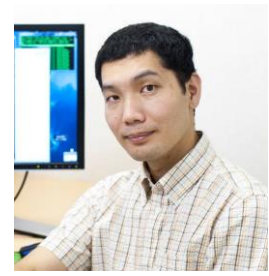


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**Current position:**

Main appointment: Team Leader, RIKEN Center for Brain Science (CBS)  
Other appointment: Affiliate Associate Professor, Brain and Body System Science Institute, Saitama University

**Education:**

1993-1996: Ph.D., Neuroscience, Department of Anatomy and Developmental Biology, University College London, (University of London, UK) (Ph.D. awarded in April 1997)  
1990-1993: B.Sc. (1st Class Honours), Computer Science, University College London (University of London, UK)

**Work experience:**

2018-present Team Leader, RIKEN Center for Brain Science, Japan  
2011-2018 Team Leader, RIKEN Brain Science Institute, Japan  
2009-present Affiliate Associate Professor, Brain and Body System Science Institute, Saitama University  
2004-2011 Unit Leader, RIKEN Brain Science Institute, Japan  
2001-2004 Research Assistant Professor, Center for Molecular and Behavioral Neuroscience, Rutgers University, Newark, NJ  
2000-2001 Postdoctoral Fellow, Department of Biological Sciences, Columbia University, New York, NY (Mentor: Rafael Yuste)  
1996-2002 Postdoctoral Fellow, Center of Molecular and Behavioral Neuroscience, Rutgers University, Newark, NJ (Mentor: György Buzsáki)

**Editorial positions:**

Editorial Board: Progress in Brain Research (2014-present), Opera Medica et Physiologica (2014-present), Neuroglia (2018-present)  
Review Editor: Frontiers in Neural Circuits (2012-present), Frontiers in Cellular Neuroscience (2014-present), Frontiers in Integrative Neuroscience (2018-present), OA Neurosciences, (2013-2015)  
Permanent Advisory Board: International Astrocyte School, 2011-present

**Awards and fellowships received:**

UCL Japan Scholarship (1993)  
Overseas Research Students Awards (1994-1996)  
Human Frontier Long-Term Fellowship (1998-2000)  
Uehara Memorial Foundation Fellowship (2000-2001)

Epilepsy Foundation Research Training Fellowship (2003-2004)  
Lundbeck visiting professorship (2016, to University of Copenhagen, with Prof. Maiken Nedergaard)

### Grants received:

- Grant-in-Aid for Scientific Research on Priority Areas from the Ministry of Education, Culture, Sports, Science and Technology (Grant #17022048) ¥2,700,000 Year 2005
- Grant-in-Aid for Scientific Research on Priority Areas from the Ministry of Education, Culture, Sports, Science and Technology (Grant #18053026) ¥6,100,000 Year 2006-2007
- Human Frontier Research Grant (Grant #RGY0073/2006-C, Principal Investigator: Attila Sik), \$337,500, Year 2006-2008
- Grant-in-Aid for Challenging Exploratory Research from the Ministry of Education, Culture, Sports, Science and Technology (Grant #21650081) ¥3,100,000 Year 2009-2010
- Saitama Regional Innovation Cluster Program (Principal Investigator: Junichi Nakai), ¥4,630,000, Year 2010-2012
- Grant-in-Aid for Innovative Research from the Ministry of Education, Culture, Sports, Science and Technology (Grant #23115522) ¥5,400,000 Year 2011-2012
- Grant-in-Aid for Innovative Research from the Japan Society for the Promotion of Science (Grant #26117520) ¥6,700,000 Year 2014-2015
- Human Frontier Research Grant (Grant #RGP0036/2014, Principal Investigator: Giovanni Marsicano), appx. \$300,000 (to be determined) Year 2014-2016
- Grant-in-Aid for Challenging Exploratory Research from the Japan Society for the Promotion of Science (Grant #16K13116) ¥2,700,000 Year 2016-2017
- Grant-in-Aid for Scientific Research (A) the Japan Society for the Promotion of Science (Grant #16H01888) ¥33,500,000 Year 2016-2019
- Grant-in-Aid for Innovative Research from the Japan Society for the Promotion of Science (Grant #18H05150) ¥4,400,000 Year 2018-2019

