural track, including sensory (special and visceral), and motor (somatic and visceral) tracks. Gray matter has not only dens neural body but also includes many synaptic connections with axon, dendrite, and glial cells. In the CNS system, a cluster of grey matter named as a nucleus and somewhere specific name. The nucleus named and identified its anatomical position and structures which are observed by eye or microscopy. Further, the nucleus divided more detailly by its function and electrochemical features.

Protective system and vascular system of the CNS.

CNS has two protective systems as the meninges and the ventricular system. There are three layers consists of connective tissue, named as meninges or dura, cover brain and spinal cord. The outermost layer is dura mater, the middle is arachnoid mater, and the innermost is pia mater. The meninges protect CNS and contains vascular system and allow the circulation of cerebrospinal fluid. The ventricular system is the inner space of the brain and the spinal cord contain cerebrospinal fluid. There are five ventricles in the CNS and they connect each other and outer space of CNS in the subarachnoid spaces.

The vascular system of the CNS. CNS is supplied many sources and has several anastomoses between inter brain arteries and spinal arteries even with meningeal arteries. However, CNS is well vascularized the neural tissue does not contain blood vessels. There is the brood-brain barrier between neural fissure and blood vessels at the ventricular system and the meninges. The venous system of CNS consists of brain veins, meningeal sinus which is a special type of vein, venous plexus of the spinal cord, and a connector vein (diploic vein and emissary's vein) between the inner and outer vein of cranial box.

Neuroanatomy is a fundamental discipline of neuroscience and it has excessive knowledge. We could not explain in detail in a short time. There are many online sources including lessons, atlas, brain maps for learning, and searching for neuroanatomy.

# DNA EXTRACTION PROTOCOLS

*Jambaldorj Jamiyansuren*
*Lecturer, Department of Molecular Biology*

DNA extraction is basic procedure of molecular biology, thought to be common source of DNA used for numerous experiments from simple (gel electrophoresis) to highly advanced high-throughput techniques such as microarray. In molecular biology, there are three basic steps in a DNA extraction and can be done almost any type of samples.

1. Cells, which contains genomic, mitochondrial and plasmid DNA, need to be collected.

2. Breaking the cell membranes open to expose the DNA along with the cytoplasm within (cell lysis). Lipids from the cell membrane and the nucleus are broken down with detergents and surfactants. Breaking proteins by adding a protease (optional). Breaking RNA by adding an RNase (optional). DNA purification from detergents, proteins, salts and reagents used during cell lysis step. The most commonly used procedures are:

- Ethanol precipitation usually by ice-cold ethanol or isopropanol. Since DNA is insoluble in these alcohols, it will aggregate together, giving a pellet upon centrifugation. Precipitation of DNA is improved by increasing of ionic strength, usually by adding sodium acetate.
- Phenol–chloroform extraction in which phenol denatures proteins in the sample. After centrifugation of the sample, denaturated proteins stay in the organic phase while aqueous phase containing nucleic acid is mixed with the chloroform that removes phenol residues from solution.
- Minicolumn purification that relies on the fact that the nucleic acids may bind (adsorption) to the solid phase (silica or other) depending on the pH and the salt concentration of the buffer.

3. The solution is treated with concentrated salt solution (saline) to make debris such as broken proteins, lipids and RNA to clump together. Centrifugation of the solution, which separates the clumped cellular debris from the DNA.

Cellular and histone proteins bound to the DNA can be removed either by adding a protease or by having precipitated the proteins with sodium or ammonium acetate, or extracted them with a phenol-chloroform mixture prior to the DNA-precipitation. After isolation, the DNA is dissolved in slightly alkaline buffer, usually in the TE buffer, or in ultra-pure water.

Some of the most common DNA extraction methods include organic extraction, and solid phase extraction. These methods consistently yield isolated DNA, but they differ in both the quality and the quantity of DNA yielded. When selecting a DNA extraction method, there are multiple factors to consider, including cost, time, safety, and risk of contamination.

Organic extraction involves the addition of and incubation in multiple different chemical solutions including a lysis step, a phenol chloroform extraction, an ethanol precipitation, and washing steps.

Organic extraction is often used in laboratories because it is cheap, and it yields large quantities of pure DNA. Though it is easy, there are many steps involved, and it takes longer than other methods. It also involves the unfavorable use of the toxic chemicals phenol and chloroform, and there is an increased risk of contamination due to transferring the DNA between multiple tubes. Several protocols based on organic extraction of DNA were effectively developed decades ago, though improved and more practical versions of these protocols have also been developed and published in the last years.

Solid phase extraction such as using a spin-column based extraction method takes advantage of the fact that DNA binds to silica. The sample containing DNA is added to a column containing a silica gel or silica beads and chaotropic salts. The chaotropic salts disrupt the hydrogen bonding between strands and facilitate binding of the DNA to silica by causing the nucleic acids to become hydrophobic. This exposes the phosphate residues so they are available for adsorption. The DNA binds to the silica, while the rest of the solution is washed out using ethanol to remove chaotropic salts and other unnecessary constituents. The DNA can then be rehydrated with aqueous low salt solutions allowing for elution of the DNA from the beads.

This method yields high-quality, largely double-stranded DNA which can be used for both PCR and RFLP analysis. This procedure can be automated and has a high throughput, although lower than the phenol-chloroform method. This is a one-step method i.e the entire procedure is completed in one tube. This lowers the risk of contamination making it very useful for forensic extraction of DNA.

# ESSENTIALS IN RT-qPCR

*Jambaldorj Jamiyansuren*
*Lecturer, Department of Molecular Biology*

A real-time polymerase chain reaction (real-time PCR), also known as quantitative polymerase chain reaction (qPCR), is a laboratory technique of molecular biology based on the polymerase chain reaction. It differs from traditional PCR with the monitoring of the amplification of a targeted DNA molecule during the polymerase chain reaction.

**Two common detection methods of PCR products in real-time PCR are:**

1. Non-specific fluorescent dyes that intercalate with any double-stranded DNA
2. Sequence-specific DNA probes consisting of oligonucleotides that are labelled with a fluorescent reporter.

Cells in all organisms regulate gene expression by turnover of gene transcripts (single stranded RNA): The amount of an expressed gene in a cell can be measured by the number of copies of an RNA transcript of that gene present in a sample. In order to robustly detect and quantify gene expression from small amounts of RNA, amplification of the gene transcript is necessary. The polymerase chain reaction (PCR) is a common method for amplifying DNA; for RNA-based PCR the RNA sample is first reverse-transcribed to complementary DNA (cDNA) with reverse transcriptase.

In order to amplify small amounts of DNA, the same methodology is used as in conventional PCR using a DNA template, at least one pair of specific primers, deoxyribonucleotides, a suitable buffer solution and a thermo-stable DNA polymerase. A substance marked with a fluorophore is added to this mixture in a thermal cycler that contains sensors for measuring the fluorescence of the fluorophore after it has been excited at the required wavelength allowing the generation rate to be measured for one or more specific products. This allows the rate of generation of the amplified product to be measured at each PCR cycle. The data thus generated can be analysed by computer software to calculate relative gene expression (or mRNA copy number) in several samples. Quantitative PCR can also be applied to the detection and quantification of DNA in samples to determine the presence and abundance of a particular DNA sequence in these samples. This measurement is made after each amplification cycle, and this is the reason why this method is called real time PCR. In the case of RNA quantitation, the template is complementary DNA (cDNA), which is obtained by reverse transcription of ribonucleic acid (RNA). In this instance the technique used is quantitative RT-PCR or Q-RT-PCR.

Quantitative PCR and DNA microarray are modern methodologies for studying gene expression. Older methods were used to measure mRNA abundance: Differential display, RNase protection assay and Northern blot. Northern blotting is often used to estimate the expression level of a gene by visualizing the abundance of its mRNA transcript in a sample. In this method, purified RNA is separated by agarose gel electrophoresis, transferred to a solid matrix (such as a nylon membrane), and probed with a specific DNA or RNA probe that is complementary to the gene of interest. Although this technique is still used to assess gene expression, it requires

relatively large amounts of RNA and provides only qualitative or semi quantitative information of mRNA levels. Estimation errors arising from variations in the quantification method can be the result of DNA integrity, enzyme efficiency and many other factors. For this reason, a number of standardization systems (often called normalization methods) have been developed. Some have been developed for quantifying total gene expression, but the most common are aimed at quantifying the specific gene being studied in relation to another gene called a normalizing gene, which is selected for its almost constant level of expression. The most commonly used normalizing genes are those that code for the following molecules: beta actin, tubulin, glyceraldehyde-3-phosphate dehydrogenase, albumin, cyclophilin, and ribosomal RNAs (16s).

**Basic principles**

Real-time PCR is carried out in a thermal cycler with the capacity to illuminate each sample with a beam of light of at least one specified wavelength and detect the fluorescence emitted by the excited fluorophore. The thermal cycler is also able to rapidly heat and chill samples, thereby taking advantage of the physicochemical properties of the nucleic acids and DNA polymerase.

The PCR process generally consists of a series of temperature changes that are repeated 25 – 50 times. These cycles normally consist of three stages: the first, at around 95 °C, allows the separation of the nucleic acids double chain; the second, at a temperature of around 50-60 °C, allows the binding of the primers with the DNA template; the third, at between 68 - 72 °C, facilitates the polymerization carried out by the DNA polymerase. Due to the small size of the fragments the last step is usually omitted in this type of PCR as the enzyme is able to increase their number during the change between the alignment stage and the denaturing stage.

**Applications used qRT-PCR**

Quantification of gene expression. Quantifying gene expression by traditional DNA detection methods is unreliable. Detection of mRNA on a Northern blot or PCR products on a gel or Southern blot does not allow precise quantification. For example, over the 20-40 cycles of a typical PCR, the amount of DNA product reaches a plateau that is not directly correlated with the amount of target DNA in the initial PCR.

Clinical Diagnostics. Diagnostic qualitative PCR is applied to rapidly detect nucleic acids that are diagnostic of, for example, infectious diseases, cancer and genetic abnormalities. The introduction of qualitative PCR assays to the clinical microbiology laboratory has significantly improved the diagnosis of infectious diseases, and is deployed as a tool to detect newly emerging diseases, such as new strains of flu, in diagnostic tests. Quantitative PCR is also used by microbiologists working in the fields of food safety, food spoilage and fermentation and for the microbial risk assessment of water quality (drinking and recreational waters) and in public health protection.

Detection of genetically modified organisms. qPCR using reverse transcription (RT-qPCR) can be used to detect GMOs given its sensitivity and dynamic range in detecting DNA. Alternatives such as DNA or protein analysis are usually less sensitive. Specific primers are used that amplify not the transgene but the promoter, terminator or even intermediate sequences used during the process of engineering the vector. As the process of creating a transgenic plant normally leads to the insertion of more than one copy of the transgene its quantity is also commonly assessed. This is often carried out by relative quantification using a control gene from the treated species that is only present as a single copy.

