International Symposium on Global Neuroscience Cooperation

Date: Sunday, July 29th, 2018

Time: 9:00 a.m. – 12:00 a.m.

Location: Kobe Convention Center Kobe International Conference Center 3F Venue 7(504+505) http://www.neuroscience2018.jnss.org/en/satelite.html

Program

Opening Remarks: Kiyoto Kasai

9:00-9:25 Dr. Hideyuki Okano

Disease Modeling and Brain Mapping using genetically modified marmosets.

9:25-9:50 Dr. Patricia Michie

Cracking the Brain's Code: Advocacy and international collaboration in Australia.

9:50-10:15 Dr. Gregory A. Light

The auditory steady state gamma band response is a sensitive biomarker of neural system engagement following initial exposure to procognitive interventions for schizophrenia

(Break)

10:25-10:50 Dr. Kamil Ugurbil

Tentative title: High field MRI/Human connectome project

10:50-11:10 Dr. Takuya Hayashi

Towards primate connectome using non-invasive multimodal imaging

11:10-11:35 Dr. Afonso Silva

Tentative title: Marmoset MRI

11:35-11:55 Dr. Ichio Aoki

Nano- and functional-MRI contrast agents for neuroscience

Closing Remarks: Norihiro Sadato

Disease Modeling and Brain Mapping using genetically modified marmosets

Dr. Hideyuki Okano

Professor
Department of Physiology
Keio University School of Medicine

The common marmoset is a small New World primate that has been extensively used as biomedical research models. There is also an increasing interest in common marmoset in Brain Science based on the its characteristic social behavior, human like trait and as a model for exploration and discovery of knowledge-based strategies for the eradication of major human brain disorders due to the availability of genetic modification (GM) technology. We first developed GM technology of marmoset by lentiviral mediated transgenesis (Sasaki et al., Nature, 2009), followed by generation of knock-out marmoset using genome editing (Sato et al., Cell Stem Cell, 2016). We generated transgenic marmoset models of neurodegenerative diseases, including Parkinson disease (PD) which overexpressed the mutant form of □-synuclein suing lentiviral vector. The PD model marmoset showed stage-dependent progression of the disease, such as sleeping disturbance followed by motor deficit. In addition, I will mention the Rett syndrome model marmoset obtained by genome editing. Using these methods, additional GM marmoset lines will be generated and characterized for modeling human neurological and psychiatric disorders. Abnormalities in brain structure and function in these marmoset models may accelerate discovery of disease biomarkers and mechanisms toward translation (Okano et al., Neuron, 2016).

Cracking the Brain's Code: Advocacy and international collaboration in Australia

Dr. Patricia T. Michie

Professor
School of Psychology
University of Newcastle

The Australian Brain Alliance (ABA) is a consortium of universities, research institutes, professional societies and neuroscience businesses formed in 2016 by the Australian Academy of Science's National Committee for Brain and Mind to champion increased investment in Australian neuroscience, behavioral sciences and psychology. The ABA has a collective vision to transform the Australian brain research sector and is calling for significant investment in an Australian Brain Initiative to fund research to crack the brain's code.

The ABA also acts as a focal point for country-level engagement with global brain initiatives. With support of The Kavli Foundation the ABA hosted a workshop on global brain science collaboration in December 2017 that resulted in a Declaration from national brain programs and organisations from the US, EU, Korea and Japan to establish an International Brain Initiative (IBI). This Declaration has subsequently been endorsed by country programs in China, Canada, Israel, and by IBRO and INCF. The ABA is continuing to work closely with The Kavli Foundation to support the IBI, and is pursuing an innovative campaign strategy to secure support for a national brain program in Australia.

The Auditory Steady State Gamma Band Response is a Sensitive Biomarker of Neural System Engagement Following Initial Exposure to Procognitive Interventions for Schizophrenia

Dr. Gregory A. Light

Professor
Department of Psychiatry
University of California,
San Diego

While cognitive training and pharmacologic strategies have shown promise for remediating cognitive impairments in schizophrenia patients, therapeutic response varies considerably across individuals and is difficult to predict in the early stages of treatment. Moreover, the development of effective treatments for cognitive impairments has been hindered by a lack of direct measures of brain function that are sensitive to the neural systems engaged by procognitive interventions. The Auditory Steady State Response (ASSR) to gamma-frequency stimulation is increasingly used as a functional biomarker of central auditory system plasticity in translational neuroscience. This presentation will show that the gamma band auditory steady state response (ASSR) is sensitive to initial exposure to some pharmacologic (e.g., memantine) and computerized cognitive training interventions. This collection of findings supports the use of the ASSR as a translational endpoint in procognitive drug discovery and early phase clinical trial designs. ASSR and related measures of EAIP can contribute to future largescale biomarker guided treatment strategies that target the cognitive impairments associated with psychosis.

Towards primate connectome using non-invasive multimodal imaging

Dr. Takuya Hayashi

Team Leader
Brain Connectomics Imaging Laboratory
RIKEN center for Biosystems Dynamics Research

The non-human primate (NHP) species is an important neuroscientific model for understanding neuroanatomy, function, connectivity of human brain. Although humans and NHPs are in the same taxonomic group, their evolution were diverged long time ago – it has been 35 million and 25 million years since humans were separated from marmosets and macaques respectively. There have been attempts using non-invasive imaging to address how human brain is different from NHPs. However, a full picture of cross-species homologies is yet to be established to understand the macro-scale cortical architecture and connectome. Recent advancement of MRI such as high gradient hardware, data acquisition and preprocessing opened the way to address parcellation and connectome in living human brain like done in human connectome project (HCP). We have been recently developing the MRI techniques for NHP connectome using a 3T MRI scanner. The RF coils provided high SNR whole-brain coverage and allowed parallel imaging with high speed acquisitions of functional and diffusion MRI. Combined with the NHPHCP preprocessing pipelines, multimodal properties of structure and function in the gray matter were robustly mapped onto cross-species standardized coordinates, ‘grayordinates’. Applications of these techniques suggest potential of the NHP connectome project to find valid methods and models and to understand dynamics of primate connectome in evolution, sociality and plasticity.

Nano- and Functional-MRI Contrast Agents for Neuroscience

Dr. Ichio Aoki

Group Leader
Group of Quantum-state Controlled MRI
National Institutes for Quantum and Radiological Science and Technology

In addition to the BOLD-based and diffusion-based correlation analysis, some new generation contrast agents will contribute to neuroscience research in the near future, both in rodents and primates. Recently, the advent of functional contrast agents and nanoparticle drug delivery systems (nano-DDSs) has opened new pathways to understanding in vivo physiology and pathophysiology using MRI. For example, the calcium phosphate nanomicelle-based manganese contrast agent (Nat Nanotech 11(8):724-30, 2017) with BBB permeation methods (Nat Commun 17;8(1):1001, 2017) may provide depolarization-dependent contrast for assessing brain function low-invasively. I would like to introduce our recent progress and prediction of the use of functional contrast agents and nano-DDSs for neuroscience.

(Abstracts for Professors Silva and Ugurbil will be posted soon.)