### Ph.D. thesis:

Hirase H., "Performance analysis of a partially connected recurrent associative net", PhD. thesis, University College London – University of London, UK, 1997

### Research articles:

- Hirase H., Recce M, (1996) A search for the optimal thresholding sequence in an associative memory. *Network: Computation in Neural Systems* 7: 741-758
- Csicsvari J, Hirase H., Czurko A, Buzsaki G (1998) Reliability and state dependence of pyramidal cell-interneuron synapses in the hippocampus: an ensemble approach in the behaving rat. *Neuron* 21:179-189.
- Czurko A, Hirase H., Csicsvari J, Buzsaki G (1999) Sustained activation of hippocampal pyramidal cells by 'space clamping' in a running wheel. *Eur J Neurosci* 11:344-352.
- Csicsvari J, Hirase H., Czurko A, Mamiya A, Buzsaki G (1999) Fast network oscillations in the hippocampal CA1 region of the behaving rat. *J Neurosci* 19:RC20.
- Csicsvari J, Hirase H., Czurko A, Mamiya A, Buzsaki G (1999) Oscillatory coupling of hippocampal pyramidal cells and interneurons in the behaving Rat. *J Neurosci* 19:274-287.
- Nadasdy Z, Hirase H., Czurko A, Csicsvari J, Buzsaki G (1999) Replay and time compression of recurring spike sequences in the hippocampus. *J Neurosci* 19:9497-9507.
- Hirase H., Czurko A, Csicsvari J, Buzsaki G (1999) Firing rate and theta-phase coding by hippocampal pyramidal neurons during 'space clamping'. *Eur J Neurosci* 11:4373-4380.
- Harris KD, Henze DA, Csicsvari J, Hirase H., Buzsaki G (2000) Accuracy of tetrode spike separation as determined by simultaneous intracellular and extracellular measurements. *J Neurophysiol* 84:401-414.
- Csicsvari J, Hirase H., Mamiya A, Buzsaki G (2000) Ensemble patterns of hippocampal CA3-CA1 neurons during sharp wave-associated population events. *Neuron* 28:585-594.
- Szabo I, Czurko A, Csicsvari J, Hirase H., Leinekugel X, Buzsaki G (2001) The application of printed circuit board technology for fabrication of multi-channel micro-drives. *J Neurosci Methods* 105:105-110.
- Hirase H., Leinekugel X, Csicsvari J, Czurko A, Buzsaki G (2001) Behavior-dependent states of the hippocampal network affect functional clustering of neurons. *J Neurosci* 21:RC145.
- Hirase H., Leinekugel X, Czurko A, Csicsvari J, Buzsaki G (2001) Firing rates of hippocampal neurons are preserved during subsequent sleep episodes and modified by novel awake experience. *Proc Natl Acad Sci U S A* 98:9386-9390.
- Harris KD, Hirase H., Leinekugel X, Henze DA, Buzsaki G (2001) Temporal interaction between single spikes and complex spike bursts in hippocampal pyramidal cells. *Neuron* 32:141-149.
- Hirase H., Nikolenko V, Goldberg JH, Yuste R (2002) Multiphoton stimulation of neurons. *J Neurobiol* 51:237-247.
- Marshall L, Henze DA, Hirase H., Leinekugel X, Dragoi G, Buzsaki G (2002) Hippocampal pyramidal cell-interneuron spike transmission is frequency dependent and responsible for place modulation of interneuron discharge. *J Neurosci* 22:RC197.
- Harris KD, Henze DA, Hirase H., Leinekugel X, Dragoi G, Czurko A, Buzsaki G (2002) Spike train dynamics predicts theta-related phase precession in hippocampal pyramidal cells. *Nature* 417:738-741.
- Leinekugel X, Khazipov R, Cannon R, Hirase H., Ben-Ari Y, Buzsaki G (2002) Correlated bursts of activity in the neonatal hippocampus in vivo. *Science* 296:2049-2052.
- Harris KD, Csicsvari J, Hirase H., Dragoi G, Buzsaki G (2003) Organization of cell assemblies in the hippocampus. *Nature* 424:552-556.
- Hirase H., Creso J, Singleton M, Bartho P, Buzsaki G (2004) Two-photon imaging of brain pericytes in vivo using dextran-conjugated dyes. *Glia* 46:95-100.
- Hirase H., Qian L, Bartho P, Buzsaki G (2004) Calcium dynamics of cortical astrocytic networks in vivo. *PLoS Biol* 2:E96.
- Bartho P, Hirase H., Moncondit L, Zugaro M, Harris KD, Buzsaki G (2004) Characterization of neocortical principal cells and interneurons by network interactions and extracellular features. *J Neurophysiol* 92:600-608.
- Hirase H., Creso J, Buzsaki G (2004) Capillary level imaging of local cerebral blood flow in bicuculline-induced epileptic foci. *Neuroscience* 128:209-216.
- Gulyas AI, Buzsaki G, Freund TF, Hirase H. (2006) Populations of hippocampal inhibitory neurons express different levels of cytochrome c. *Eur J Neurosci* 23:2581-2594.
- Sakatani S, Seto-Ohshima A, Itohara S, Hirase H. (2007) Impact of S100B on local field potential patterns in anesthetized and kainic acid-induced seizure conditions in vivo. *Eur J Neurosci* 25:1144-1154.
- Mishima T, Sakatani S, Hirase H. (2007) Intracellular labeling of single cortical astrocytes in vivo. *J Neurosci Methods* 166:32-40.
- Takata N, Hirase H. (2008) Cortical layer 1 and layer 2/3 astrocytes exhibit distinct calcium dynamics in vivo. *PLoS One* 3:e2525.
- Sakatani S, Seto-Ohshima A, Shinohara Y, Yamamoto Y, Yamamoto H, Itohara S, Hirase H. (2008) Neural-activity-dependent release of S100B from astrocytes enhances kainate-induced gamma oscillations in vivo. *J Neurosci* 28:10928-10936.
- Shinohara Y, Hirase H., Watanabe M, Itakura M, Takahashi M, Shigemoto R (2008) Left-right asymmetry of the hippocampal synapses with differential subunit allocation of glutamate receptors. *Proc Natl Acad Sci U S A* 105:19498-19503.