# IMMUNOHISTOCHEMISTRY

*Tungalag Ser-Od*
*Specialist, Department of Administration, Monitoring and Evaluation*

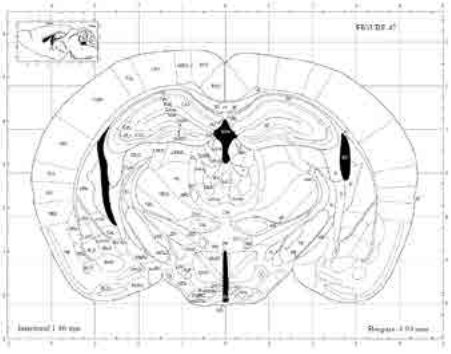
Immunochemistry is a technique used for detecting molecules within biological tissues and is widely used for pathological diagnosis and research laboratories. It uses the principle of antibodies binding antigens in the tissue. Immunohistochemistry uses monoclonal or polyclonal antibodies to detect antigens in the tissue in order to visualize and localize cellular components or target molecules in the tissue. There are two staining methods when it comes to detecting target antigens: direct method and indirect method. The direct method is one-step staining method using labeled antibodies. This method is simple and quick because it reacts directly with the antigen in the tissue. Therefore, the sensitivity of the reaction is lower. On the other hand, indirect method uses unlabeled primary antibody, which binds with antigen in the tissue, followed by labeled secondary antibody that reacts with the primary antibody. The latter one is more sensitive though being used often.

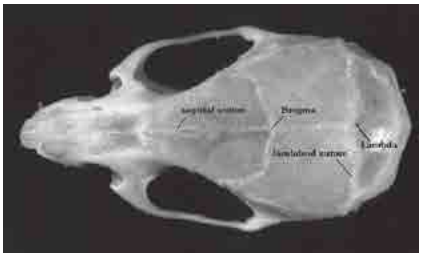
# STEREOTAXIC SURGERY

*Darambazar Gantulga*
*Dean, High School*

A stereotaxic surgery is an invasive procedure used to precisely target specific regions of the brain. The word stereotaxic is derived from the root's stereos, meaning "three-dimensional," and taxic, meaning "having an arrangement." Thus, a stereotaxic surgery places an animal brain within a three-dim

tensional coordinate system so an investigator can place neurobiological probes and reagents in discrete brain regions. These tools can be used to measure neural activity, sample bioactive substances within the extracellular environment, or manipulate neural function.



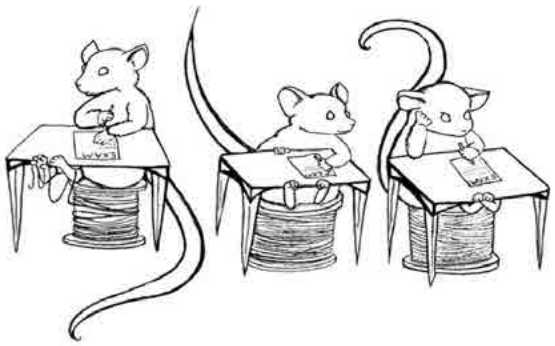


Just as sailors use maps and astronomical reference points to navigate the globe, scientists use brain atlases and anatomical landmarks to navigate the brain. Published atlases provide three-dimensional coordinates of brain structures for a variety of animals, including rodents, primates, and even birds and bats. The coordinates of brain structures are defined in terms of distances to anatomical landmarks visible as seams on the skull: bregma and lambda. Bregma is defined as the intersection between the sagittal and coronal sutures of the skull; lambda is defined as the intersection between the lines of best fit through the sagittal and lambdoid sutures. In order to properly align an animal brain so that its structures are consistent with the coordinates in a brain atlas, a scientist must correctly position the animal's head on a stereotaxic instrument. This specialized equipment holds an animal in place and uses a fine-scale micromanipulator to precisely measure and target distances in 1 um increments.

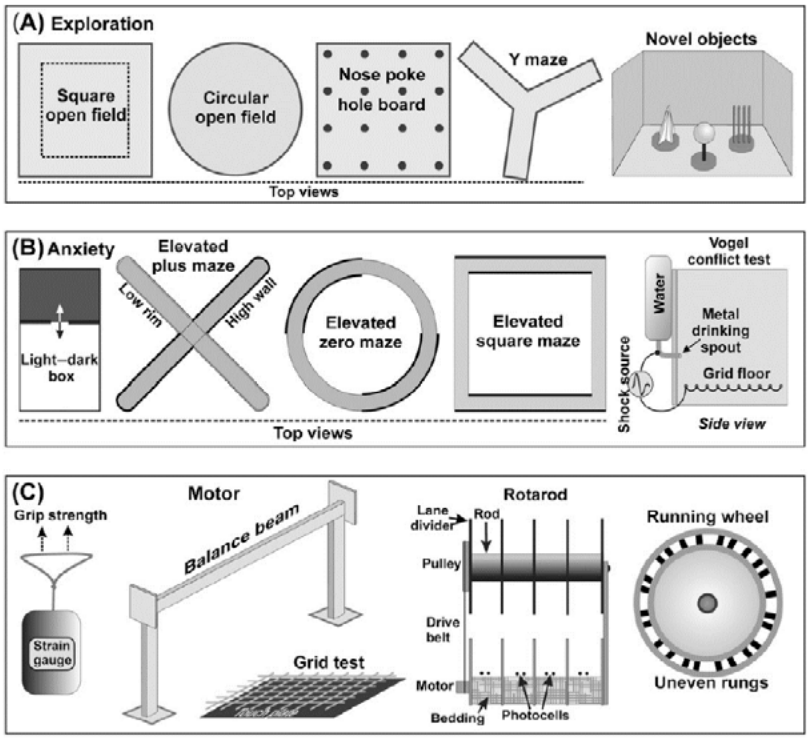
Brain atlases provide a useful three-dimensional guide for targeting discrete brain regions. However, because different animal strains and individuals vary, scientists must empirically determine the actual coordinates for a region of interest before any experiments take place. Scientists can verify the correct targeting of brain regions by examining histological sections of the brain after experiments have ended.

# BEHAVIORAL TESTING

*Darambazar Gantulga*
*Dean, High School*



Whereas the research environment varies greatly in different countries and institutions, the actual process of doing research, for instance with mice, is or should be the same everywhere. The choice of how many and which tests to use determines the structure of the experiment. The specific tests have a pervasive influence on the ordering, balancing, and randomization of test administration. The tests even play a major role in determining sample size, because every study is constrained by funds and time. The popular tests are grouped into broad domains mainly for convenience, and many tests are clearly pertinent to more than one domain. The seemingly simple open field test, for example, assesses exploratory activity as well as anxiety-related behavior (wall hugging), motor capabilities (rearing, grooming), and even memory (habituation of activity) to some extent. Having decided upon the design, the tests, and the number of mice, permission to conduct the study must be given. After all the planning is completed and everyone is ready for the first day of testing, the real action begins. Everything should go smoothly if the conditions have been properly prepared.

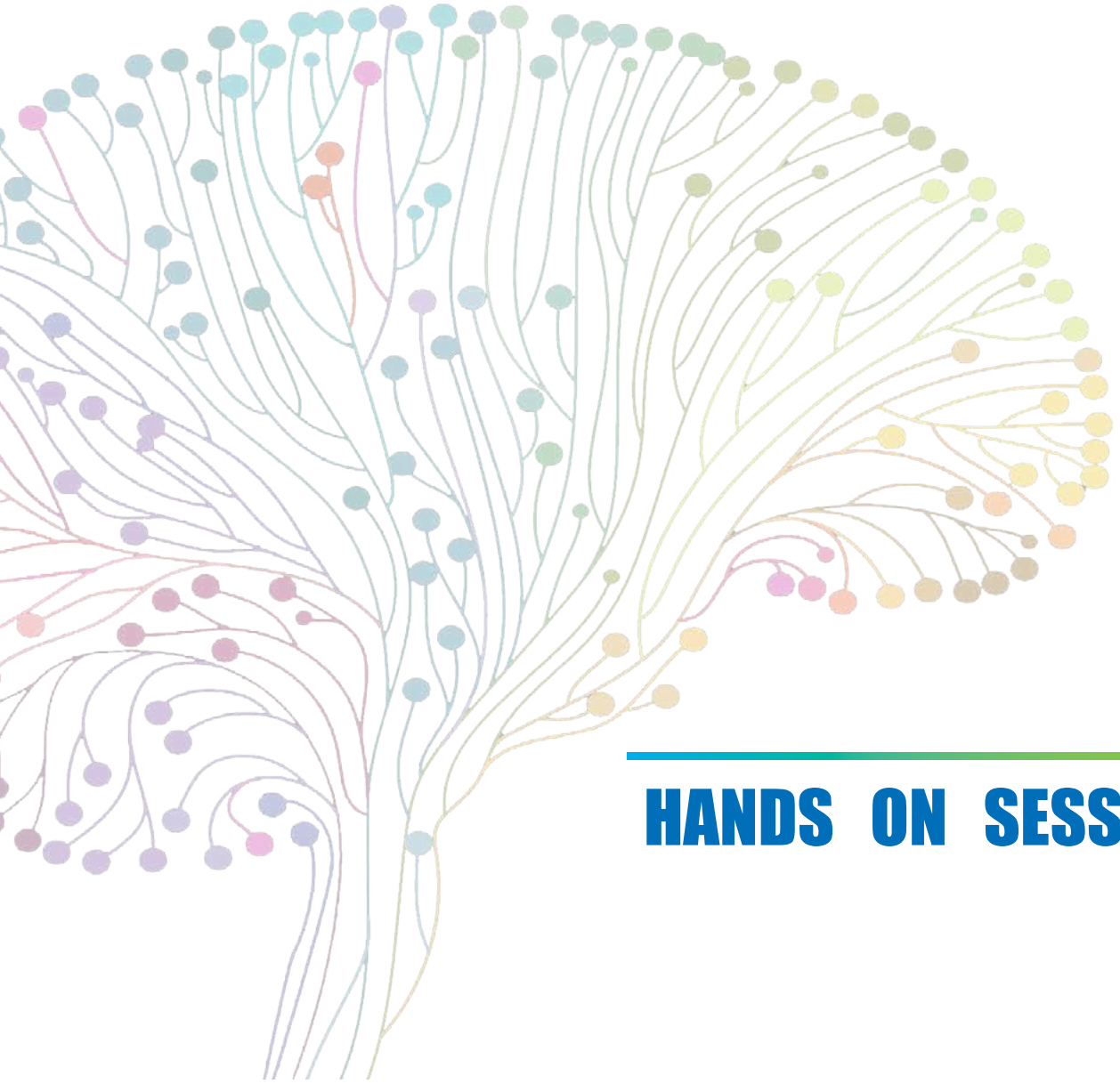


# DISSECTING RODENTS BRAINS

*Mandakhnaran Davaadorj*
*Researcher, Brain Science Institute*

Fresh dissection of brain tissue has the advantage that particular brain regions can easily be dissected based on visual information, such as differences in color of adjacent tissues, and on the natural anatomical boundaries of certain regions present in the brain. Examples of these are the hypocampus that can be easily taken off from the cortex, and are distinct in color, and the hippocampus that differs from the occipital cortex by color and because it lies loosely on the thalamus, basically only connected by the fornix. For other tissues, such as medial prefrontal cortex (mPFC) and striatum, dissection in both fresh and frozen tissue could be carried out, with frozen tissue likely yielding a slightly more accurate dissection, because it allows thinner sections to be made. In fresh tissue, dissection of these structures is more challenging as these regions are highly interconnected, and change shape going from rostral to caudal. Brain dissection is the first and most important step of many neuroscience applications including simple H&E staining and more complicated immunofluorescence staining.

# IBRO-APRC ASSOCIATE SCHOOL ON BASIC TECHNIQUES IN NEUROSCIENCE – THE 3rd ULAANBAATAR SCHOOL



## HANDS ON SESSIONS

# PERFUSION OF MOUSE BRAIN

*Galindev Batnasan*
*Researcher, Department of Science and Technology*

**Aim:** Perfusion fixation is to use the vascular system of a deeply anesthetized animal to deliver fixatives to the tissues of interest. This is the optimal method of tissue preservation because the tissues are fixed before autolysis begins. Perfused tissues are less susceptible to artifacts caused by handling. Techniques for fixation vary depending on the organ and the desired processing.

