KAZUNARI MIYAMICHI

Laboratory of Comparative Connectomics, RIKEN Centre for Biosystems Dynamics Research (BDR)
RmN505, Building-C, Minatojima-minamimachi 2-2-3, Chuo-ku, Kobe 650-0047, Hyogo, Japan
lab phone 81-78-306-3376, fax 81-78-306-3377
kmiyamichi@gmail.com
kazunari.miyamichi@riken.jp

Education

Ph.D. in Biophysics and Biochemistry, Graduate School of Science, The University of Tokyo 2006
B.S. in Biophysics and Biochemistry, The University of Tokyo 2001

Experience

Associate Editor, *Science Advances* 2025–
Team Director, RIKEN Center for Biosystems Dynamics Research 2025.4–
Team Leader, Riken Center for Biosystems Dynamics Research 2018.4–2025.3

- Management of laboratory for comparative connectomics.
- Studying mouse neural circuits underlying various social behaviors and physiological regulations.

Project associate professor, The University of Tokyo, Department of Agricultural and Life Sciences
Group leader, ERATO Touhara Chemosensory Project 2013.9–2018.3

- Studying mouse pheromone processing neuronal circuits in the amygdala-hypothalamus axis.
- Optimizing rabies virus-mediated trans-synaptic tracing tools for whole-brain imaging and computational analysis.

Stanford University, Department of Biology and HHMI
HHMI Research Associate in the laboratory of Prof. Liqun Luo 2010–2013
Postdoctoral Fellow in the laboratory of Prof. Liqun Luo 2006–2010

- Defined the organization of neuronal circuits in the higher olfactory centers in mice by using rabies virus-mediated retrograde trans-synaptic tracing system.
- Participated in the improvement and extension of a genetic mosaic analysis method (Mosaic Analysis with Double Markers).
- Supervised one graduate student and one undergraduate student.

The University of Tokyo, Department of Biophysics and Biochemistry
Graduate Student in the laboratory of Prof. Hitoshi Sakano 2001–2006

- Defined mechanisms for mono-allelic expression of odorant receptor genes and glomerular map formation in the olfactory bulb.
- Supervised one graduate student and two undergraduate students.
- Assisted in one graduate-level training course (introductory biochemistry).

The University of Tokyo, Department of Biophysics and Biochemistry
Undergraduate Thesis Student in the laboratory of Prof. Hitoshi Sakano 2000–2001

- Analyzed gene expression in the olfactory epithelium to define region-specific markers.

Fellowships and Awards

RIKEN Oubu Award 2023
Human Frontier Science Program Postdoctoral Fellowship 2007–2010
JSPS Postdoctoral Fellow for Research Abroad 2006–2007
Research Fellowship for Young Scientists from JSPS 2004–2006
Sammy Kuo Award for postdoctoral fellow 2011

Publication Lists

Original Paper (*correspondence; #co-first)