- Sakatani S, Yamada K, Homma C, Munesue S, Yamamoto Y, Yamamoto H, [Hirase H](#) (2009) Deletion of RAGE causes hyperactivity and increased sensitivity to auditory stimuli in mice. *PLoS One* 4:e8309.
- Mishima T, [Hirase H](#) (2010) In vivo intracellular recording suggests that gray matter astrocytes in mature cerebral cortex and hippocampus are electrophysiologically homogeneous. *J Neurosci* 30:3093-3100.
- Shinoda Y, Sadakata T, Nakao K, Kato-Semba R, Kinameri E, Furuya A, Yanagawa Y, [Hirase H](#), Furuichi T (2011) Augmented BDNF secretion kinetics by CAPS2 is critical for development of hippocampal GABAergic interneuron networks. *Proc Natl Acad Sci USA* 108:373-378.
- Iwai Y, Honda S, Ozeki H, Hashimoto M, [Hirase H](#) (2011) A simple head-mountable LED device for chronic stimulation of optogenetic molecules in freely moving mice. *Neurosci Res* 70:124-127.
- Shinohara Y, Yahagi K, Kawano M, Nishiyori H, Kawazu C, Suzuki N, Manabe R, [Hirase H](#) (2011) miRNA profiling of bilateral rat hippocampal CA3 by deep sequencing. *Biochem Biophys Res Commun* 409:293-298.
- Kaneko M, Yamaguchi K, Eiraku M, Takata N, Kiyohara Y, Mishina M, [Hirase H](#), Hashikawa T, Kengaku M (2011) Remodeling of monopolar Purkinje cell dendrites during cerebellar circuit formation. *PLoS One* 6:e21018.
- Takata N, Mishima T, Hisatsune C, Nagai T, Eibusi E, Mikoshiba K, [Hirase H](#) (2011) Astrocyte calcium signaling transforms cholinergic modulation to cortical plasticity in vivo. *J Neurosci* 31:18155-18165.
- Shinohara Y, Hosoya A, Yamasaki N, Ahmed H, Hattori S, Eguchi M, Yamaguchi S, Miyakawa T, [Hirase H](#), Shigemoto R (2012) Right-hemispheric dominance of spatial memory in split-brain mice. *Hippocampus* 22:117-121.
- Shinohara Y, Hosoya A, Yahagi K, Ferecsko AS, Yaguchi K, Sik A, Itakura M, Takahashi M, [Hirase H](#) (2012) Hippocampal CA3 and CA2 have distinct bilateral innervation patterns to CA1 in rodents. *Eur J Neurosci* 35: 702-710.
- [Hirase H](#), Nikolenko V, Yuste R (2012) Multiphoton stimulation of neurons and spines. *Cold Spring Harb Protoc.* 2012(4):472-5.
- Miyazaki T, Takase K, Nakajima W, Tada H, Ohya D, Sano A, Goto T, [Hirase H](#), Malinow R, Takahashi T (2012) Disruption of cortical function underlies behavior dysfunction due to social isolation. *J Clin Invest* 122:2690-2701.
- Molter C, O'Neill J, Yamaguchi Y, [Hirase H](#), Leinekugel X (2012) Rhythmic modulation of theta oscillations supports encoding of spatial and behavioral information in the rat hippocampus. *Neuron* 75:889-903.