**Materials**

- C57BL/6j Mouse
- Peristaltic pump
- Inhalation anesthesia machine
- Ketamnine + xylazine (150/10 mg/kg=0.1 ml/20 g)
- Collecting dish
- Surgical stage/platform
- 0.9 % NaCl solution
- 5%-10% formaldehyde solution
- Isofluorane
- 20 gauge needle
- 1 mL syringe

**Surgical tools:**

- Veterinary surgical instrument set
- Veterinary LED operating lamp

**Procedure:**

1. Place mouse in inhalation chamber.
2. Remove mouse from chamber.
3. Wait for 3 minutes or until the mouse no longer responds to painful stimuli, such as paw pinch before proceeding.
4. Locate the mouse on its back.
5. Using tweezers and operating/dissecting scissors open up the skin and expose the abdomen and chest cavity.
6. Cut open the diaphragm using scissors. To expose the heart.
7. Insert the 20 g needle (from the tubing with saline/10% formalin solution) into the apex of the left ventricle.
8. Immediately after inserting the needle into the left ventricle, cut the right atrium using scissors.
9. Perfuse with saline solution for 10 minutes.
10. After 10 minutes, switch the stopcock to allow for flow of formalin solution.
11. Perfuse for 10-12 minutes with 5%-10% formaldehyde solution.
12. Remove the head using a pair of scissor.
13. Remove the skin over the skull.
14. Remove the brain and place it in a vial of fixative.
15. The skull removed and the brain exposed.
16. When collecting tissues, keep tissues in 10% formalin solution for ~24 hours at 4 degree C.
17. Transfer tissues to 3%-5% sucrose after for long-term storage at -80 degree C.

# CRYOSTAT SECTIONING OF MICE BRAIN

*Galindev Batnasan*
*Researcher, Department of Science and Technology*

**Aim:** Cryostat is used in medicine to cut histological sections. They are usually used in a process called frozen section histology. The cryostat is essentially an ultrafine "deli-slicer", called a microtome, placed in a freezer. The cryostat is usually a stationary upright freezer, with an external wheel for rotating the microtome. The temperature can be varied, depending on the tissue being cut - usually from minus 20 to minus 30 degree Celsius. The freezer is either powered by electricity, or by a refrigerant like liquid nitrogen. To minimize unnecessary warming all necessary mechanical movements of the microtome can be achieved by hand via a wheel mounted outside the chamber.

**Materials:**

- Cryostat/ freezing microtome
- Fresh tissue
- Frozen section medium
- Cutting blade
- Brush or anti-roll plate
- Clean glass slides
- A diamond pencil

**Procedure:**

1. Transfer the frozen tissue block to a cryostat at -20$^0$C and allow the temperature of the frozen tissue block to equilibrate to the temperature of the cryostat.
2. Apply frozen section medium to fix the tissue block to the holder.
3. Fix the tissue block to the arm and adjust the setting to the desired angle and thickness.
4. Attach the tissue sample to a slide approved for immunostaining.
5. Dry the slides at room temperature for one hour before staining, or store at -20$^0$C for future use.

**Cryostat microtome**

# CONFOCAL MICROSCOPY

*Tumenjin Enkhbat*
*Lecturer, Depertment of Anatomy*

Confocal microscopy is a technique in optical imaging that uses point illumination via a spatial pinhole to eliminate out of-focus signals. The excitation light in confocal microscopy is usually provided by a laser to generate high intensities of fluorescence or reflectance from the focal spot. Fluorescence confocal microscopy is the most used in dermatology to analyze ex vivo and in vitro samples. Reflectance confocal microscopy can be used for real-time microscopy and uses melanin as a natural contrast agent. Confocal microscopy has many advantages, including increasing the optical resolution and contrast of an image of a specimen; facilitating reconstruction of 3-D images; enabling collection of serial optical sections from thick specimens; and enabling in vivo imaging without the artifact induced by tissue processing (Pawley, 2006). In addition to LSCM, 3-D images of nonliving samples can also be acquired by SCEM, where an electron beam is used for illumination, resulting in higher resolution compared with on focal microscopy. Limitations of confocal microscopy include the depth of imaging within thick samples and cost compared with conventional microscopes. The problems of fluorescent probe photobleaching and phototoxicity inherent in conventional fluorescence microscopy are also present with confocal microscopy. Multiphoton microscopy is an alternative strategy for fluorescence microscopy, which offers higher resolution, somewhat greater depth of imaging, and minimal photobleaching. Technologies for microscopy are promising and are still being improved.

# WESTERN BLOTTING PROTOCOL

*Galindev Batnasan*
*Researcher, Department of Science and Technology*

**Aim**: Western blotting is an important technique used in cell and molecular biology. By using a western blot, researchers are able to identify specific proteins from a complex mixture of proteins extracted from cells.

In this technique a mixture of proteins is separated based on molecular weight, and thus by type, through gel electrophoresis. The immunoassay uses a membrane made of nitrocellulose or PVDF (polyvinylidene fluoride). The gel is placed next to the membrane and application of an electrical current induces the proteins to migrate from the gel to the membrane. The membrane can then be further processed with antibodies specific for the target of interest, and visualized using secondary antibodies and detection reagents.

**Solutions and reagents:**

Lysis Buffer
- **RIPA**
- 150 mM NaCl
- 1% NP-40 or Triton X-100
- 0.5% sodium deoxycholate
- 0.1% SDS
- 50 mM Tris, pH 8.0
- Tris-HCl
- 20 mM Tris-Hcl, pH 7.5

Loading Buffer
- **2X Laemmli buffer**
- 4% SDS
- 5 % 2-mercaptoethanol
- 20% glycerol
- 0.004% bromophenol blue
- 0.125 M Tris HCl, pH 6.8

Running Buffer
- **1X running buffer**
- 25 mM Tris base
- 192 mM glycine
- 0.1% SDS
- Adjust to pH 8.3

Transfer Buffer
- **1X transfer buffer (wet)**
- 25 mM Tris base
- 192 mM glycine
- 20 % methanol
- Adjust to pH to 8.3
- 1X transfer buffer (semi-dry)
- 48 mM Tris base
- 39 mM glycine
- 20 % methanol
- Adjust pH to 8.3

Blocking Buffer

- **Blocking solution**
- 1X TBST
- 5% non-fat dry milk OR 5% BSA

Washing buffer

- **Tris-buffered saline with Tween 20 (TBST) buffer**
- 20nM Tris, pH 7.5
- 150 nM NaCI
- 0.1% Tween 20
- 10x Phosphate Buffered Saline (PBS)
- 800g NaCI
- 20g KCI
- 144 g $Na_2HPO_4 \cdot 2H_2O$
- 24 g $KH_2PO_4$
- 8L of distilled water

**Procedure:**

**Preparation of lysate from cell culture**

1. Place the cell culture dish on ice and wash the cells with ice-cold PBS.
2. Aspirate the PBS, then add ice-cold RIPA buffer (1 mL per 100 mm dish).
3. Scrape adherent cells off the dish using a cold plastic cell scraper, then gently transfer the cell suspension into a pre-cooled microcentrifuge tube.
4. Maintain constant agitation for 30 min at 4°C.
5. Centrifuge in a microcentrifuge at 4°C. You may have to vary the centrifugation force and time depending on the cell type; a guideline is 20 min at 12,000 rpm but this must be determined for your experiment.
6. Gently remove the tubes from the centrifuge and place on ice, aspirate the supernatant and place in a fresh tube kept on ice, and discard the pellet.
7. Remove a small volume (10-20) of lysate to perform a protein assay. Determine the protein concentration of each cell lysate.
8. Determine how much protein to load (Recommended: 10-50 µg/lane) and add an equal volume 2X Laemmli buffer.
9. Reduce and denature the samples by boiling the lysates in sample buffer at 95-100˚C for 5 minutes.
10. Centrifuge at 16,000 x g in a microcentrifuge for 1 min.

**Protein separation by gel electrophoresis**

1. Load equal amounts of protein (20 µg) into the wells of a mini (8.6 x 6.7 cm) or midi (13.3 x 8.7 cm) format SDS- PAGE gel, along with molecular weight markers.
2. Run the gel for 5 min at 50 V.
3. Increase the voltage to 100–150 V to finish the run in about 1 hr.

Gel percentage selection depends on the size of the protein of interest. A 4–20% gradient gel separates proteins of all sizes very well.

**Transferring the protein from the gel to the membrane**

1. Place the gel in 1x transfer buffer for 10–15 min.
2. The membrane can be either nitrocellulose or PVDF. Activate PVDF with methanol for 1 min and rinse with transfer buffer before preparing the stack.
3. Prepare the stack as follows:


4. Assemble the transfer sandwich and make sure no air bubbles are trapped in the sandwich. The blot should be on the cathode and the gel on the anode.
5. Place the cassette in the transfer tank and place an ice block in the tank.
6. Transfer overnight in a coldroom at a constant current of 10 mA.

   Note: Transfer can also be done at 100 V for 1hr, but the method needs to be optimized for proteins of different sizes.

**Immunoblotting**

1. After transfer, rinse the membrane briefly in 1X TBST.
2. Incubate membrane in blocking solution for 1 hour at room temperature or overnight at 4˚C with constant rocking.
3. Incubate overnight in the primary antibody solution against the target protein at 4°C.
   Note: The antibody should be diluted in the blocking buffer according to the manufacturer's recommended ratio.
4. Rinse the blot 3–5 times for 5 min with TBST.
5. Incubate in the HRP-conjugated secondary antibody solution for 1 hr at room temperature.
6. Rinse the blot 3–5 times for 5 min with TBST.

**Imaging and data analysis**

1. Apply the chemiluminescent substrate to the blot according to the manufacturer's recommendation.
2. Expose the membrane to autoradiography film in a dark room or image with a chemiluminescent imaging system, such as a ChemiDoc.
3. Use image analysis software to read the band intensity of the target proteins.

