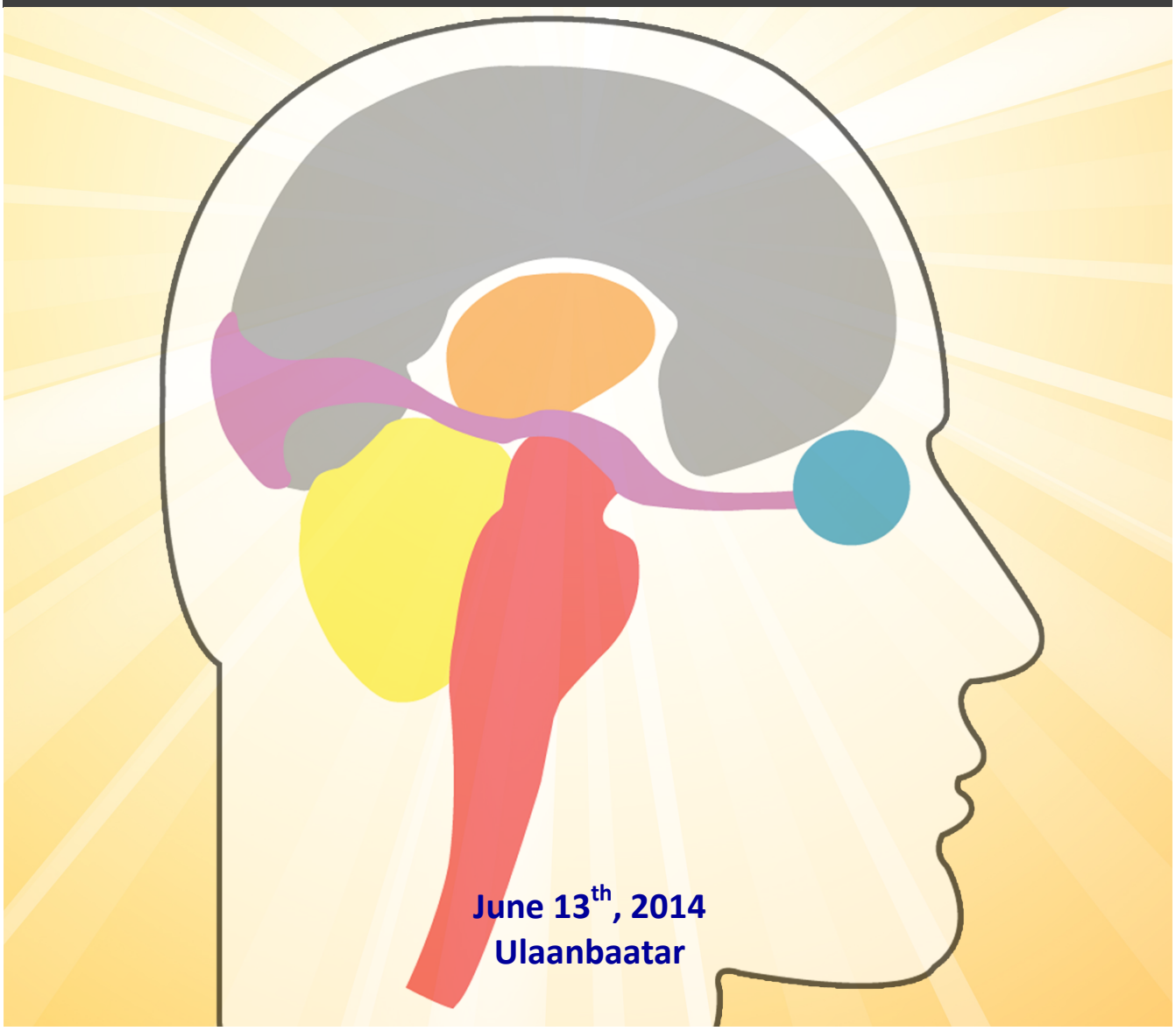
Organized by:

MNS

MONGOLIAN NEUROSCIENCE SOCIETY

The First International Workshop Neuroscience 2014



June 13th, 2014
Ulaanbaatar

Contact: Mongolian National University of Medical Sciences, Room #203, Zorig Street 3, Ulaanbaatar TEL: 99193543

Neuroscience Workshop Agenda
June 13

09:00 - 09:30	Introduction to the Workshop ¨ Opening remarks ¨ Introduction to MNS
09:30— 10:00	**Keynote Address:** "The contribution of diacylglycerol kinase delta to insulin resistance" Marc Gilbert
10:00 —10:15	"Ghrelin interacts with GLP-1 action to stimulate glucose-induced insulin secretion in islet b-cells" Damdindorj Boldbaatar
10:15 - 10:30	"Paraventricular NUCB2/nesfatin-1 regulates feeding behavior and mediates anorexigenic effect of leptin" Darambazar Gantulga
10:30—10:45	"Lymphotoxin β receptor regulates the development of CCL21-expressing subset of postnatal medullary thymic epithelial cells" Enkhsaikhan Lkhagvasuren
10:45 -11:00	"Fos distribution pattern of acute autonomic, emotional, and behavioral responses to social defeat stress" Battuvshin Lkhagvasuren
11:00—11:15	**"**Macrophage-specific disruption of HMG-CoA reductase inhibited the development of atherosclerosis" Bayasgalan Tumenbayar
11:15 — 11:30	"Mathematics in neuroscience: coupled cell systems and synchrony-breaking bifurcations, its reducibility" Ganbat Atarsaikhan
11:30 — 11:40	Closing

MNS Mongolian Neuroscience Society

About Us

The Mongolian Neuroscience Society (MNS) is an academic organization of scientists who study the brain and nervous system. The Society has recently founded by 7 members in May 2014 with the aim developing and promoting neuroscience research in Mongolia.

The distinguishing features of neuroscience are that it covers an extremely broad range of research fields from molecular biology, cell biology, anatomy, physiology, biochemistry, biophysics, and pharmacology to psychology, behavioral science, technology, mathematics and clinical medicine, and that it requires an integration of such various fields and a close collaboration of neuroscientists in those fields.

MNS's mission is to:

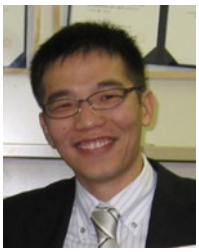
Advance the understanding of the brain and the nervous system by bringing together scientists of diverse backgrounds, by facilitating the integration of research directed at all levels of biological organization.

Provide professional development activities, information, and educational resources for neuroscientists at all stages of their careers, including undergraduates, graduates, and postdoctoral fellows, and increase participation of scientists in range of backgrounds.

Committee Members of the Mongolian Neuroscience Society	
President	Damdindorj Boldbaatar
Chairman	Battuvshin Lkhagvasuren
Vice chairman	Bayasgalan Tumenbayar
Secretary	Darambazar Gantulga
Board of Directors	Jambaldorj Jamiyansuren Enkhsaikhan Lkhagvasuren Udval Sedbazar

MNS Mongolian Neuroscience Society

Message from President



2014 MNS President Damdindorj Boldbaatar

It is my pleasure to welcome you to the First International Workshop Neuroscience of the Mongolian Neuroscience Society at the Mongolian National University of Medical Sciences on Friday, June 13 2014.

The Mongolian Neuroscience Society was founded by 7 members in May 2014 with the aim developing and wish to develop and promoting neuroscience research in Mongolia .

Last few years have seen remarkable advancements in neuroscience as research paradigms are developed at every level of research, from molecules to genes, cells, neural networks, behavior, theories, and neuroscience development. Therefore we extremely want to bring Neurosciences advancement into Mongolia. From this point of view, the Mongolian Neuroscience Society attempts to make it Neuroscience workshop where various researchers and students who aim to study neuroscience can interact with each other.