- Shinohara Y, Hosoya A, [Hirase H](#) (2013) Experience enhances gamma oscillations and interhemispheric asymmetry in the hippocampus. *Nature Commun* 4:1652.
- Takata N, Nagai T, Ozawa K, Oe Y, Mikoshiba K, [Hirase H](#) (2013) Cerebral blood flow modulation by basal forebrain or whisker stimulation can occur independently of large cytosolic Ca<sup>2+</sup> signaling in astrocytes. *PLoS One* 8:e66525.
- Hashimoto M, Hata A, Miyata T, [Hirase H](#) (2014), Programmable and wireless LED-stimulator for chronic stimulation of optogenetic molecules in freely moving mice. *Neurophotonics* 1:011002.
- Aida T, Yoshida J, Nomura M, Tanimura A, Iino Y, Soma M, Bai N, Ito Y, Cui W, Aizawa H, Yanagisawa M, Nagai T, Takata N, Tanaka K, Takayanagi R, Kano M, Gotz M, [Hirase H](#), Tanaka K (2015) Astroglial glutamate transporter deficiency increases synaptic excitability and leads to pathological repetitive behaviors in mice. *Neuropsychopharmacology* 40:1569-1579.
- Nagai T, Takata N, Shinohara Y, [Hirase H](#) (2015) Adaptive changes of extracellular amino acid concentrations in mouse dorsal striatum by 4-AP-induced cortical seizures. *Neuroscience* 205: 229-236.
- Monai H, Ohkura M, Tanaka M, Oe Y, Konno A, Hirai H, Mikoshiba K, Itohara S, Nakai, J, Iwai Y, [Hirase H](#), Tanaka K (2016) Calcium imaging reveals glial involvement in transcranial direct current stimulation-induced plasticity in mouse brain. *Nature Commun* 7:11100.
- Oe Y, Baba O, Ashida H, Nakamura KC, Hirase H (2016) Glycogen distribution in the microwave-fixed mouse brain reveals heterogeneous of astrocytic patterns. *Glia* 64:1532-1545.
- Nakai N, Nagano M, Saitow F, Watanabe Y, Kawamura Y, Kawamoto A, Tamada K, Mizuma H, Onoe H, Watanabe Y, Monai H, Hirase H, Nakatani J, Inagaki H, Kawada T, Miyazaki T, Watanabe M, Sato Y, Okabe S, Kitamura K, Kano M, Hashimoto K, Suzuki H, Takumi T (2017) Serotonin rebalances cortical tuning and behavior linked to autism symptoms in 15q11-13 CNV mice. *Sci Adv.* 3(6): e1603001.
- Harada K, Ito M, Wang X, Tanaka M, Wongso D, Konno A, Hirai H, [Hirase H](#), Tsuboi T, Kitaguchi T (2017) Red fluorescent protein-based cAMP indicator applicable to optogenetics and *in vivo* imaging. *Sci Rep* 7:7351.
- Tanaka M, Wang X, Mikoshiba K, [Hirase H](#), Shinohara Y (2017) Hippocampal LFP changes by rearing condition and their dependence on inositol trisphosphate receptor type 2 in mice. *J Physiol* 595:6557-6568.
- Ue Y, Monai H, Higuchi K, Nishiwaki D, Tajima T, Okazaki K, Hama H, Hirase H, Miyawaki A (2018) A spherical aberration-free microscopy system for live brain imaging. *Biochem Biophys Res Commun* 126:15-21.