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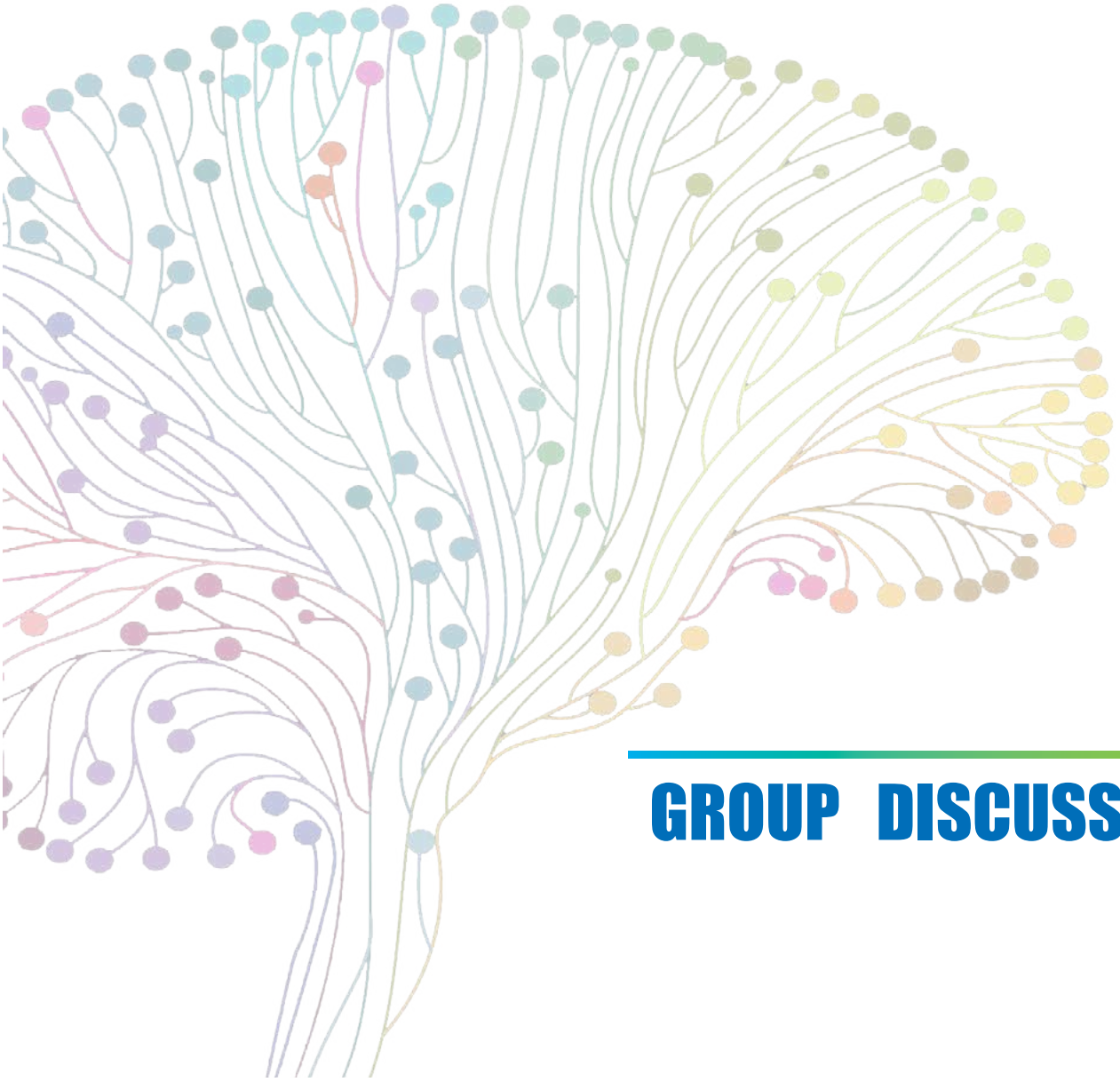


# GROUP DISCUSSIONS

# POSTER PRESENTATION

*Erdenezaya Odkhuu*
*Lecturer, Department of Anatomy,*
*School of Biomedicine, MNUMS*

A poster presentation is a way to communicate your study in a short and concise format. You will need to analyze and evaluate information, synthesize ideas and creatively demonstrate your understanding of a topic or the findings of your research. Poster size and structure are varied, however that it should be summarize and present very shortly. Many seminar or workshops organizers supplies guidelines suggesting suitable typeface styles and sizes, along with conventions for titles and subheadings. Use these to guide your basic poster design.

**Poster presentation has some advantages:** 1) to reach a broader audience when compared to a presentation limited in time. 2) to present several posters in the same room and at the same time; visitors can have a look at those posters they are interested in. 3) sometimes to present a poster while giving a short introduction. An interactive situation evolves while having a close contact to the audience, closer than when delivering a speech. 4) Poster can be used several times or you can put it on your room wall.

**However, it also has some disadvantages:** 1) A poster must attract attention. Especially when being presented at a poster fair, it has to compete with many others posters. 2) Once a poster is printed it will be difficult to make corrections or adaptions; it is therefore less flexible when compared to a presentation that can be modified any time. 3) Preparing a poster can take just as much time as when writing a speech. However, practice makes perfect. 4) Posters generally require reduced content as well as getting to the point. Selecting what has to be included or omitted is not always easy.

**There are two popular types to making a poster.**

**1) One-piece method:** The presenter chooses to design the poster in one large piece. The design is prepared using a versatile software application. Make sure you start working on your first poster in plenty of time. Using a template could save you some time or you can find a template in internet.

**2) Panel method:** The allocated poster area is divided up into a number of separate panels and/or pages. These may consist of different elements such as text, pictures, tables or titles.

Poster producing can be divided into following 4 steps.

1) Choosing content
2) Making a plan: structure, developing your poster design
3) Preparing your final poster: using text, colour palette, diagrams
4) Showing your poster

Finally, posters are a highly visual medium and can be a very effective way of communicating information to a wide audience. The challenge is to produce a poster design that is both pleasing to the eye and logical to the mind. Time taken to produce a coherent and creative display can produce stunning results.

# ORAL PRESENTATION

*Mandakhnaran Davaadorj*
*Researcher, Brain Science Institute, MNUMS*

An oral presentation is a short talk on a set topic given to a tutorial or seminar group. In an oral presentation one (or more) students give a talk to a tutorial group and present views on a topic based on their readings or research. The rest of the group then joins in a discussion of the topic.

Depending on your course, giving an oral presentation can involve:

- reading background material
- preparing and delivering a talk
- leading a group discussion
- preparing handouts and visual aids
- preparing relevant and thought-provoking questions
- submitting a written assignment based on the presentation topic

Presentation topics are usually scheduled early in the semester. You may be able to choose your topic or one may be allocated to you. If you are able to choose a topic, select the one that you have some questions about and that interests you the most. Your presentation may be given as an individual or as part of a group.

In some courses the oral presentation may be the basis for a written assignment. Check with your tutor for details. There may be specific requirements you may need to meet and these are usually detailed in your course outline or study guide.

# NEUROSCIENCES AND BIOETHICS

*Tserenbat Minjuur*
*Director, Institute of Medical law*

Ethics is a philosophical discipline pertaining to notions of good and bad, right and wrong our moral life in community.

Bioethics is the application of ethics to the field of medicine and healthcare. Ethicists and bioethicists ask relevant questions more than provide sure and certain answers.

Bioethics are multidisciplinary. It blends philosophy, theology, history, and law with medicine, nursing, health policy, and the medical humanities. Insights from various disciplines are brought to bear on the complex interaction of human life, science, and technology. Although its questions are as old as humankind, the origins of bioethics as a field are more recent and difficult to capture in a single view.

When the term "bioethics" was first coined, it may have signified merely the combination of biology and bioscience with humanistic knowledge. However, the field of bioethics now encompasses a full range of concerns, from difficult private decisions made in clinical settings, to controversies surrounding stem cell research, to implications of reproductive technologies, to broader concerns such as international human subject research, to public policy in healthcare, and to the neurosciences researches.

# CASE-BASED JOURNAL CLUB

*Battuvshin Lkhagvasuren,*
*Director, Brain Science Institute, MNUMS*

**1. Introductory remarks**

**2. Responsible conduct of research**

Case-based discussion using 2-3 excellent supporting materials in the form of peer-reviewed papers/publications.

Doing Global Science, A Guide to Responsible Conduct in the Global Research Enterprise (Princeton University Press, 2016) *http://www.interacademies.org/33345/Doing-Global-Science-A-Guide-to-Responsible-Conduct-in-the- Global-Research-Enterprise* funded through the US Dept. Of Health and Human Services, Office of Research Inetgrity (ORI), Responsible Conduct of Research (RCR) Resource Development Program to James M. DuBois, St. Louis University) *https://ori.hhs.gov/rcr-casebook-stories-about-researchers-worth-discussing*

**3. History and important principles for modern neuroethics**

Case-based discussion emphasizing the importance of adaptation to diversity of values and cultures. Identify 2-3 excellent general supporting materials in the form of peer-reviewed papers/publications.

What is neuroethics? Neuroethics Questions to Guide Ethical Research in the International Brain Initiatives (Neuron, 2018) Karen S. Rommelfanger, Sung-Jin Jeong, Arisa Ema, Tamami Fukushi, Kiyoto Kasai, Khara M. Ramos, Arleen Salles and Ilina Singh https://globalneuroethicssummit.com/wp-content/uploads/2018/10/NeQN_Neurong2018.pdf

An Ethics Toolbox for Neurotechnology (Neuron, 2015)

Martha J. Farah https://www.cell.com/neuron/fulltext/S0896-6273(15)00262-7

RCR Casebook: Stories about Researchers Worth Discussing

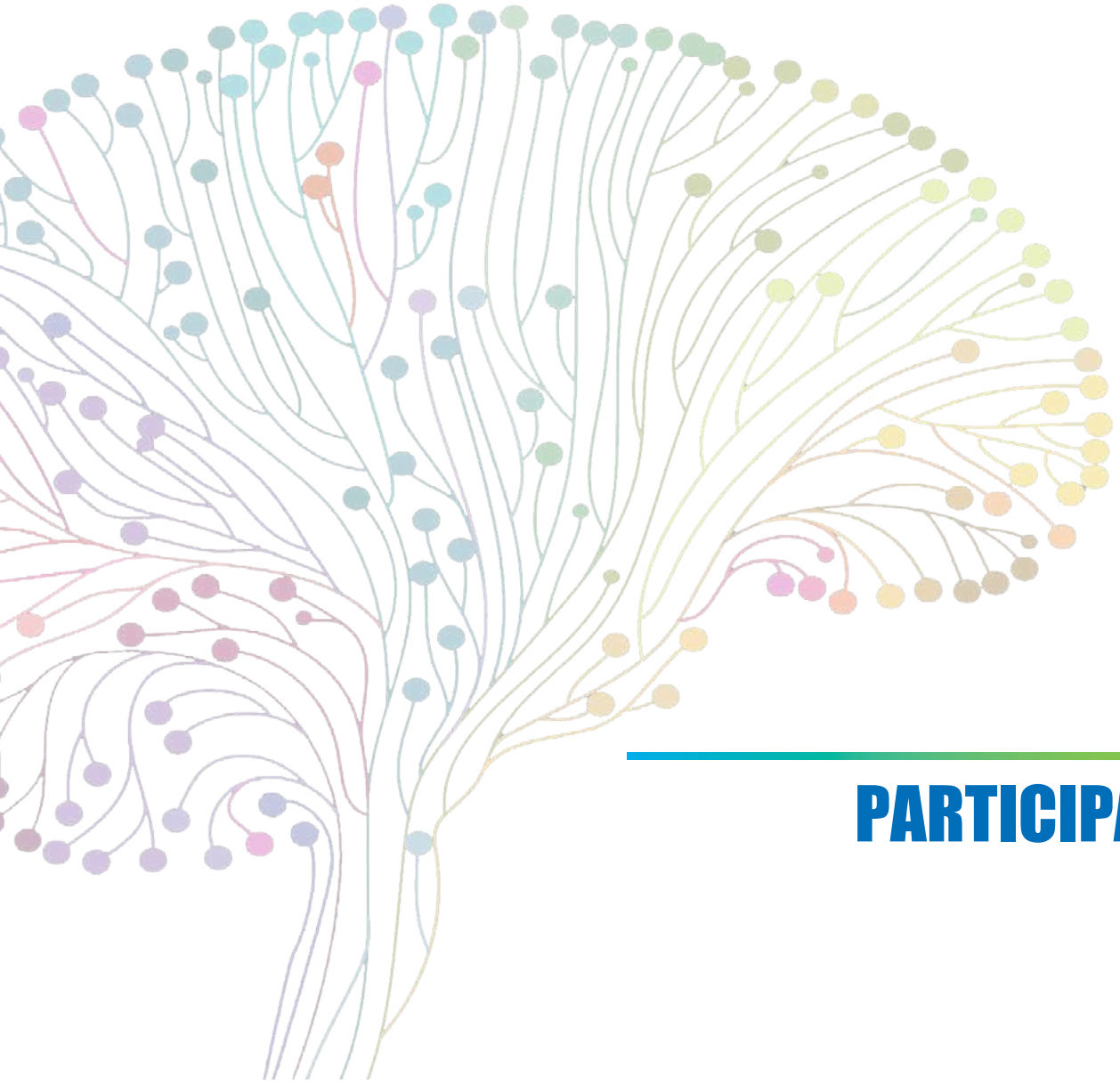
**4. Case/theme-based journal club** supported by peer-reviewed papers/articles matched to the IBRO school theme

Students can be split into smaller groups so that each group can critically evaluate one assigned paper/article to then share their general assessment with everyone else. Task force members will help the school organiser(s) and facilitators arrange this.