The First International Workshop
Neuroscience 2014

Invited Speaker:

Professor Marc Gilbert

Dept of Molecular Medicine and Surgery

Karolinska Institutet

S-17177 STOCKHOLM

SWEDEN

Education and Training

Baccalaureate major-biology, 1964

University of Paris VI, B.S, 1968

University of Paris VI, M.S, major-cell biology, biochemistry and major-physiology, 1969

University of Paris VI, DSc, 1971; Ph.D., 1978

Thesis title: The thyroid function in the fetus. Adv: Pr A. Jost.

University of Paris VI, DSc (Doctorat Es-Sciences) *cum laude,* 1971

Thesis title: Glucose metabolism in late pregnancy: maternal and fetal aspects. Adv, Pr A.Jost. University of Paris VI, PhD, *cum laude,* 1978

1972-1976 : Research Fellowship. Division of Endocrinology & Metabolism Univ. of P& M Curie, Paris

1976-1980 : Research in Lab. of Developmental Physiology, College de France, Paris

1980-1981 : Fellowship Dept of Pediatrics, Univ. Colorado HSC, Denver

1981-1984 : Research in Lab. of Developmental Physiology, College de France, Paris

1984-1985 : Visiting scientist in the Dept. of Pediatrics, Univ. Colorado HSC, Denver

1985-1988 : Research in Lab. of Developmental Physiology, College de France, Paris

1988-1989 : Visiting scientist in the Dept. of Pediatrics, Univ. Colorado HSC, Denver

1990-2005: Research in Lab.of Physiopathology of Nutrition Univ. of Denis Diderot, Paris

1992 (June-September) & 1995 (June-September) : Visiting scientist in the Lab of Beth Israel Hospital, Harvard Medical School, Boston

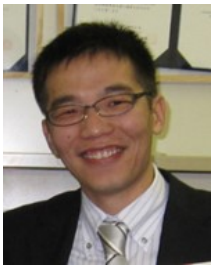
2005-2014 : Guest-Professor, Karolinska Institutet, Stockholm

Invited Speaker: Professor Marc Gilbert

The contribution of diacylglycerol kinase delta to insulin resistance

Type 2 (non-insulin-dependent) diabetes mellitus is a progressive metabolic disorder arising from genetic and environmental factors that impair beta cell function and insulin action in peripheral tissues. We identified reduced diacylglycerol kinase d (DGKd) expression and DGK activity in skeletal muscle from type 2 diabetic patients. In diabetic animals, reduced DGKd protein and DGK kinase activity were restored upon correction of glycemia. DGKd haploinsufficiency increased diacylglycerol content, reduced peripheral insulin sensitivity, insulin signaling, and glucose transport, and led to age-dependent obesity. Metabolic flexibility, evident by the transition between lipid and carbohydrate utilization during fasted and fed conditions, was impaired in DGKd haploinsufficient mice. We reveal a previously unrecognized role for DGKd in contributing to hyperglycemia-induced peripheral insulin resistance and thereby exacerbating he severity of type 2 diabetes. DGKd deficiency causes peripheral insulin resistance and metabolic inflexibility. These defects in glucose and energy homeostasis contribute to mild obesity later in life

Speaker



Damdindorj Boldbaatar MD., PhD

2003 - MD Health Sciences University, Mongolia

2010 - PhD Jichi Medical University, Japan

Ghrelin interacts with GLP-1 action to stimulate glucose-induced insulin secretion in islet b-cells

Ghrelin, an acylated 28-amino acid peptide, was isolated from the stomach as the endogenous ligand for the growth hormone (GH) secretagogue receptor (GHSR). Circulating ghrelin is produced predominantly in the oxyntic mucosa of stomach and is potently stimulates GH release and feeding. Ghrelin and its receptor are also located in the pancreatic islets.

Ghrelin suppresses glucose-induced insulin release in islet b-cells by activating voltage-dependent K^+ (Kv) channels via stimulating Ga_{i2}, an inhibitory subtype of guanosine-5'-triphosphate (GTP)-binding protein, suggesting that ghrelin may inhibit cyclic adenosine monophosphate (cAMP) signaling pathway. This raises a possibility that ghrelin could counteract the effect of glucagon-like peptide-1 (GLP-1), which is the intestinal hormone that stimulates cAMP signaling and promotes insulin release in b-cells.