1. *Tasaka G, Hagihara M, Kobayashi H, Kihara M, Abe T, *Miyamichi K. Submedius thalamic inputs shape the presynaptic architecture of layer 5 orbitofrontal cortex in mice. *iScienc*e (2026) **29**: 2114828.
2. *Inada K, Hagihara M, Yaguchi K, Irie S, Inoue YU, Inoue T, *Miyamichi K. Vasopressin-to-Oxytocin Receptor Crosstalk in the Preoptic Area Underlying Parental Behaviors in Male Mice. *Nat Commun*. (2025) **16**: 10844.
3. Hagihara M, Sakurai T, *Miyamichi K, *Inada K. Artificially induced torpor during pregnancy impairs fetal growth in mice. *Sci Rep.* (2025) **15**: 37069.
4. *Tasaka G, Hagihara M, Irie S, Kobayashi H, Inada K, Kobayashi K, Kato S, Kobayashi K, *Miyamichi K. Orbitofrontal cortex influences dopamine dynamics associated with alloparental behavioral acquisition in female mice. *Sci Adv.* (2025) **11**: eadr4620.
5. *Inada K, Hagihara M, Kihara M, Abe T, *Miyamichi K. A transgenic mouse line for rabies virus-mediated trans-synaptic tracing in the postnatal developing brain. *PLoS One* (2025) **20**: e0323629.
6. *Goto T, Hagihara M, Irie S, Abe T, Kiyonari H, *Miyamichi K. Dietary availability acutely influences puberty onset via a hypothalamic neural circuit. *Neuron* (2025) **113**: 1036–1050.
7. Yaguchi K, *Miyamichi K, Tasaka GI. Flexible adjustment of oxytocin neuron activity in mouse dams revealed by microendoscopy. *Sci Adv.* (2024) **10**: eadt1555.
8. *Harima Y, Tsurutani M, Yamada S, Uchida S, Inada K, Hagihara M, Irie S, Shigeta M, Abe T, Inoue YU, Inoue T, *Miyamichi K. Parallel labeled-line organization of sympathetic outflow for selective organ regulation in mice. *Nat Commun.* (2024) **15**: 10478.
9. Tsurutani M, Goto T, Hagihara M, Irie S, *Miyamichi K. Selective vulnerability of parvocellular oxytocin neurons in social dysfunction. *Nat Commun.* (2024) **15**: 8661.
10. *Goto T, Hagihara M, *Miyamichi K. Dynamics of pulsatile activities of arcuate kisspeptin neurons in aging female mice. *Elife* (2023) **12**: e82533.
11. Yaguchi K, Hagihara M, Konno A, Hirai H, Yukinaga H, *Miyamichi K. Dynamic modulation of pulsatile activities of oxytocin neurons in lactating wild-type mice. *PLoS One* (2023) **18**: e0285589.
12. Hagihara M, *Miyamichi K, *Inada K. The importance of oxytocin neurons in the supraoptic nucleus for breastfeeding in mice. *PLoS One* (2023) **18**: e0283152.
13. *Inada K, Tsujimoto K, Yoshida M, Nishimori K, *Miyamichi K. Oxytocin signaling in the posterior hypothalamus prevents hyperphagic obesity in mice. *Elife* (2022)**11**: e75718.
14. Yukinaga H, Hagihara M, Tsujimoto K, Chiang HL, Kato S, Kobayashi K, *Miyamichi K. Recording and Manipulation of the Maternal Oxytocin Neural Activities in Mice. *Curr Biol.* (2022) **32**: 3821–3829.
15. *Inada K, Hagihara M, Tsujimoto K, Abe T, Konno A, Hirai H, Kiyonari H, *Miyamichi K. Plasticity of neural connections underlying oxytocin-mediated parental behaviors of male mice. *Neuron* (2022) **110**: 2009–2023.
16. Osakada T[#], Ishii KK[#], Mori H, Eguchi R, Ferrero DM, Yoshihara Y, Liberles SD, *Miyamichi K[#], *Touhara K. Sexual rejection via a vomeronasal receptor-triggered limbic circuit. *Nat Commun* (2018) **9**: 4463.
17. Ishii KK[#], Osakada T[#], Mori H, Miyasaka N, Yoshihara Y, *Miyamichi K[#], *Touhara K. A Labeled-Line Neural Circuit for Pheromone-Mediated Sexual Behaviors in Mice. *Neuron* (2017) **95**: 123–137.
18. Schwarz LA[#], Miyamichi K[#], Gao XJ, Beier KT, Weissbourd B, DeLoach KE, Ren J, Ibanes S, Malenka RC, Kremer EJ, *Luo L. Viral-genetic tracing of the input-output organization of a central noradrenaline circuit. *Nature* (2015) **524**: 88–92.
19. Weissbourd BC, Ren J, DeLoach KE, Guenthner CJ, *Miyamichi K, *Luo L. Presynaptic Partners of

Dorsal Raphe Serotonergic and GABAergic Neurons. *Neuron* (2014) **83**: 1–18.

