

**(1) Contact Information**

---

RIKEN Brain Science Institute

Lab for Circuit &amp; Behavioral Physiology

2-1 Hirosawa

Wako-shi, Saitama, 351-0198, JAPAN

Tel: +81 48 467 5189

email: [tjmchugh@brain.riken.jp](mailto:tjmchugh@brain.riken.jp)**(2) Present Appointments**

---

RIKEN Brain Science Institute, Lab for Circuit &amp; Behavioral Physiology

*Senior Team Leader*

Wako-shi, JAPAN

2017-present

The University of Tokyo

Graduate School of Arts &amp; Sciences, Department of Life Sciences

*Adjunct Associate Professor*

Tokyo, JAPAN

2015-present

**(3) Previous Appointments**

---

RIKEN Brain Science Institute, Lab for Circuit &amp; Behavioral Physiology

*Team Leader*

Wako-shi, JAPAN

2009 – 2016

Massachusetts Institute of Technology,

The Picower Institute for Learning and Memory

*Research Scientist**HHMI Postdoctoral Research Associate*

Cambridge, MA

2004 –2009

2001 –2004

**(4) Academic Qualifications**

---

Massachusetts Institute of Technology

Department of Biology

*Ph.D. in Biology*

Cambridge, MA

1994 –2001

University of California, Berkeley

*B.A. in Molecular and Cell Biology*

Berkeley, CA

1990 –1994

**(5) Awards, Honours and Distinctions**

---

MIT School of Science Infinite Mile Award, 2002

MIT School of Science Dean's Educational Advising Award, 2005

**(6) Other Professional Activities**

---

- Invited referee (journals): Nature, Science, Cell, Neuron, Nature Neuroscience, eLife, Current Biology, Nature Communications, Journal of Neuroscience, Hippocampus, Nature Neuroscience Reviews, Neurobiology of Learning & Memory, PLoS, European Journal of Neuroscience, Neuroscience Research, Journal of Comparative Neurology, Scientific Reports, Journal of Neuroscience Methods, Molecular Brain, eNeuro
- Invited referee (grants): Israel Science Foundation, French Agence Nationale de la Recherche, Austrian Science Fund
- Member Society for Neuroscience, Japan Neuroscience Society, Molecular & Cellular Cognition Society
- Editorial Board Molecular Brain
- Reviewing Editor eNeuro

## **(7) Journal Articles**

---

Yasuda K, Hayashi Y, Nakagawa N, Tanaka M, Kashiwagi M, Ando R, Huang A, Hosoya T, McHugh TJ, Kuwahara M, Itohara S (2017). Schizophrenia-like phenotypes in mice with NMDA receptor ablation in intralaminar thalamic nucleus cells and gene therapy-based reversal in adults. **Translational Psychiatry**, *in press*.

Weitemier AZ and McHugh TJ. (2016) Noradrenergic modulation of dopamine release and pH shift in the mouse dorsal hippocampus and ventral striatum. **Brain Research**, Dec 2 2016 epub.

Middleton SJ and McHugh TJ. (2016) Silencing CA3 disrupts temporal coding in the CA1 Ensemble. **Nature Neuroscience**, 19(7): 945-951.

Miyamoto D, Hirai D, Fung CCA, Inutsuka A, Odagawa M, Suzuki T, Boehringer R, Adaikkan C, Matsubara C, Matsuki N, Fukai T, McHugh TJ, Yamanaka A, Murayama M. (2016) Top-Down Cortical Input during NREM Sleep Consolidates Perceptual Memory. **Science**, 352(6291): 1315-1318.

Prosser P, Hashimoto R, Polygalov D, Ohi K, Zhang Q, McHugh TJ, Takeda M, Itohara S. (2016) Cognitive endophenotypes of modern and extinct hominins associated with NTNG gene paralogs. **Biomed Genet Genomics**, 1(1): 5-13.

Prosser P, Polygalov D, Zhang Q, McHugh TJ, Itohara S. (2016) Cognitive domains function complementation by NTNG gene paralogs. **Biomed Genet Genomics**, 1(1): 24-33.