**5. Open discussion**

**6. Evaluation of** curriculum by students and facilitator – by the end of the school

# IBRO-APRC ASSOCIATE SCHOOL ON BASIC TECHNIQUES IN NEUROSCIENCE – THE 3rd ULAANBAATAR SCHOOL



## PARTICIPANTS

**ARIUNAA KHADBAATAR**
Current position/Occupation: Lecturer, Physical therapy,
Mongolian National University of Medical Sciences (MNUMS)
Research area: Physiology
Institutional Address: Department of Physiology, MNUMS,
Mongolia
E-mail: Ariunaa.kh@mnums.edu.mn
Phone: +976-88069035

# ASSESSMENT OF TRUNK MUSCLES ACTIVITIES IN SPORT'S RIFLE SHOOTING SIGHTING

*Ariunaa Khadbaatar*

**Background:** Prolonged standing with heavy weights makes the shooters susceptible to various injuries such as low back pain and scoliosis. Few studies have been conducted to examine how stance width affects postural stability and muscle activity in rifle shooting sport. It is clinical important to prevent from chronic low back pain and scoliosis. We should describe that in unknown field in Mongolian rifle shooting sport.

**Purpose:** Describe to abdominal and back muscles electromyogram activities in sport's rifle shooting sighting posture.

**Method:** This was an observational study; we were performed to study in laboratory "Gerontology and Functional diagnosis", school of Biomedicine, Health Sciences University of Mongolia. The sample size was calculated by formula "N= (p*q*z2) /e2". The all 25 men subjects (mean age 21.0±1.1) participated in study. The subject stands to hold on sport's rifle shooting gun for 75 seconds. They performed to two kind of stance of sport's rifle shooting sport. First was a subject stand to distance of feet with shoulder width apart and second was a subject stand to him comfortable width apart of feet each for 75 seconds. The some of abdominal and back muscle activities were measured by surface electromyography in two kind of rifle shooting sighting posture for 75 seconds.

**Results: 1.** The significant difference (p-0.01) was found on right lumbar paraspinal muscle's lesser activity in a stance with shoulder width apart than stance with comfortable width apart. 2. The significant difference (p-0.01) was found on right lumbar paraspinal muscle's higher activity in stance with comfortable width apart than shoulder width apart. 3.The significant difference (p-0.01) was found to compare between first and second of sport's rifle shooting sighting standing.

**Conclusion: 1.** The EMG activity of right lumbar paraspinal muscle (MLP.D) decreased at stance with shoulder width apart, left hand and arm supports to rifle gun. 2. The EMG activity of right lumbar paraspinal muscle (MLP.D) was balanced at stance with comfortable width apart, left hand and arm supports the rifle gun. 3. Novices can choose to feel comfortable width apart, its effect on balanced contraction of back muscles.

**BALJINNYAM ERDENEBAATAR**
Current position/Occupation: General Surgeon
Research area: Surgery
Institutional Address: Hospital of Arkhangai Province, General Surgery Department
E-mail: baljaa_ar09@yahoo.com
Phone: +976-88228737

## THE EVALUATION BENIGN PROSTATIC HYPERPLASIA USING INTERNATIONAL PROSTATE SYMPTOM SCORE - IPSS

*Baljinnyam.E.[1]*, Gankhuyag.A[1], Battulga.A[1], Choijiljamba.TS.[1], Ulziisaikhan.D[1], Narantuya. D[1], Amarjargal.D.[1], Natsagdorj.B[2]*

**Aims & Objectives:** Benign prostatic hyperplasia occurs commonly among the older man, and can adversely affect in their quality of life. During the age related benign prostatic enlargement, tissue thickening occurs in transitional zone and it cause benign prostatic obstruction. Do analysis of the status of patient diagnosed with prostatic enlargement and evaluate benign prostatic hyperplasia using International Prostate Symptom Score – IPSS.

**Method & Results:** This retrospective study was conducted among 195 patients diagnosed with prostatic enlargement in hospital of Arkhangai province between 2018-2019. We use International Prostate Symptom Score–IPSS to identify benign prostatic hyperplasia. Among total 195 participants, mean age was 60.3±9.9, mean IPSS score was 15.5±7.9, mean prostate volume was 36.6±25.4, mean residual urine volume was 74.4±53.3. By result of the international prostate symptom score among total 195 participants, 76 (38.9%) were mild, 110 (56.4%) were moderate, 9 (4.6%) were severe. When IPSS score increased, the prostate volume and residual urine volume were statistically significant increased.

**Conclusion:** Among total participants, mean age was 60.3±9.9 and 60-70% of total participants were 60-80 years old, mean IPSS score was 15.5±7.9, mean prostate volume was 36.6±25.4, mean residual urine volume was 74.4±53.3. Prostate volume and residual urine volume was statistically significant associated with international prostate symptom score.

**BAOYINBATU GABIYATU**
Current position/Occupation: Orthopedic surgeon
Research area: Surgery
Institutional Address: International Cyber
University of Medical Sciences
E-mail: Wurihan1982@gmail.com
Phone: +976-94064047

## TO EXPLORE THE CLINICAL EFFECT OF ORTHOPEDIC EMERGENCY SURGERY FOR MULTIPLE TRAUMA

*Baoyinbatu Gabiyatu*

**Aims & Objectives:** To study and explore the clinical effect and application value of orthopedic emergency surgery for multiple trauma.

**Method & Results:** Select 80 orthopedic patients with multiple trauma in the emergency department of our hospital from January 2019 to December 2019. The patients were divided into two groups by randomization. 40 cases were used as the control group and the other 40 cases were treated conservatively. As the experimental group, patients were treated with orthopedic emergency surgery. Compare the treatment effect of the two groups of patients. After different treatments, the experimental group was better than the control group in terms of bleeding volume and complication rate. The difference was statistically significant ($P<0.05$), and no adverse events occurred.

**Conclusion:** Surgical treatment of multiple trauma patients in the orthopedic emergency department can reduce the amount of intraoperative blood loss, reduce the incidence of complications, improve the treatment effect, and promote the healing of the fracture. The clinical effect is good and it has the value of popularization.

**BOLORMAA GANBAATAR**
Current position/Occupation: Medical student
Institutional Address: School of Medicine,
Mongolian National University of medical science
E-mail: bolormaa462@gmail.com
Phone: +976-91196651

## THE RESULT OF THE ESTROUS STAGE IMBALANCE OF MICE AFFECTED WITH RESTRAINT STRESS

*G.Bolormaa[1], J.Saruukhunan[1], B.Enkhzul[2], S.Ariunaa[2], B.Chintogtokh[2], B.Lagshmi[2], B.Dalai[2], D,Tsolmon[2]*

**Aims & Objectives:** A wealth of scientific and clinical evidence supports the notion that stress causes reproductive compromise and increases health burden. Neuroendocrine, metabolic and behavioral responses to acute stress represent transient homeostatic adaptations that promote survival in the face of perceived challenge; chronic stress elicits allostatic adjustments that also promote survival but at greater health cost.

**Method & Results:** This article focused on the estrous stages of mice. The current study used 20 white mice. The mice were affected with chronic stress during 35 days at the same time. Furthermore, the stress caused the dysfunction of ovary and the imbalance of the estrous stages. We had taking the cytological assessments of vaginal smears from mice during the experimental days. It helped to identify estrous stage. On the last day of study mice were decapitated and detached from the ovary. We had prepared the histology slides and analyzed the anovulation.

**Conclusion:** Although the weights of the experimental mice were increased by 4.35gr during the first 15 days, the weights were decreased in the last 15 days of our research. Comparing the control group mice, the duration of estrous stages was extended by 32 hours, detected the loss of the estrous stage balance.

**CHEN YULIN**
Current position/Occupation: Master's student
Research area: Physiology
Institutional Address: International Cyber
University of Medical Sciences, Mongolia
E-mail: hurichaiphone@gmail.com
Phone: +976-88850662

## EFFECTS OF MEDITATION ON ATTENTIONAL SOME PARAMETERS

*Chen Yulin*

**Background:** Aligning and studying knowledge on human body functions and structure in traditional medicine with philosophical thinking and livelihood of the time is important in order to correctly understand and learn its root, source and theory. Especially, possessing thorough pulse feeling skill, the main diagnostic method of traditional medicine, makes a direct impact to treatment results. Unfortunately, there has not been any research done on determining the scientific nature of the pulse feeling diagnostic method in Mongolia other than the research by academician Sh.Bold. Therefore, the topic was selected in order to clarify several issues of history and theory of the pulse feeling method and to prove the method with practical application.

**Research methods:** Text and source-study, Comparison method

**Research results and discussion:** The pulse feeling method originates from Chinese medicine and it is known to have come down to us along with many literary works of Buddhism during the third spread of the religion in early 16th century. The method thereafter developed and became more sophisticated, thus became the basis of pulse feeling method of Traditional Mongolian Medicine. It has been identified that scientists such as SumbekhambaIshbaljir, TsakhargevshLuvsanchultem, Luvsanchoinbol and Zorigt van Jigmeddanzanjamts significantly enriched and developed the content of pulse feeling method based on their research and experience. According to the research result, pulse feeling is based on the nature and connection of the wind and blood and their actions in regard to traditional medicine, whereas by modern medical theory; it is based on functioning factors of vascular muscle layers, pulse rate, pressure to vascular wall and condition of vascular wall as well as thickness and thinness of blood flow.

**DULGUUN GANBAT**
Current position/Occupation: Master of science
Research area: Neuroscience/ electrophysiology
Institutional Address: Pharmacy school, Hanyangdaehakru-55, Sangnok-gu, Ansan-si, Gyeonggi-do
E-mail: dulguun38584@gmail.com
Phone: +976-99181118

# MODIFICATION OF NEURAL ACTIVITY IN THE PRESENCE OF EXOSOME DERIVED FROM NASAL LAVAGE FLUID OF NEURODEGENERATIVE ANIMALS

*Dulguun Ganbat, Sujin Hyung, Youn Jeong Lee, Jong Wook Hong, Sang Seong Kim*

**Aims & Objectives:** Exosome is tiny cellular vesicles with a diameter of a few hundred-nanometer ranges, in which various biological modulating components such as peptides, mRNAs, and cytokines are encapsulated. According to the recent functional characterization of the organ-specific extracts, the individual groups of exosomes denote a myriad of roles in immune response, cancer therapy, diagnostics, and others. Among them, the nasal lavage fluid is known to contain exosomes that function as an immunological barrier in the airway epithelium of nasal cavity.

Neuronal network is recorded by HD MEA in primary neuron as well as organotypic hippocampal slice cultures in presence of exosomes from NLF of 5XFAD mice. The observed hyperactivation of cortical neurons and increased bursting pattern of neuronal spikes imply neurodegenerative effect of the exosome suggesting as a functional marker of AD symptom.