20. Miyamichi K[#], Shlomai-Fuchs Y[#], Shu M, Weissbourd BC, *Luo L, *Mizrahi A. Dissecting Local Circuits: Parvalbumin Interneurons Underlie Broad Feedback Control of Olfactory Bulb Output. *Neuron* (2013) **80**: 1232–1245.
21. Tasic B[#], Miyamichi K[#], Hippenmeyer S[#], Dani VS, Zeng H, Joo W, Zong H, Chen-Tsai Y, *Luo L. Extensions of MADM (mosaic analysis with double markers) in mice. *PLoS One* (2012) **7**, e33332.
22. Miyamichi K, Amat F, Moussavi F, Wang C, Wickersham I, Wall NR, Taniguchi H, Tasic B, Huang ZJ, He Z, Callaway EM, Horowitz MA, *Luo L. Cortical representations of olfactory input by trans-synaptic tracing. *Nature* (2011) **472**: 191–196.
23. Serizawa S[#], Miyamichi K[#], Takeuchi H[#], Yamagishi Y, Suzuki M, *Sakano H. A neuronal identity code for the odorant receptor-specific and activity-dependent axon sorting. *Cell* (2006) **127**: 1057–1069.
24. Miyamichi K, Serizawa S, Kimura H, *Sakano H. Continuous and overlapping expression domains of odorant receptor genes in the olfactory epithelium determine the dorsal/ventral positioning of glomeruli in the olfactory bulb. *J Neurosci*. (2005) **25**: 3586–3592.
25. Serizawa S[#], Miyamichi K[#], Nakatani H, Suzuki M, Saito M, Yoshihara Y, *Sakano H. Negative feedback regulation ensures the one receptor-one olfactory neuron rule in mouse. *Science* (2003) **302**: 2088–2094.

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26. *Uchida S, Hagihara M, Inoue K, Abe T, Sakurai T, *Miyamichi K. Dissecting Medullary Raphe Neurons Regulating Multiple Thermogenic Pathways. *bioRxiv* https://doi.org/10.1101/2025.09.01.673572
27. Inada K[#], Tasaka G[#], Hagihara M, Kobayashi K, *Yukinaga H[#], *Miyamichi K. Neural Circuit Remodeling Underlying Enhanced Feeding During Pregnancy in Mice. *bioRxiv* https://doi.org/10.1101/2025.08.07.669199

Collaborative Contribution

28. Duan S, Kanda H, Zhu F, Okubo M, Koike T, Ohno Y, Tanaka T, Harima Y, Miyamichi K, Fukui H, Shinzaki S, Cui Y, Noguchi K, *Dai Y. Sympathetic Overactivation Drives Colonic Eosinophil Infiltration Linked to Visceral Hypersensitivity in Irritable Bowel Syndrome. *Cell Mol Gastroenterol Hepatol*. (2025) **20**: 101658.
29. Neyama H, Wu Y, Nakaya Y, Kato S, Shimizu T, Tahara T, Shigeta M, Inoue M, Miyamichi K, Matsushita N, Mashimo T, Miyasaka Y, Dai Y, Noguchi K, Watanabe Y, Kobayashi M, Kobayashi K, *Cui Y. Opioidergic activation of the descending pain inhibitory system underlies placebo analgesia. *Sci Adv.* (2025) **11**: eadp8494.
30. Kon K, Ode KL, Mano T, Fujishima H, Takahashi RR, Tone D, Shimizu C, Shiono S, Yada S, Matsuzawa K, Yoshida SY, Yoshida Garçon J, Kaneko M, Shinohara Y, Yamada RG, Shi S, Miyamichi K, Sumiyama K, Kiyonari H, Susaki EA, *Ueda HR. Cortical parvalbumin neurons are responsible for homeostatic sleep rebound through CaMKII activation. *Nat Commun*. (2024) **15**: 6054.
31. Tone D, Ode KL, Zhang Q, Fujishima H, Yamada RG, Nagashima Y, Matsumoto K, Wen Z, Yoshida SY, Mitani TT, Arisato Y, Ohno RI, Ukai-Tadenuma M, Yoshida Garçon J, Kaneko M, Shi S, Ukai H, Miyamichi K, Okada T, Sumiyama K, Kiyonari H, *Ueda HR. Distinct phosphorylation states of mammalian CaMKIIβ control the induction and maintenance of sleep. *PLoS Biol*. (2022) **20**: e3001813.
32. Itakura T, Murata K, Miyamichi K, Ishii KK, Yoshihara Y, *Touhara K. A single vomeronasal receptor