Yu LMY, Polygalov D, Wintzer ME, Chiang MC, McHugh TJ. (2016) CA3 synaptic silencing attenuates kainic acid induced seizures and hippocampal network oscillations. **eNeuro**, 3(1), <http://dx.doi.org/10.1523/ENEURO.0003-16.2016>

Roh M, McHugh TJ, Lee K. (2015) A video based feedback system for control of an active commutator during behavioral physiology. **Molecular Brain**, 2015 Oct 12; 8(1):61. doi: 10.1186/s13041-015-0152-8.

Tsuneoka Y, Tokita K, Yoshihara C, Amano T, Esposito G, Huang AJ, Yu LM, Odaka Y, Shinozuka K, McHugh TJ, Kuroda KO. (2015) Distinct preoptic-BST nuclei dissociate paternal and infanticidal behavior in mice. **EMBO J**. 2015 Nov 3; 34(21):2652-70. doi: 10.15252/embj.201591942.

Sakaguchi M, Kim K, Yu LM, Hashikawa Y, Sekine Y, Okumura Y, Kawano M, Hayashi M, Kumar D, Boyden ES, McHugh TJ, Hayashi Y. (2015) Inhibiting the Activity of CA1 Hippocampal Neurons Prevents the Recall of Contextual Fear Memory in Inducible ArchT Transgenic Mice. **PLoS One**, 2015 Jun 15; 10(6):e0130163. doi: 10.1371/journal.pone.0130163

Tomar A, Polygalov D, Chattarji S, McHugh TJ. (2015) The dynamic impact of repeated stress on the hippocampal spatial map. **Hippocampus**, 25(1): 38-50.

Chinnakkaruppan A, Wintzer ME, McHugh TJ<sup>\*</sup>, Rosenblum K. (2014) Differential contribution of hippocampal subfields to components of associative taste learning. **J. Neurosci.**, 2014 August 13; 34(33):11007-15. <sup>\*</sup>Co-senior and sole corresponding author.

Wintzer ME, Boehringer R, Polygalov D, McHugh TJ. (2014) The Hippocampal CA2 Ensemble is Sensitive to Contextual Change. **J. Neurosci.**, 34(8): 3056-66.

Shih PY, Savtchenko LP, Kamasawa N, Dembitskaya Y, McHugh TJ, Rusakov DA, Shigemoto R, Semyanov A. (2013) Retrograde synaptic signaling mediated by K<sup>+</sup> efflux through postsynaptic NMDA receptors. **Cell Reports**, 5(4): 941-51.

Aizawa H, Yanagihara S, Kobayashi M, Niisato K, Takekawa T, Harukuni R, McHugh TJ, Fukai T, Isomura Y, Okamoto H. (2013) The synchronous activity of lateral habenular neurons is essential for regulating hippocampal theta oscillation. **J. Neurosci.**, 33(20): 8909-21.

Wu, Y-W, Grebenyuk, S., McHugh TJ, Rusakov, DA, Semyanov, A. (2012) Backpropagating action potentials enable detection of extrasynaptic glutamate by NMDA receptors. **Cell Reports**, 1(5): 495-505.

Place R, Lykken C, Beer Z, Suh J, McHugh TJ, Tonegawa S, Eichenbaum H, Sauvage MM. (2012) NMDA signaling in CA1 mediates selectively the spatial component of episodic memory. **Learning & Memory**, 19(4):164-9.

Nakashiba T, Cushman JD, Pelkey KA, Renaudineau S, Buhl DL, McHugh TJ, Barrera VR, Chittajallu R, Iwamoto KS, McBain CJ, Fanselow MS, Tonegawa S. (2012) Young Dentate Granule Cells Mediate Pattern Separation, whereas Old Granule Cells Facilitate Pattern Completion. **Cell**, 149(1): 188-201.

Yoshimi K, Naya Y, Mitani N, Kato T, Inoue M, Natori S, Takahashi T, Weitemier A, Nishikawa N, McHugh T, Einaga Y, Kitazawa S. (2011) Phasic reward responses in the monkey striatum as detected by voltammetry with diamond microelectrodes. **Neurosci. Res.**, 71(1): 49-62.