## Book chapters/proceedings:

- [Hirase H.](#) and Recce M., "Performance analysis of progressive recall in partially connected recurrent networks", Proceedings of the International Conference on Artificial Neural Networks (ICANN'95), 1995, pp509-514.
- [Hirase H.](#) and Recce M., "Interneuron plasticity in associative networks", Computational Neuroscience: Trends in Research, 1997 pp:347-351, Plenum, New York (CNS'96 Computational neuroscience meeting, MA, USA)
- Buzsaki G., Carpi, D., Csicsvari, J., Dragoi, G, Harris, K.D., Henze, D. A., [Hirase H.](#) Maintenance and modification of firing rates and sequences in the hippocampus: does sleep play a role? In Maquet, P., Smith, C., and Stickgold, R. (eds). Sleep and Plasticity. Oxford University Press., Oxford. 2003. Pp. 247-270.
- [Hirase H.](#), Nikolenko V. and Yuste R., "Direct multiphoton stimulation of neurons and spines", In Yuste, R. and Konnerth A. (eds.), Imaging in Neuroscience and Development – a Laboratory Manual, Cold Spring Harbor Laboratory Press, New York, 2005, Chapter 54, pp421-424.
- Hashikawa T and [Hirase H.](#), "Morphology and function in neural systems", In Amari S. and Furuichi T. (eds.) Molecular, cellular, and synaptic view of the brain, University of Tokyo Press, 2008, Chapter 2 pp 7-42.
- [Hirase H.](#), Nikolenko V. and Yuste R., "Multiphoton stimulation of neurons and spines", In Helmchen F., Konnerth A., and Yuste R. (eds.), Imaging in Neuroscience: A Laboratory Manual, Cold Spring Harbor Laboratory Press, New York, 2011, Chapter 42, pp411-416.
- Takata N., Shinohara S., Ohkura M., Mishima T., Nakai J. and [Hirase H.](#), "Imaging of Astrocytic Activity in Living Rodents", In Helmchen F. and Weber B. (eds.), Optical Imaging of Neocortical Dynamics, Neuromethods 2014, 85:191-207, Humana Press, Springer Science+Business Media, New York