promotes intermale aggression through dedicated hypothalamic neurons. *Neuron* (2022) **110**: 2455–2469.
33. Osakada T, Abe T, Itakura T, Mori H, Ishii KK, Eguchi R, Murata K, Saito K, Haga-Yamanaka S, Kimoto K, Yoshihara Y, Miyamichi K, *Touhara K. Hemoglobin in the blood acts as a chemosensory signal via the mouse vomeronasal system. *Nat Commun.* (2022) **13**: 556.
34. Yoshihara C, Tokita K, Maruyama T, Kaneko M, Tsuneoka Y, Fukumitsu K, Miyazawa E, Shinozuka K, Huang AJ, McHugh TJ, Tanaka M, Itohara S, Touhara K, Miyamichi K, *Kuroda KO. Calcitonin receptor signaling in the medial preoptic area enables risk-taking maternal care. *Cell Rep*. (2021) **35**: 109204.
35. Mano T, Murata K, Kon K, Shimizu C, Ono H, Shi S, Yamada RG, Miyamichi K, Susaki EA, Touhara K, *Ueda HR. CUBIC-Cloud: An Integrative Computational Framework Towards Community-driven Whole-Mouse-Brain Mapping. *Cell Rep Method* (2021) **11**, 1982.
36. Susaki EA, Shimizu C, Kuno A, Tainaka K, Li X, Nishi K, Morishima K, Ono H, Ode KL, Saeki Y, Miyamichi K, Isa K, Yokoyama C, Kitaura H, Ikemura M, Ushiku T, Shimizu Y, Saito T, Saido TC, Fukayama M, Onoe H, Touhara K, Isa T, Kakita A, Shibayama M, *Ueda HR. Versatile whole-organ/body staining and imaging based on electrolyte-gel properties of biological tissues. *Nat Commun.* (2020) **11**: 1982.
37. Sato K, Hamasaki Y, Fukui K, Ito K, Miyamichi K, Minami M, *Amano T. Amygdalohippocampal Area Neurons That Project to the Preoptic Area Mediate Infant-Directed Attack in Male Mice. *J Neurosci*. (2020) **40**: 3981–3994.
38. Murata K, Kinoshita T, Fukazawa Y, Kobayashi K, Kobayashi K, Miyamichi K, Okuno H, Bito H, Sakurai Y, Yamaguchi M, Mori K, *Manabe H. GABAergic neurons in the olfactory cortex projecting to the lateral hypothalamus in mice. *Sci Rep.* (2019) **9**: 7132.
39. Kohl J, Babayan BM, Rubinstein ND, Autry AE, Marin-Rodriguez B, Kapoor V, Miyamichi K, Zweifel LS, Luo L, Uchida N, *Dulac C. Functional circuit architecture underlying parental behaviour. *Nature* (2018) **556**: 326–331.
40. Tsunoda M, Miyamichi K, Eguchi R, Sakuma Y, Yoshihara Y, Kikusui T, Kuwahara M, *Touhara K. Identification of an Intra- and Inter-specific Tear Protein Signal in Rodents. *Curr Biol.* (2018) **28**: 1213–1223.
41. Do JP, Xu M, Lee SH, Chang WC, Zhang S, Chung S, Yung TJ, Fan JL, Miyamichi K, Luo L, *Dan Y. Cell type-specific long-range connections of basal forebrain circuit. *eLife* (2016) **5**, e13214.
42. Adelson JD, Sapp RW, Brott BK, Lee H, Miyamichi K, Luo L, Cheng S, Djurisic M, *Shatz CJ. Developmental Sculpting of Intracortical Circuits by MHC Class I H2-Db and H2-Kb. *Cereb Cortex* (2016) **26**: 1453–1463.
43. Beier KT, Steinberg EE, DeLoach KE, Xie S, Miyamichi K, Schwarz L, Gao XJ, Kremer EJ, Malenka RC, *Luo L. Circuit Architecture of VTA Dopamine Neurons Revealed by Systematic Input-Output Mapping. *Cell* (2015) **162**: 622–34.
44. Adam Y, Livneh Y, Miyamichi K, Groysman M, Luo L, *Mizrahi A. Functional transformations of odor inputs in the mouse olfactory bulb. *Front Neural Circuits* (2014) **8**: 129.
45. Zhang S, Xu M, Kamigaki T, Hoang Do JP, Chang WC, Jenvay S, Miyamichi K, Luo L, *Dan Y. Long-range and local circuits for top-down modulation of visual cortex processing. *Science* (2014) **345**: 660–665.
46. Ni Y, Nawabi H, Liu X, Yang L, Miyamichi K, Tedeschi A, Xu B, Wall NR, Callaway EM, *He Z. Characterization of long descending premotor propriospinal neurons in the spinal cord. *J Neurosci*. (2014) **34**: 9404–9417.
47. Guenthner CJ, Miyamichi K, Yang HH, Heller HC, *Luo L. Permanent Genetic Access to Transiently