Kamsler A, McHugh TJ, Gerber D, Huang S-Y and Tonegawa S. (2010) Presynaptic m1 muscarinic receptors are necessary for mGluR long-term depression in the hippocampus. **Proc. Nat. Acad. Sci.**, 107(4):1618-23, 2010. doi:10.1073/pnas.0912540107

McHugh TJ and Tonegawa S. (2009) CA3 NMDA Receptors are Required for the Rapid Formation of a Salient Contextual Representation. **Hippocampus**, 19(12): 1153-8, 2009. doi:10.1002/hipo.20684

Nakashiba T\*, Buhl DL\*, McHugh TJ \*, Tonegawa S. (2009) Hippocampal CA3 Output is Crucial for Ripple-Associated Reactivation and Consolidation of Memory. **Neuron**, 62, 781-787, 2009. \* These authors contributed equally doi: 10.1016/j.neuron.2009.05.013.

Nakashiba T, Young JZ, McHugh TJ, Buhl DL, Tonegawa S. (2008) Transgenic Inhibition of Synaptic Transmission Reveals the Role of CA3 Output in Hippocampal Learning and Memory. **Science**, 319(5876): 1260-4, 2008. DOI: 10.1126/science.1151120

McHugh TJ \*, Jones MW\*, Quinn JJ, Balthasar N, Coppari R, Elmquist JK, Lowell BB, Fanselow MS, Wilson MA, Tonegawa S. (2007) Dentate gyrus NMDA receptors mediate rapid pattern separation in the hippocampal network. **Science**, 317(5834):94-9. \* These authors contributed equally

McHugh TJ and Tonegawa S. (2007) Spatial exploration is required for the formation of contextual fear memory. **Behav. Neurosci.** 121(2):335-9.

McHugh T.J., Blum K.I., Tsien J.Z., Tonegawa S., and Wilson M.A. (1996) Impaired Hippocampal Representation of Space in CA-1 Specific NMDAR1 Knockout Mice. **Cell**, 87:1339-1349.

### ***(8) Review Articles, Book Chapters, Invited Comments***

---

Thomas J. McHugh. (2012) Memory Circuits in the Hippocampus. In *Memory Mechanisms in Health and Disease*. K.P Giese Ed., World Scientific Publishing, London.

Matthew W. Jones and Thomas J. McHugh (2011) Updating hippocampal representations: CA2 joins the circuit. **Trends in Neuroscience**, 34(10):526-35.

Susumu Tonegawa and Thomas J. McHugh (2008) The Ins and Outs of the Hippocampal Circuit. **Neuron**, 57(2):175-177.

Susumu Tonegawa and [Thomas J. McHugh](#) (2007) Molecular and Circuit Mechanisms for Hippocampal Learning. In *Retrotransposition Diversity and the Brain*, F.H. Gage & Y. Christen Eds., Springer-Verlag Press, New York.

Nakazawa, K, [McHugh, T.J.](#), Wilson, M.A., and Tonegawa, S., and Wilson, M.A. (2004) NMDA receptors, place cells and hippocampal spatial memory. **Nature Reviews Neuroscience**. 5(5):361-372.

[McHugh, T.J.](#) and Nakazawa, K. Multiple Electrode-Recording on the Genetically Engineered Mouse Brain (In Japanese). (1998) **Genes & Medicine**, 2(4): 47-53.

### ***(9) Selected Talks and Symposia***

---

Session Organizer and Speaker. Japan Neuroscience Annual Meeting, Yokohama, Japan. July 20-22, 2016.

Invited Speaker. NYU Frontiers in Memory Research, Florence, Italy. June 27-29, 2016.

Invited Speaker. GDR NeuroMem Meeting, Bordeaux, France. May 17-20, 2016.

Invited Seminar. Champalimaud Neuroscience Institute, Lisbon, Portugal. March 31, 2016.

Invited Speaker. Memory and Mind Meeting, Tohoku, Japan. September 28-29, 2015.

Session Organizer and Speaker. Japan Society for Neurochemistry, Saitama City, Japan. September 11-13, 2015.

Invited Seminar. University of Tokyo Department of Neurochemistry, Tokyo, Japan. May 26, 2015.

Invited Speaker. Weizmann-BSI Joint Symposium, Rehovot, Israel. January 21-22, 2015.

Invited Seminar. Haifa University Department of Neurobiology & Ethology, Haifa, Israel. January 20, 2015.

Invited Speaker. Genetic Approaches to Study the Neurobiology of Learning and Memory, London, UK. November 27-28, 2014.