We demonstrated that exogenous ghrelin significantly inhibits GLP-1-induced insulin release in isolated islets. In beta cells, GLP-1-induced cytosolic Ca^{2+} concentration ($[Ca^{2+}]_i$) increases attenuated by ghrelin. At 8.3 mmol/l glucose, forskolin, an adenylate cyclase activator, induced $[Ca^{2+}]_i$ increases, and they were attenuated by ghrelin in single b-cells, while ghrelin did not alter $[Ca^{2+}]_i$ responses to 6-phenyl-cAMP, an activator of protein kinase A (PKA). Glucose-induced cAMP generation in isolated rat islets was potentiated by GLP-1 and this potentiation was completely abolished by ghrelin. Furthermore, GLP-1-induced $[Ca^{2+}]_i$ increases, insulin secretion and cAMP production in isolated islets were significantly enhanced by a GHSR antagonist. These results indicate that both exogenous and endogenous ghrelin inhibit GLP-1-induced $[Ca^{2+}]_i$ increases and insulin release by attenuating cAMP productions in islet b-cells.

Blockade of insulinostatic activity of islet ghrelin may provide a novel treatment for type 2 diabetes. Since ghrelin attenuates cAMP pathway that is the major signaling route for GLP-1, ghrelin blockade is expected to effectively cooperate with GLP-1 in stimulating islet b-cells and promote insulin release.

Speaker

Darambazar Gantulga MD., PhD

2003 - MD Health Sciences University, Mongolia

2013 - PhD Jichi Medical University, Japan

Paraventricular NUCB2/nesfatin-1 regulates feeding behavior and mediates anorexigenic effect of leptin

Nesfatin-1, an anorectic peptide processed from nucleobindin-2 (NUCB2), is expressed in the hypothalamus including the paraventricular nucleus (PVN), an integrative center for energy homeostasis. However, little is known about the role of NUCB2/nesfatin-1 in PVN in feeding and metabolism. In this study, we investigated physiological role of endogenous PVN NUCB2/nesfatin-1 in food intake and body weight by using RNA interference and whether the NUCB2/nesfatin-1 in PVN mediates anorectic action of leptin. Adeno-associated viral (AAV) vectors encoding short hairpin RNAs targeting NUCB2 (AAV-NUCB2-shRNA) were generated to induce NUCB2 knockdown in PVN. PVN-specific NUCB2 knockdown resulted in increased daily food intake and body weight gain without affecting energy expenditure. AAV-NUCB2-shRNA injected mice also exhibited significant increases in mesenteric adipose tissue and impaired insulin sensitivity. Furthermore, both central and peripheral leptin injection failed to inhibit food intake in mice injected with AAV-NUCB2-shRNA. In addition, central injection of leptin significantly increased NUCB2 mRNA expression both in vivo and in vitro. Leptin increased cytosolic Ca^{2+} in 30 of 165 (18.2%) single PVN neurons, and 30 of 44 (68%) leptin-responsive PVN neurons were identified as NUCB2/nesftin-1 neurons. This study demonstrate that the NUCB2/nesfatin-1 neuron in PVN plays an essential role in the long-term regulation of energy balance and serves as the direct and major target for the anorexigenic action of leptin.

Speaker

Enkhsaikhan Lkhagvasuren MD., PhD

2003 - MD Health Sciences University, Mongolia

2013 - PhD Tokushima University, Japan

Lymphotoxin β receptor regulates the development of CCL21-expressing subset of postnatal medullary thymic epithelial cells.