## Reviews/comments:

- Buzsaki G, Csicsvari J, Dragoi G, Harris K, Henze D, [Hirase H](#) (2002) Homeostatic maintenance of neuronal excitability by burst discharges in vivo. *Cereb Cortex* 12:893-899.
- [Hirase H](#) (2002) Local field potential and neuronal firing in rat hippocampus. *Saibo Kogaku (Cell Engineering)*, 21: 999-1003 (Japanese).
- [Hirase H](#) (2005) A multi-photon window onto neuronal-glial-vascular communication. *Trends Neurosci* 28:217-219.
- [Hirase H.](#) Takata N (2007) In vivo measurements of astrocyte dynamics. *Brain Nerve* 59:773-781 (Japanese).
- Shinohara Y, [Hirase H](#) (2009) Size and receptor density of glutamatergic synapses: a viewpoint from left-right asymmetry of CA3-CA1 connections. *Frontiers in Neuroanatomy* 3:10.
- Sik A, Kocsis B, [Hirase H](#) (2013) A new challenge in neurosciences. *OA Neurosciences* 2013 1:1.
- [Hirase H.](#) Iwai Y, Takata N, Shinohara Y, Mishima T (2014) Volume transmission signalling via astrocytes. *Philos Trans R Soc Lond B Biol Sci* 369:20130604.
- [Hirase H.](#) Shinohara Y (2014) Transformation of cortical and hippocampal neural circuit by environmental enrichment. *Neuroscience* 280:282-298.

Nuriya M, [Hirase H](#) (2016) Involvement of astrocytes in neurovascular communication. *Progress in Brain Research* 225:41-62.

Masamoto K, Yamada K, [Hirase H](#) (2016) Neurovascular coupling - what next? *Progress in Brain Research* 225:269-272.

Monai H, [Hirase H](#) (2016) Astrocytic calcium activation in a mouse model of tDCS – extended discussion. *Neurogenesis* 3, DOI: 10.1080/23262133.2016.1240055

Monai H, [Hirase H](#) (2018) Astrocytes as a target of transcranial direct current stimulation (tDCS) to treat depression. *Neuroscience Research* 126:15-21. DOI: 10.1016/j.neures.2017.08.012

## Invited lectures/symposia:

Third International Congress of the World Federation of Sleep Research Societies, October 2001, Punta del Este, Uruguay, "Memory formation during sleep"

International Symposium: Glial Activities in Neural Plasticity and Information Processing, January 2005, Tokyo, Japan, "Calcium dynamics of cortical astrocytes in vivo"

7th European Meeting on Glial Cell Function in Health and Disease (EUROGLIA), May 2005, Amsterdam, Netherlands. "Calcium dynamics of cortical astrocytes in vivo"

6th FENS Forum of European Neuroscience Satellite Symposium on Synaptic and Extrasynaptic Signaling Versus Glia, July, 2008, Geneva, Switzerland, "Neuron-glia communication through S100B"

11th Annual Japanese-American Kavli Frontiers of Science Symposium, December 2008, Irvine, USA, "Optical measurement and control of neural activity"

29th Naito Conference on GLIA WORLD, October 2010, Kanagawa, Japan, "Astrocytic modulation of local field potential and synaptic plasticity"

1st Japanese-French Frontiers of Engineering Symposium, October 2008, Grenoble, France, "In vivo investigation of astrocytic dynamics"

Gordon Research Conference: Glial Biology, March 2011, Ventura, USA, "Astrocytic modulation of sensory-evoked LFP response"

14th Annual Meeting of the Korean Society for Brain and Neural Science, September 2011, Seoul, Korea "Astrocytic modulation of local field potential in vivo"

International Astrocyte School, March 2011, 2012, 2014, Bertinoro, Italy, "Modulation of sensory induced cortical plasticity by astrocytic calcium elevation" (permanent advisory board)

First International Symposium on In Vivo Microscopy, May 2012, Helsinki, Finland, "Cholinergic modulation of in vivo barrel cortical plasticity via astrocytes"

SFB 894 Calcium Signaling: Molecular Mechanisms and Integrative Functions, September 2012, Saarland University, Homburg, Germany, "Astrocyte calcium signaling transforms cholinergic modulation to cortical plasticity in vivo"

Cajal Institute seminar, September 2012, Madrid, Spain, "Astrocyte Ca<sup>2+</sup> surges, gamma oscillations, and synaptic plasticity"