Invited Seminar. Oxford University Cortex Club, Oxford, UK. November 25<sup>th</sup>, 2014.

Session Organizer and Speaker. FENS, Milan, Italy. July 5-9, 2014.

Invited Speaker. MCCS-Europe Meeting. Milan, Italy. July 3-4, 2014.

Invited Speaker. The 2<sup>nd</sup> Annual IIS Symposium, Tsukuba, Japan. Jan 19-21, 2014.

Invited Seminar. Center for Functional Connectomics, KIST, Seoul, Korea. December 4<sup>th</sup>, 2013.

Session Organizer and Speaker. Japan Neuroscience Annual Meeting, Kyoto, Japan. June 20-23, 2013.

Invited Speaker. Functional Architecture of Memory Meeting, Madenburg, Germany. May 23-25, 2012.

Invited Speaker. KSBNS/MCCS-Asia Memory Meeting, Seoul, Korea. September 19, 2011.

Invited Speaker. Learning about Memory, Bangalore, India. February 14-17, 2010

Invited Speaker. Winter Workshop on Mechanisms of Brain and Mind, Rusutsu, Japan. January 12-14, 2010.

Invited Seminar. Keio University, Tokyo, Japan, April 2009.

### ***(10) RIKEN BSI Committees and Service***

---

BSI Summer Program Committee: 2010-2012, 2016 (Chair)

BSI Academic Council: 2011, 2012 (Chair)

BSI Social Committee: 2010-Present (Chair)

BSI Retreat Committee: 2015, 2016 (Chair)

BSI Brain Training Course Lecturer 2011-Present

### ***(11) Student (Supervised and Visiting)***

---

Ming-Ching Chaing, PhD Candidate, Waseda University, April 2014-Present

Hefei Guan, PhD Candidate, Waseda University, September 2015-Present

Hongshen He, PhD Candidate, University of Tokyo, April 2016-Present

Tao Yanqi, Undergraduate Thesis Student, Waseda University, September 2015-Present

Eriko Kamiki, Undergraduate Thesis Student, Waseda University, September 2015-Present

Jingyi Chen, Undergraduate student, Waseda University, April 2016-Present

Linmeng He, Undergraduate Student, Waseda University, June 2016-Present

Rosemary Menzies, Undergraduate Student, University of Sydney, August- September 2016

Michael Thor, Visiting PhD Candidate, University College London, March-April 2016

Georgios Foustoukos, Visiting Masters Candidate, EPFL, January-July, 2016.

Wynne Stagnaro, Undergraduate Student, Harvard University, Summer 2016.

Aryssa Izuyama, Undergraduate student, Waseda University, August 2015.  
Frances Ding, Undergraduate Student, Harvard University, Summer 2015.  
Seria Honjo, Undergraduate student, Waseda University, August 2014.  
Ali Ozgur Argunsah, Visiting PhD Candidate, Champalimaud Neuroscience Program, Summer 2014.  
Yael Stovetzky, Undergraduate Student, Harvard University, Summer 2014.  
Emily Kneller, Undergraduate Student, University of British Columbia, Summer 2014, 2015, 2016.  
Angela Oh, Undergraduate Student, Harvard University, Summer 2013.  
Akie Fujita, Undergraduate Student, Columbia University, Summer 2012.  
Chinna Adaikkan, Visiting PhD Student, Haifa University, Spring 2012, Spring 2013, March-December 2015  
Anupratap Tomar, Visiting PhD Student, NCBS, Bangalore, India, Summer 2010, January-June 2011, Fall 2013  
So-Young Gil, Visiting Masters Student, Ulsan University, Korea, Winter 2010.  
Haneul Kwon, Ewha Women's University, Korea, Winter 2010.  
Ka Pak Ng, Visiting PhD Student, University of Hong Kong, August 2010

### ***(12) Grants and Awards***

---

JSPS Kakenhi: Challenging Exploratory Research, Optogenetic dissection of hypothalamic modulation of hippocampal memory, 2015-2016.  
JSPS Kakenhi : Scientific Research on Innovative Areas 科学研究費補助金 新学術領域研究, 2013-14  
NARSAD Young Investigator Award, 2011-2012.  
RIKEN President's Discretionary Fund, 2009-2011.  
CREST 脳神経回路の形成・動作原理の解明と制御技術の創出, 2009-2014.