Medullary thymic epithelial cells (mTECs) play a pivotal role in the establishment of self-tolerance in T cells by ectopically expressing various tissue-restricted self-Ags and by chemo-attracting developing thymocytes. The nuclear protein Aire expressed by mTECs contributes to the promiscuous expression of self-Ags, whereas CCR7-ligand (CCR7L) chemokines expressed by mTECs are responsible for the attraction of positively selected thymocytes. It is known that lymphotoxin signals from the positively selected thymocytes preferentially promote the expression of CCR7L rather than Aire in postnatal mTECs. However, it is unknown how lymphotoxin signals differentially regulate the expression of CCR7L and Aire in mTECs and whether CCR7L-expressing mTECs and Aire-expressing mTECs are distinct populations. In this study, we show that the majority of postnatal mTECs that express CCL21, a CCR7L chemokine, represent an mTEC subpopulation distinct from the Aire-expressing mTEC subpopulation. Interestingly, the development of CCL21-expressing mTECs, but not Aire-expressing mTECs, is impaired in mice deficient in the lymphotoxin β receptor. These results indicate that postnatal mTECs consist of heterogeneous subsets that differ in the expression of CCL21 and Aire, and that lymphotoxin β receptor regulates the development of the CCL21-expressing subset.

Speaker

Battuvshin Lkhagvasuren MD., PhD

2005 - MD Health Sciences University, Mongolia

2013 - PhD Kyushu University, Japan

Fos distribution pattern of acute autonomic, emotional, and behavioral responses to social defeat stress

We exposed rats to a social defeat stress (60 min), which caused an abrupt increase in body temperature by up to 2°C within 20 min followed by a gradual decrease to the baseline temperature. Pretreatment with diazepam (4 mg/kg, i.p.) attenuated the stress-induced hyperthermia. To identify the brain circuitry activated during the response, the distribution of cells expressing Fos, a marker of neuronal activation, in the forebrain and midbrain was examined after the stress exposure. The stress markedly increased Fos- immunoreactive cells in most regions of the cerebral cortex, limbic system, thalamus, hypothalamus and midbrain, which included parts of the thermoregulatory, autonomic, neuroendocrine, emotional and arousal systems. In rats stressed following the diazepam treatment, Fos-immunoreactive cells were significantly reduced in many, but specific brain regions including the prefrontal, sensory and motor cortices, septum, medial amygdaloid nucleus, medial and lateral preoptic areas, parvicellular paraventricular hypothalamic nucleus, dorsomedial hypothalamus, perifornical nucleus, tuberomammillary nucleus, association, midline and intralaminar thalamus, and median and dorsal raphe nuclei. In contrast, diazepam-caused increase in Fosimmunoreactive cells was observed in the central amygdaloid nucleus, medial habenular nucleus, ventromedial hypothalamic nucleus and magnocellular lateral hypothalamus. Interestingly, social defeat stress did not activate the median preoptic nucleus or organum vasculosum lamina terminalis, important sites for fever development and thermoregulation. These results provide anatomical bases for elucidating the neural circuitries to cope with social stress as well as for differentiating the central mechanisms of stress-induced hyperthermia

Speaker

Bayasgalan Tumenbayar MD., PhD

2004 - MD Health Sciences University, Mongolia

2012 - PhD Jichi medical University, Japan

Macrophage-specific disruption of HMG-CoA reductase inhibited the development of atherosclerosis

Inhibiting 3-hydroxy-3-methylglutaryl coenzyme A reductase (HMGCR), the rate-limiting enzyme in the cholesterol biosynthesis, is the most effective way to lower plasma cholesterol level. Accumulating evidence has suggested that HMGCR inhibitor, statin, inhibits the occurrence of coronary heart diseases via a pathway independent of cholesterol-lowering. Besides anti-inflammation, a wide variety of effects on the arterial wall cells have been proposed to mediate the pleiotropic effects. However, little is known about its effects on monocyte/macrophages, especially in *in vivo* setting. To address this, we have generated mice lacking HMGCR in macrophage-specific manner (M-HMGCRKO) by crossing mice overexperssing Cre recombinase under the promoter of lysozyme to floxed HMGCR mice ($HMGCR^{fl/fl}$).