UAB Mini Symposium: Physiology and Pathophysiology of Astroglia, October 2012, Birmingham, AL, "Astrocyte calcium signaling in plasticity of local cortical circuits in vivo"

11th European Meeting on Glial Cells in Health and Disease (Euroglia), July 2013, Berlin, Germany, "Astrocytic Ca<sup>2+</sup> surges, gamma oscillations, and synaptic plasticity" Invited seminar at Scuola Normale Superiore, April 2014, Pisa, Italy, "Experience enhances gamma oscillations and interhemispheric asymmetry in the hippocampus"

Special Neuroscience Seminar, October 2014, Paris Descartes University, Paris, France. "Ca<sup>2+</sup> signaling of astrocytes in cortical plasticity and blood flow"

Kick-off meeting of Human Frontiers Research Program, October 2014, Bordeaux, France. "Astrocytic Ca<sup>2+</sup> surges, gamma oscillations, and synaptic plasticity"

Glial heterogeneity SPP 1757 Symposium, October 2014, Dusseldorf, Germany. "Ca<sup>2+</sup> signaling of astrocytes in cortical plasticity and blood flow"

The 3rd "International Institute for Advanced Studies" Conference of Novel Developments on the Study of Life and Biological Systems Based on Genome Engineering and Imaging Science", October 2014, Kyoto, Japan, "Ca<sup>2+</sup> signaling of astrocytes in cortical plasticity"

Special Seminar, November, 2014, University of Minnesota, Minneapolis, "An attempt to monitor and manipulate astrocytic Ca<sup>2+</sup> signaling in the cerebral cortex"

International Symposium 2014 (Current trends on neurobiology), Ulsan National Institute of Science and Technology, Ulsan, Korea, November 2014, "Experience-dependent development of gamma oscillations and interhemispheric asymmetry in the hippocampus"

27th International Symposium on Cerebral Blood Flow, Metabolism and Function & 12th International Conference on Quantification of Brain Function with PET (BRAIN 2015), June, 2015, Vancouver, Canada. "Cerebral blood flow modulation can occur independently of large cytosolic Ca<sup>2+</sup> signaling in astrocytes"

6th FAONS Congress and Chinese Neuroscience Society Conference, September, 2015, Wuzhen, China,

"Cortical plasticity induced via volume transmitter-activated glia"

1st IBRO/APRC Chandigarh Neuroscience Symposium, February, 2016, Chandigarh, India, "Cortical plasticity induced via volume transmitter-activated glia"

Invited seminar at National Institute of Neuroscience (NCNP), May 2016, Tokyo, Japan. "Activation of astrocytes by transcranial direct current stimulation" (in Japanese)

Special Seminars, May 2016, Korean Institute of Science and Technology (KIST) and Yonsei University, "Astrocyte-mediated synaptic plasticity promoted by volume-transmitted neuromodulators"

DNP/CBTN Seminar, August 2016, University of Copenhagen, "Transcranial direct current stimulation, astrocytes, and glycogen in the mouse brain"

NYC Neuromodulation 2017, January 2017, New York, NY "tDCS metaplasticity and astrocytic calcium in mice"

International Astrocyte School, March 2017, Bertinoro, Italy, "Role of astrocytic calcium elevation in transcranial direct current stimulation in mice" (permanent advisory board)

Two-photon Imaging Course, October 2017, Chongqing China, "Imaging of neural activity during transcranial DC stimulation"

20th International Symposium on Calcium Binding Proteins and Calcium Function in Health and Disease (CaBP20), October 2017, Awajishima, Japan, "Transcranial direct current stimulation triggers cortical metaplasticity via glial calcium elevation"

Saitama University Brain Center International Symposium, November 2017, Saitama, Japan. "Imaging of brain cell activity during transcranial DC stimulation"

Yanbian University Cellular Function Research Center special seminar, January 2018, Yanji, China. "Imaging of neural activity during transcranial DC stimulation"

13th International Conference on Brain Energy Metabolism, March 2018, Valdivia, Chile. "Brain glycogen distribution by glycogen immunohistochemistry in the mouse"