**Method & Results:** In this study, we are able to obtain infinitesimal amounts of intact exosomes from the nasal lavage fluid of the Alzheimer's disease (AD) model mouse, 5XFAD, by the pinched flow fractionation method. Nanoparticle tracking and biochemical analysis show the increase of the exosome concentration of the 5XFAD nasal lavage fluid. Likewise, the number of nanoparticles in the intact condition from 5XFAD is higher than that from the wild type animals on the transmission electron microscopy (TEM). To exam the functional implication in neurons, the cortical and hippocampal neurons from the P0 animal brain are prepared on the Biochip of the multielectrode array (HD-MEA) system with 4096 electrodes. Interestingly, the neural spike recording in the 5XFAD exosome treated MEA significantly accelerates the frequency of activation, escalating to the burst-tonic response from a random phasic pattern in the spontaneous synchrony activities. This response pattern resembles the result of the active amyloid-beta (Aβ) plaque treatment. In the organotypic hippocampal slice (OHS) recordings also represents similar results both in Aβ as well as 5XFAD exosome treatment. Finally, exosomes from wild type animals recover the neural activity to the normal condition. Therefore, the intact exosomes from the AD nasal lavage fluid functionally reflect the neurodegenerative disease symptoms in the neuronal level at the same time exosomes from healthy subject has a therapeutic potential.

**Conclusion:** We observed neuronal hyperactivation in the presence of Aβ and 5XFAD exosome-treated neurons with reduction of network stability. According to this new finding, the application of NLF exosome can be enriched to the diagnostic marker finding in the neurodegenerative disease in a much convenient way. In the following study, the content analysis inside the exosome will be performed by single cell sequencing as well as transcriptome analysis.

**ENKHJIN BAT-ERDENE**
Current position/Occupation: Medical Doctor
Research area: Neuroscience
Institutional Address: Brain Science Institute, Mongolian National University of Medical Sciences
E-mail: EnkhjinBatErdene0502@gmail.com
Phone: +976-88729563

# USE SOUND OF RUNNING WATER FOR THERAPEUTIC PRACTICES PATIENTS WITH RHEUMATOID ARTHRITIS AND SJOGREN'S SYNDROME

*Enkhjin.B, Davaadulam.E, Ulziikhishig.D, Khaliun.E, Zulgerel.D, Lkham-Erdene.B*

**Aims & Objectives:** Rheumatoid arthritis (RA) is a chronic, inflammatory autoimmune disease of unknown cause, characterized by chronic synovial inflammation and progressive erosions of cartilage and bone. 1 Tumor necrosis factor (TNF), interleukin-1 (IL-1), and IL-6 are clearly involved in the arthritic process.2 Cholinergic anti-inflammatory pathway, Acetylcholine (ACh) binds to α-7-nicotinic ACh receptors of those macrophages to inhibit the release of tumor necrosis (TNF)α, a pro-inflammatory cytokine.3 Studies have estimated that secondary Sjцgren's syndrome in cases that fulfill diagnostic criteria affects from 4% to 31% of patients with RA. Autoantibodies that act as antagonists at M3-muscarinic receptors on smooth muscle occur in a subset of patients with secondary Sjцgren's syndrome.4 RA and other autoimmune inflammatory diseases the vagal tone is subnormal and sympathetic tone is high.5 As result of our research in 2017, it was confirmed that running water sound stimulates parasympathetic nervous system. PNS stimulation aids in reducing inflammation and can help people with Rheumatoid arthritis (RA) and Sjцgren's syndrome (SS) .

**Method & Results:** A case control study design was used. The total 30 participants, the 10 patients that was diagnosed RA and SS. Data has been collected by Schirmer's test, Saxon's test and stress test. For statistical analysis, IBM SPSS 20.0 and Graphpad Prism 7.0 were used. There were significant differences between case groups after WS effect. ($p<0.05$)

**Conclusion:** According to our findings, PNS stimulation aids in reducing inflammation and can help people with Rheumatoid arthritis (RA) and Sjцgren's syndrome (SS) . For the use of anti-inflammatory treatment like running water sound listening process, that effect of parasympathetic stimulation in case group more than control group has been shown to increase the effect of inflammation on the Schirmer's test, Saxon's test and stress test analysis. Therefore, that simple, low cost and no side effect of treatment method is useful in the use of chronic inflammatory diseases such as rheumatoid arthritis and the sjцgren's syndrome.

**ENKHNARAN TUMURBAATAR**
Current position/Occupation: Staff member, Division for Science and Technology at the Mongolian National University of Medical Sciences
Research area: Neurobiology, electrophysiology
Institutional Address: Brain Science Institute, Mongolian National University of Medical Sciences, Ulaanbaatar, Mongolia
E-mail: enkhnaran@mnums.edu.mn
Phone: +976-80251515

## VALIDATION AND PSYCHOMETRIC PROPERTIES OF THE MONGOLIAN VERSION OF THE TOUCH EXPERIENCES AND ATTITUDES QUESTIONNAIRE

*Enkhnaran Tumurbaatar, Oyunsuren Jargalsaikhan, Elena Belovol*

**Aims & Objectives:** The main objective of the study was to adapt and validate the TEAQ questionnaire for a Mongolian sample. At the same time, the opinion of the authors of the English-language questionnaire, as well as the authors of the Russian-language version of this questionnaire, was taken into account that it is necessary not only to adapt the existing version of the questionnaire, but to create a parallel Mongolian-language version based on the original battery of 117 items, which was used to create the original version of the questionnaire. The object of the research is the TEAQ questionnaire for the study of tactile contact and psychometric characteristics of the Mongolian version of the TEAQ questionnaire. The empirical hypothesis assumes that the factor structure of the Mongolian version will generally correspond to the structures of the British and Russian versions, since the attitude towards tactile contact is not only culturally, but also biologically determined.

**Research objectives:**

1. Consider and analyze theoretical approaches to the study of tactile contacts of domestic and foreign psychologists.
2. Translate the TEAQ questionnaire into Mongolian
3. Analyze the psychometric characteristics of the Mongolian version of the TEAQ questionnaire.

**Method & Results:** Comparative theoretical and analytical analysis of psychological works; interview; for quantitative analysis, the methods of mathematical statistics were used: calculation of reliability based on the internal consistency of α-Cronbach, analysis of questionnaire items using the Likert method, factor analysis. The analysis of the results was carried out using the IBM SPSSStatistics 24 and Microsoft OfficeExcel 2010 programs.

**Sample and empirical base of the study:** The study involved 166 respondents. The age of the participants ranged from 18 to 63 years

**Theoretical significance of the study:** this work will reflect the specifics of tactile contacts among representatives of Mongolia,

**Conclusion:** An analysis of theoretical approaches to the study of tactile contacts showed the importance of these contacts for the development and formation of personality. It was shown that since the end of the 80s, a new concept associated with tactile sensations has appeared in psychophysiology. Thus, the hypothesis of our research has found partial confirmation, the research objectives have been completed, the goal has been achieved.

**ELBERELT UNURBAT**
Current position/Occupation: researcher
Research area: molecular biology
Institutional Address: Mongolian National University of Medical Science
E-mail: elberelt.u777@gmail.com
Phone: +976-96651642

## THE STUDY OF ADRB2 GENE RS1042713 AND RS1042714 POLYMORPHISMS WITH ASTHMA

*Elberelt U, Chimedlkhamsuren G, Jambaldorj J, Batbold B, Odontungalag B, Sarantuya B*

**Background:** Asthma is a common multifactorial disorder that is influenced by environmental and genetic risk factors. In the findings from Genome wide association study (GWAS), some polymorphisms in certain locus may contribute on pathogenesis and asthma susceptibility. We expecting rs1042713 and rs1042714 polymorphisms in *ADRB2* gene may influence on susceptibility to asthma and treatments to relieve asthma.

**Material and method:** 50 patients with asthma and 100 healthy volunteers were randomly involved in this case-control study. We extracted genomic DNA from buffy coat by standard protocol. We genotyped two SNPs included rs1042713 and rs1042714 in *ADRB2*, using allele specific PCR and PCR-RFLP method. We confirmed our result by agarose gel electrophoresis. Statistical analysis was done using STATA 13.0 (StataCorp, USA).

**Result:** Allele frequency of $Gln_{27}$ (OR=3.1, 95% CI 1.73-5.55, p<0.001), genotype frequency of the $Arg/Gly_{16}$ (OR=3.69, 95% CI 1.69-8.01, p=0.01) and homozygote $Gln/Gln_{27}$ (OR=3.78, 95% CI 1.85-7.71, p=0.0003) and haplotype frequency of $Gly_{16}$+$Gln_{27}$ (OR=3.88, 95% CI, 2.28-6.62; p<0.001) was more frequent in asthma patients than controls.

**Conclusion:** The results from this study suggest that Gln allele, $Arg/Gly_{16}$, $Gln/Gln_{27}$ genotypes and $Gly_{16}$+$Gln_{27}$ haplotype in ADRB2 gene may be increasing the carrier's susceptibility to the development of asthma.

**KHOROLSUREN LHAGVASUREN**
Current position/Occupation: Psychologist in Khan-Uul district clinic
Research area: Psychology
Institutional Address: Khan-Uul district clinic
E-mail: Asmile940@gmail.com
Phone: +976-80050522

## STUDY ON TYPE OF MENTAL DISORDERS, CHANGING AMONG CHILDREN AND ADOLESCENTS

*Khorolsuren.L[1], Enkhtuvshin.R[2], [1]Psychiatrist of the Khan Uul Health Center,*
*[2] MNUMS, School of Medicine, Mental Health Department*

**Background:** 20 percent or the one fifth of the children has mental or behaviour based illness and according to WHO most of them are revealed at early age.

In the "Health Behavior" study conducted by the Mongolian Public Health Center in 2013, one of every four students think about suicide, one of every 7 students plans to suicide, and one in every 10 students attempted suicide more than once. The results of the survey have become the basis for the study of the mental health of children and adolescents.

**Research materials and methodology:** The survey was conducted by the NCMH of Mongolia on Teenage Crisis 2010 - 2017 by SPSS 21.0 with documentary study using basic documentation, reports and database for inpatient care.

The data is grouped and discrete and dependent analysis is done. It is assumed true if the statistical value p is less than 0.005.

**Study results:**

- Total 2330 children were involved in the survey. 56.7% (n = 1321) were males and 43.3% (n = 1009) were females.
- In 2010, 205 patients were hospitalized in the Clinic for Young Adults. In 2017, it has been increased by 55.7% in comparison to 2010.
- Patients with 11-15 years of age were the most inpatient for pediatric patients. * P = 0.000
- 42.5% out of all patients have adolescence and emotional disorders, 30.3% have neuroses and physical disorders related to stress, 9.8% have Schizophrenia, genetic and delirium disorders, 8.7% have acute respiratory disease and 7.8% is diagnosed and treated.
  Male aged 11-15 hospitalized by adolescent disorder have been 2.9% more(p = 0.000).
  Female over the age of 16 have been hospitalized for 1,6% more(p = 0.000).
- The F9 disorder was 15.6% in 2010 and increased by 34.6% in 2017 to 49.6%.
  The F7 range was 23.4% of total illness in 2010, down from 17.5% in 2017 to 5.5%.
  The F4 disorder was 35.6% in 2010 and increased by 6.8% in 2017 to 42.4%.
  The F2 disorders accounted for 9.3% of all cases in 2010, down from 4.3% in 2017 to 5%.