Southern blot analysis showed, 50% of HMGCR gene was disrupted in peritoneal macrophages ($p<0.05$). mRNA level of HMGCR was reduced to the same degree. Numbers of circulating monocytes were reduced by 45.9% ($p<0.001$). Adhesiveness of peritoneal macrophages to plastic dish reduced by 32.6% in M-HMGCRKO mice ($p<0.05$).

To examine the effect of the absence of HMGCR in macrophages on the development of atherosclerosis, we generated mice lacking both macrophage HMGCR and LDL receptor (M-HMGCRKO/LDLRKO). After 12 weeks on atherogenic diet, M-HMGCRKO/LDLRKO mice were leaner by 18.7% ($p<0.01$) and less hypercholesterolemic by 36.6% ($p<0.001$) than $HMGCR^{fl/fl}$/LDLRKO mice. The reduced weight was primarily attributable to reduced food intake (-18.7%, $p<0.001$). M-HMGCRKO/LDLRKO mice developed less atherosclerotic lesions than M-$HMGCR^{fl/fl}$/LDLRKO mice (cross-section of aortic root: 8.3±3.7 vs. 22.5±6.4%, $p<0.0001$, and *en face* of aorta: 17.3±7.5 vs. 55.7±3.5X10^5 μm^2, $p<0.0001$). The lesion size showed significant positive correlation with body weight ($r=0.63$, $p=0.015$), but not with plasma cholesterol levels.

In conclusion, genetic disruption of HMGCR in macrophages inhibited the development of atherosclerosis in hypercholesterolemic mice even though the disruption was partial. In addition to the changes in the numbers and functions of monocyte/macrophage, the metabolic changes might contribute to the alleviation of the atherosclerotic lesion formation.

Speaker

Ganbat Atarsaikhan PhD

2008 - MD National University of Mongolia

2014 - PhD Kyoto University, Japan

Mathematics in neuroscience: coupled cell systems and synchrony-breaking bifurcations, its reducibility

A general theory for coupled cell systems was formulated recently by I. Stewart, M. Golubitsky and their collaborators. In their theory, a coupled cell system is a network of interacting dynamical systems whose coupling architecture is expressed by a directed graph called a coupled cell network. An equivalence relation on cells in a regular network (a coupled cell network with identical nodes and identical edges) determines a new network called quotient network by identifying cells in the same equivalence class and determines a quotient system as well. In this paper we develop an idea of reducibility of bifurcations in coupled cell systems associated with regular networks. A bifurcation of equilibria from subspace where states of all cells are equal is called a synchrony-breaking bifurcation. We say that a synchrony-breaking steady-state bifurcation is reducible in a coupled cell system if any bifurcation branch for the system is lifted from those for some quotient system. First, we give the complete classification of codimension-one synchrony-breaking steady-state bifurcations in 1-input regular networks (where each cell receives only one edge). Second, we show that under a mild condition on the multiplicity of critical eigenvalues, codimension-one synchrony-breaking steady-state bifurcations in generic coupled cell systems associated with an n-cell coupled cell network with DnDn symmetry, a regular network, is reducible for n>2n>2.

MNS Mongolian Neuroscience Society

Membership Application Form

GIVEN NAME: _____

SURNAME: _____

GENDER: _____ NATIONALITY_____

ADDRESS: _____

PROFESSION _____ POSITION: _____

INSTITUTION _____

DEPARTMENT _____

EMAIL: _____ TEL:_____

Membership Application Form

GIVEN NAME: _____

SURNAME: _____

GENDER: _____ NATIONALITY_____

ADDRESS: _____

PROFESSION _____ POSITION: _____

INSTITUTION _____

DEPARTMENT _____

EMAIL: _____ TEL:_____

On behalf of the Mongolian Neuroscience Society (MNS), I appreciate our co-organizers and supporters, Mongolian National University of Medical Sciences, National Center for Mental Health and our guest speaker Marc Gilbert to join us in the momentous occasion of the lunch of the Society and it's 1st International Workshop.

Darambazar Gantulga MD., PhD
Secretary of MNS