- Comparison of patients age group from 2010 to 2017Children aged 6-10 are Transient tic disorder (F95.0) and Chronic motor or vocal tic disorder (F95.1) diagnosis, aged 11-15 are neurological (F48.0), Other conduct disorders (F91.8), adaptation disorders (F43.2) specific emotional disorders (F93), family disorders (F91.0), post-traumatic disorder (F43.1), Conduct disorder, adolescent-onset type (F91.2), 16 -19-year-olds have anesthetic disorder (F06.6), Paranoid schizophrenia (F20.0).

**Conclusion:** The number of in-patient adolescents growing in National Center of Mental Health is increasing year by year, indicating that children are increasingly developing mental illness among adolescents. Boys were dominant in gender comparison, and the number of adolescent aged 11-15 was higher in terms of birth and malnutrition, and more girls with over 16 years of age were more statistically significant in terms of mental illness.

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**LKHAM-ERDENE BYAMBADOO**
Current position/Occupation: Master's student
Research area: Rheumatology
Institutional Address: Department of Public Administration and Management Ministry of Health
E-mail: lkhamerdene.b@moh.gov.mn
Phone: +976-88114187

# INTRODUCTION AND VALIDATION OF A NEW SEMI-AUTOMATED METHOD TO DETERMINE SYMPATHETIC FIBER DENSITY IN TARGET TISSUES

*Dennis Bleck [1], Li Ma [2], Lkham Erdene-Bymbadoo [1], Ralph Brinks [1], Matthias Schneider [1], Li Tian [2 3], Georg Pongratz [1]*

**Aims & Objectives:** In recent years, the role of sympathetic nervous fibers in chronic inflammation has become increasingly evident. At the onset of inflammation, sympathetic activity is increased in the affected tissue. However, sympathetic fibers are largely absent from chronically inflamed tissue. Apparently, there is a very dynamic relationship between sympathetic innervation and the immune system in areas of inflammation, and hence a rapid and easy method for quantification of nerve fiber density of target organs is of great value to answer potential research questions. Currently, nervous fiber densities are either determined by tedious manual counting, which is not suitable for high throughput approaches, or by expensive automated processes relying on specialized software and high-end microscopy equipment. Usually, tyrosine hydroxylase (TH) is used as the marker for sympathetic fibers. In order to overcome the current quantification bottleneck with a cost-efficient alternative, an automated process was established and compared to the classic manual approach of counting TH-positive sympathetic fibers. Since TH is not exclusively expressed on sympathetic fibers, but also in a number of catecholamine-producing cells, a prerequisite for automated determination of fiber densities is to reliably distinct between cells and fibers. Therefore, an additional staining using peripherin exclusively expressed in nervous fibers as a secondary marker was established

**Method & Results:** Using this novel approach, we studied the spleens from a syndecan-3 knockout (SDC3KO) mouse line, and demonstrated equal results on SNS fiber density for both manual and automated counts (Manual counts: wildtype: 22.57 +/- 11.72 fibers per mm2; ko: 31.95 +/- 18.85 fibers per mm2; p = 0.05; Automated counts: wildtype: 31.6 +/- 18.98 fibers per mm2; ko: 45.49 +/- 19.65 fibers per mm2; p = 0.02).

**Conclusion:** In conclusion, this new and simple method can be used as a high-throughput approach to reliably and quickly estimate SNS nerve fiber density in target tissues.

**MUNKHJARGAL ZINAMYADAR**
Current position/Occupation: Medical Doctor
Research area: Neuroscience
Institutional Address: Brain Science Institute,
Mongolian National University of Medical Sciences
E-mail: Munkhjargaljgm@gmail.com
Phone: +976-99962526

## INHIBITION OF RECEPTOR ACTIVATOR OF NUCLEAR FACTOR-KB LIGAND (RANKL)-INDUCED OSTEOCLAST FORMATION BY SALIDROSIDE

*Munkhjargal.Z, Erdenezaya.O, Avirmed.A*

**Background:** Salidrosid is a bioactive compound of Rhodiola Rosae. The Rhodiola rosea stems have long been used by Mongolians to promote bone reformation. Zhang JK (2013) determined the protective action of Salidroside using an experimental model of osteoporosis and MC3T3-E1 cell culture. It has also been shown to promote bone protection by promoting the transport of calcium between cells in experimental animals. (Chen XF, 2017). However, it is not clear how salidroside affects osteoclast formation, which is the basis of our study.

**Aims & Objectives:** We are going to study the effect of salidroside on the osteoclast formation induced by receptor activator of nuclear factor-κB ligand (RANKL) using RAW 264.7 macrophage-shaped cells.

**Methods:** In this study, RANKL-induced osteoclast formation from RAW 264.7 cells model will used, and osteoclasts will be identified as tartrate-resistant acid phosphatase (TRAP)-positive multinucleated cells using reverse microscopic analysis. Osteoclastogenic transcription factor, NFATc1, and other signaling molecules will be analyzed by the protein expression level and phosphorylation using immunoblotting assay.

**Hypothesize:** However, we hypothesize that salidroside inhibits the appearance of osteoclasts in RANKL-induced osteoclast differentiation. This study will examine the following. Whether salidroside inhibits key transcription factors of osteoclastogenesis in RANKL-induced cells as well as activated T-cell nucleus factor (NFATc1). On the other hand, does Salidroside inhibit the signaling pathway from RANK / RANKL to NFATc1 activation. It is important to know whether NF-κB and mitogen-activated protein kinases (MAPKs) are involved.

**MUNKH-ERDENE KHERLEN**
Current position/Occupation: Biomedical researcher
Research area: Immunology
Institutional Address: Department of Immunology,
E-mail: khmunkhuuz@gmail.com
Phone: +976-88690029

## BASIC TWO ANTIBODY STAINING PROTOCOL EVALUATION FOR FLOW CYTOMETRY

*Munkh-Erdene Kherlen,Gansukh Choijilsuren ,*
*Khongorzul Togoo, Tsogtsaikhan Sandag*

**Background:** There are two basic protocols for antibody staining that are widely used in flowcytometry. First method is direct antibody staining of leucocytes without lysing red blood cells. Second one is antibody staining after red blood cell lysis. In order to establish in house antibody staining protocol, cost of consumables, reagents, spend-time, staining efficiency (mean fluorescent intensity) using same concentration of antibody were needed to be compared between these 2 protocol.

Goal To compare cost of consumables, reagents, spend-time, staining efficiency between two basic antibody staining protocols using same concentration of antibody.

**Material and Methods:** The peripheral blood sample were collected from 3 healthy individual after informed consent. Total white blood cell and lymphocyte and it's subsets are counted using flow cytometry MACSQuant 10.0 analyzer. Antibody staining efficiency were measured by mean fluorescent intensity.

MFI of protocol 1 staining were APC-CD3 312.2 ± 15.4, FITC-CD19 25.5 ± 1.6, PEVio770-CD8 183.9 ± 9.5, and VioGreen-CD4 30.3 ± 1.5. MFI of protocol 2 were APC-CD3 286.1 ± 26.5, FITC-CD19 24.5 ± 1.9, PEVio770-CD8 95.6 ± 8.3, and VioGreen-CD4 18.8 ± 3.5. The time and cost of protocol 1 were efficient compared to these of protocol 2.

**Result and conclusion:** Direct antibody staining protocol is better than staining after red blood cell lysis method in terms of cost, spend-time and staining efficiency. and the number of normal skin's moisture increased.

**OCHIRTUYA NERGUIKHUU**
Current position/Occupation: Residency of neurology
Research area: neurology
Institutional Address: Postgraduate Training Institute, Mongolian National University of Medical Science,
E-mail: ochirtuya856@gmail.com
Phone: +976-95959400

## FREQUENCY OF FETAL MACROSOMIA AND THE ASSOCIATED RISK FACTORS IN PREGNANCIES

*Odonbaatar.G Lhagwadulam.Ts, Tuul.O,Ochirtuya Ne, Oyun-erdene.D*

**Aims & Objectives:** The American College of Obstetricians and Gynecologists (ACOG) defined macrosomia as birth-weight over 4,000 g irrespective of gestational age. These births affect 3-15% of all pregnancies worldwide. Recently, rates of macrosomia have increased in developed countries, paralleled by the rise in maternal obesity and diabetes. The present study aimed to determine the relationship between mother's characteristics and macrosomic births and also compare macrosomic and normal newborns.

**Method & Results:** Total of 60 pregnant women was taken into control group who had no record of diabetes and had babies that were born below 4000 grams. Five sets of survey were taken in order to gather research information. The results of the research were analyzed using statistical program SPSS 17.0. In our research, velocity of births, prior macrosomal births, male fetuses, overweight before pregnancy and gaining more weight than recommended are the risk factors of macrosomia infant births.

**Conclusion:** In our study, multiple maternal births, previous macrosomal pregnancies, male sex of the fetus, pre-pregnancy maternal obesity, and weight gain during pregnancy were recommended risk factors for macrosomal neonatal births.

**OYUNSUREN JARGALSAIKHAN**
Current position/Occupation: Lecturer
Research area: Psychology
Institutional Address: School of International Relations & Social Studies, University of the Humanities, Ulaanbaatar, Mongolia
E-mail: oyunsuren.j@humanities.mn
Phone: +976-88107236

# A FACTOR ANALYSIS OF CHARACTERIZATION OF "POLITICIAN" CRITERIA BY DIFFERENT GENERATIONS IN MONGOLIA

*Ariunsan Gantuya, Jargalsaikhan Oyunsuren*

**Aims & Objectives:** A main contribution of this work is the quantitative demonstration of factors that can be used as a basic requirement for assessing politicians. A factor analysis has been conducted by the authors in order to identify the revolutionary nature of politics and its perception among public and the way it is characterized by different generations.

**Method & Results:** The survey was conducted in Ulaanbaatar, Mongolia, randomly sampled 2721 respondents were subject to one-to-one interview by using a structured questionnaire to identify the basic criteria used by Mongolians to assess politician as a potential representative. In the following paper, we used open data of respondents' age and clustered them into four generations. Given the centrality of selecting the criteria for politician, we used 1 to 5 scale question with 20 criteria and used the subjective and rational evaluation of the respondents. According to the result of factor analysis based on absolute significance value above 0.30, it can be interpreted that 20 criteria are classified into 5 factors for each generation. Certain commonalities and discrepancies are observed among generations and analyzed accordingly. One out of 20 items have shown significant level below 0.30 in factor analysis of each generation, which is 'having knowledge on international political issues'. Thus, it has been arranged to conduct correlation tests between items in terms of relevance as the below table and the result enabled to factorize the 3 items into one factor.

**Conclusion:** Intergeneration studies are rare in Mongolian science practice and the authors take this chance to contribute a complementary knowledge about characterization of politician criteria among generations. Although this research is not a new discovery, a practical importance underlies for future factor analysis on other variables that reflect intergeneration effects. A rough estimation of above factor analysis indicates that Generations BB and X; Generations Y and Z are closer to each other in terms of identified politician criteria. Personal image and personal life factors are almost identically perceived by the four generations. Given the magnitude of knowledge factor, each knowledge items are factorized together with ethics in every generations, which indicates that ethics is also an essential knowledge, which is especially a must for politicians in Mongolia. Despite such commonality, significant discrepancies are observed in education factor, which younger generations characterize education as a part of political qualification and combine education and political experience in a single factor. Also, they identify public skills of politician as one significant factor. On the other hand, older generations tend to factorize political experience and education as separate factors.

**SAINZAYA MUNKHSAIKHAN**
Current position/Occupation: Medical Doctor
Research area: Surgery
Institutional Address: School of Medicine,
Ach Medical University
E-mail: sainaam0626@gmail.com
Phone: +976-94329416

## DETERMINE PREOPERATIVE RISK ASSESSMENT

*Sainzaya Munkhsaikhan*

**Aims & Objectives:** Risk assessment in adults who are about to undergo elective surgery (other than cardiac and thoracic procedures) involves history-taking, physical examination, and ancillary studies performed for individual indications. Further testing beyond the history and physical examination is often of low predictive value for perioperative complications.

**Method & Results:** We based on pertinent articles that were retrieved by a selective search in databases. The history and physical examination remain the central components of preoperative risk assessment. Advanced age is not, in itself, a reason for ancillary testing. Laboratory testing should be performed only if relevant organ disease is known or suspected, or to assess the potential side effects of pharmacotherapy. Electrocardiography as a screening test seems to add little relevant information, even in patients with stable heart disease. A chest X-ray should be obtained only if a disease is suspected whose detection would have clinical consequences in the perioperative period.

**Conclusion:** In preoperative risk assessment, the history and physical examination are the strongest predictors of perioperative complications. Ancillary tests are indicated on an individual basis if the history and physical examination reveal that significant disease may be present.

**SUVDAA ERDENESAIKHAN**
Current position/ Occupation: Senior student coordinator
Institutional Address:
E-mail: suwdaa1925@gmail.com
Phone: +976-97010041

## THE POLYMORPHISM OF TP53 CODON 72 AND CANCER RISK

*Ж.Анужин[1*], Э. Сувдаа[2], Bat-Erdene B[3], Tsogzolmaa Sh[4], Shiirevnyamba A.[5]*
*[1]Mongolian National University of Medical Sciences, School of Medicine-415*

The objective of this study was to study the association between the p53 codon 72 polymorphism and renal cell carcinoma in Mongolian people. The DNAs were collected from peripheral blood of 87 renal cell carcinoma cases and 87 controls using Qiagen mini blood DNA kit (Qiagen Inc, Valencia, CA). Thereafter, the polymorphisms were evaluated using a Polymerase chain reaction-restriction fragment length polymorphism (PCR-RELP)assay, followed by multivariate logistic regression model analysis. The results revealed that the proportions of the p53 codon 72 genotype of 87 Mongolian patients with RCC were Arg/Arg57.5%, Arg/Pro 26.4% and Pro/Pro16.1% respectively. The genotype proportions of the cancer-free Mongolian people were Arg/Arg50.6%, Arg/Pro 35.6%, Pro/Pro 13.8%, respectively. Compared to the RR genotype, odds ratio and 95% confidence interval of the PR and PP genotypes were OR=0.652 (95% CI. 0.70-0.85; p=0.997) and OR=1.026 (95% CI. 0.55-0.71; p=0.998), respectively. The results indicate thatArg/Arg genotype is the most common genotype in Mongolian patients with RCC and cancer-free people. Moreover, the p53 codon 72 polymorphism does not associate with RCC in Mongolian people.

**URJINKHAND DAMDINSUREN**
Current position/Occupation: Medical Doctor
Research area: Neuroscience
Institutional Address: Mongolian National University of Medical Sciences, Ulaanbaatar, Mongolia
E-mail: urje2511@gmail.com
Phone: +976-99039199

# DEFINING THE KNOWLEDGE, ATTITUDES AND PRACTICES OF PARENTS WITH CHILDREN UNDER 5 YEARS ABOUT AIR POLLUTION AND HEALTH

*D. Urjinkhand, A. Altjin, N. Undarmaa, B. Choinyam, G. Mandukhai*

**Aim:** To define the knowledge, attitudes and practices of parents with children under 5 years about air pollution and health.

**Materials & Method:** The "Right to Breathe" project implemented by People in need International organization. A total of 222 participants (parents of children under the age of 5) from 21 khoroos of 5 districts were selected using purposive sampling method from 9 districts. In this project we used questionnaire and group interviews. Research data was analyzed using SPSS 25.0 program. Trained researchers entered numerical data and checked for errors.

**Results:** The total number of parents surveyed was Bayanzurkh district 32.9%, Songino-khairkhan district 26.6%, Sukhbaatar district 22.5%, Chingeltei district 4.5% and Khan-Uul district 13.5%. Among parents with young children involved in the survey, 89(40.1%) does not wear masks, 111(50.0%) wears masks occasionally, and 22(9.9%) wears masks regularly. Among young children involved in the survey, 41(18.5%) does not wear masks, 112(50.5%) wears masks occasionally, and 68(30.6%) wears masks regularly. Common reasons for not using masks for children, 39.9% said masks make breathing more difficult, 32.9% said they are unable to afford the masks, and 42.3% said their children refused to wear masks. 81.7% of the surveyed households do not use air purifiers at home and 18.3% use air purifiers at home. Among all study participants, 27 (12.4%) of parents reported smoking at home and 190 (87.6%) reported not smoking at home. 84.7% of all respondents had been breastfeeding and 15.3% have not been breastfeeding. 75% of the study participants reported carrying their child when passing through traffic, while 24.5% do not carry their child.

**Conclusion:** According to the results of the survey, there are a variety of reasons for the lack of mask use in children, ranging from financial limitations, social perceptions, and child's own dislike of masks. Even though the number of parents who have not been breastfeeding and smoking at home is not much, this shows their insufficient education about health.

**WURIHAN AMUERSANA**
Current position/Occupation: Gynecologist
Research area: Gynecology
Institutional Address: International Cyber University of Medical Sciences
E-mail: Wurihan1982@gmail.com
Phone: +976-94064045

# RESEARCH ON CLINICAL INTERVENTION ON PREECLAMPSIA ACUTE PULMONARY EDEMA DURING THE PERIOPERATIVE PERIOD IN THE DEPARTMENT OF OBSTETRICS

*Wurihan Amuersana*

**Aims & Objectives** To research the clinical intervention on preeclampsia acute pulmonary edema during the perioperative period in the department of obstetrics and realize the effective control of the acute pulmonary edema.

**Method & Results:** 126 cases of patients with preeclampsia cesarean section admitted and treated in our hospital from January 2015 to December 2016 were selected and randomly divided into two group, and the control group were only treated with routine method, while the observation group adopted the intervention treatment on the basis of the routine measures, and the respiratory frequency, occurrence of acute pulmonary edema and oxyhemoglobin saturation were compared before and after treatment were compared. Results Before treatment, the differences in the heart failure, respiratory frequency, oxyhemoglobin saturation and mean arterial pressure were big and the differences were not statistically significant ($P>0.05$, after treatment, the oxyhemoglobin saturation in the observation group was much higher than that in the control group [(98.54±1.55% vs 92.34±1.97)%], and the difference was statistically significant ($P<0.05$, and the respiratory frequency in the observation group was obviously better than that in the control group [(19.02±1.24) times/min vs 24.57±1.66) times/min], and the difference was statistically significant ($P<0.05$), and the difference in the heart failure between the observation group and the control group was statistically significant [(85.95±10.58) times/min vs 108.44±12.42) times/min], and the mean arterial pressure, postoperative urine volume, oncotic pressure and incidence rate of acute pulmonary edema in the observation group were obviously better than those in the control group, and the differences were statistically significant($P<0.05$.

**Conclusion:** The implementation of effective treatment intervention of preeclampsia cesarean section patients during the perioperative period can realize the effective prevention of acute pulmonary edema, which is of important significance to ensuring the health and promoting the recovery.

**YERKHANAT KHUANBAI**
Current position/Occupation: Master's student (MSc) /General Surgeon
Research area: Cancer, Surgery
Institutional Address: Department of Surgery, Mongolian National University of Medical Sciences, Ulaanbaatar, Mongolia
E-mail: Yerkhanat9@gmail.com
Phone: +976-88299988

# ASSOCIATION OF GSTM1, NAT2 GENE POLYMORPHISMS WITH RISK FACTORS AND CLINICAL CHARACTERISTICS IN BLADDER CANCER PATIENTS IN MONGOLIA

*Yerkhanat Khuanbai[1*], Shiirevnyamba Avirmed[1]*

**Introduction:** In Mongolia, the bladder cancer is the second most frequent cancer among urological cancers and incidence of bladder cancer is increasing each year. Previous studies suggest that genetic polymorphisms in activating and detoxifying enzymes may play a role in determining an individual's susceptibility to bladder cancer in particular when in combination with specific environmental exposures.

**Objective:** To investigate the correlation of GSTM1, NAT2 gene polymorphisms with risk factors and clinical characteristics of bladder cancer in Mongolian population

**Materials and Methods:** Our current study was hospital-based case-control study including 60 histologically confirmed bladder cancer patients and 60 cancer-free controls. After written informed consent, genomic DNA of all participants was extracted from peripheral venous blood and was used to identify GSTM1 and NAT2 polymorphisms using PCR, PCR-RFLP techniques and clinical characteristics of bladder cancer patients were obtained from patient's past medical history.

**Results:** The mean age of bladder cancer group was 58±4 and the mean age of healthy controls was 57±3. In our study, the male to female bladder cancer incidence ratio was 3.28:1. The NAT2 low acetylator phenotype was more common in patients with bladder cancer (15%) than in healthy controls (5%). Furthermore, the individuals with NAT2 low acetylator phenotype were at almost 3.35-fold increased risk to develop bladder cancer (OR=3.35, 95%CI=0.8604-13.0657, p=0.081) while the risk was even higher when combined with GSTM1 null genotype (OR=4, 95%CI=0.4459-37.5308, p=0.213) but there was no statistical significance. Transitional cell carcinoma was the most frequent histological type (93.33%), followed by Squamous cell carcinoma (3.33%). Bladder cancer recurrence was identified in 16 cases (26.67%) and 8 (50%) of the recurrences occurred within first three months. Furthermore, bladder cancer recurrence rate was higher in individuals with GSTM1 null genotype and NAT2 high acetylator phenotype. In our study, 14 (46.67%) patients out of 30 who have classified by pathologic staging, were diagnosed at SI stage and 11 (36.67%) patients were diagnosed at SII stage.

**Conclusion:** Our current study presents evidence that in the Mongolian population, the risk of bladder cancer was the highest for tobacco smokers having the NAT2 low acetylator phenotype and GSTM1 null genotype. Also, the risk of bladder cancer was higher for the subjects at age ≤ 60 years old with NAT2 low acetylator phenotype. Moreover, individuals with GSTM1 null genotype and NAT2 high acetylator phenotype were diagnosed at late stages and received more repeated surgery treatment for bladder cancer recurrence.

**Training Satisfaction Surveys**

*for participants in IBRO-APRC Associate School on Basic Techniques in Neuroscience – The 3rd Ulaanbaatar School Trainings*

Date: _____

Trainer: _____

| | The training I have received so far: | Strongly Disagree | Disagree | Neither Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **PART A: Overall Experience** | | | | | | |
| 1 | The objectives of the training were clearly defined. | | | | | |
| 2 | Participation and interaction were encouraged. | | | | | |
| 3 | The topics were relevant to me. | | | | | |
| 4 | The distributed materials were helpful. | | | | | |
| 5 | This training will be useful for my work. | | | | | |
| 6 | The trainer was well prepared. | | | | | |
| 7 | The trainer explained all aspects thoroughly | | | | | |
| 8 | The time allotted for the trainings was sufficient. | | | | | |
| 9 | The facilities were adequate and comfortable. | | | | | |
| **PART B: Meeting Structure** | | | | | | |
| 10 | The venue (meeting rooms) | | | | | |
| 11 | Food/beverage | | | | | |
| 12 | Schedule (timing of sessions, etc.) | | | | | |
| 13 | Small group sessions/workshops | | | | | |

Please share any additional comments about the training.

_____

_____

_____

Thank you for taking time to provide your feedback on the training!


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