Active Neurons Using Targeted Recombination in Active Populations (TRAP). *Neuron* (2013) **78**: 773–784.

48. Beier K, Saunders A, Oldenburg IA, Miyamichi K, Akhtar N, Luo L, Whelan S, Sabatini BL, *Cepko C. Anterograde or retrograde transsynaptic labeling of CNS neurons with vesicular stomatitis virus vectors. *Proc Natl Acad Sci USA* (2011) **108**: 15414–15419.
49. Hippenmeyer S, Youn YH, Moon HM, Miyamichi K, Zong H, Wynshaw-Boris A, *Luo L. Genetic mosaic dissection of Lis1 and Ndel1 in neuronal migration. *Neuron* (2010) **68**: 695–709.
50. Muzumdar MD, Tasic B, Miyamichi K, Li L, *Luo L. A global double-fluorescent Cre reporter mouse. *Genesis* (2007) **45**: 593–605.
51. Oka Y, Kobayakawa K, Nishizumi H, Miyamichi K, Hirose S, Tsuboi A, *Sakano H. O-MACS, a novel member of the medium-chain acyl-CoA synthetase family, specifically expressed in the olfactory epithelium in a zone-specific manner. *Eur J Biochem.* (2003) **270**: 1995–2004.
52. Kobayakawa K, Hayashi R, Morita K, Miyamichi K, Oka Y, Tsuboi A, *Sakano H. Stomatin-related olfactory protein, SRO, specifically expressed in the murine olfactory sensory neurons. *J Neurosci.* (2002) **22**: 5931–5937.

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53. Hatashita Y, Li B, Hagihara M, Matsuzaki F, Miyamichi K, *Inoue T. Cortical Laminar Organization of Neuron-to-Astrocyte Connections Revealed by Transsynaptic Tracing. SSRN http://dx.doi.org/10.2139/ssrn.4592585

Review

54. *Miyamichi K. Neural Basis for Parental Behavioral Transitions in Mice. Curr Opin Neurobiol. (2025) 95:103113.
55. Yukinaga H, *Miyamichi K. Oxytocin and neuroscience of lactation: Insights from the molecular genetic approach. Neurosci Res. (2025) 216: 104873.
56. *Miyamichi K. Neural basis for behavioral plasticity during the parental life-stage transition in mice. Front Neural Circuits. (2024) 17: 1340497
57. *Inada K, *Miyamichi K. Association between parental behaviors and structural plasticity in the brain of male rodents. Neurosci Res. (2023) 196: 1–10
58. Serizawa S, Miyamichi K, *Sakano H. Negative feedback regulation ensures the one neuron–one receptor rule in the mouse olfactory system. Chem Senses. (2005) 30, i99–i100
59. Serizawa S, Miyamichi K, *Sakano H. One neuron–one receptor rule in the mouse olfactory system. Trends Genet. (2004) 20, 648–653

Book

1. *Miyamichi K & Schwarz LA. Connectivity and Circuit Architecture Using Transsynaptic Tracing in Vertebrates. "Decoding Neural Circuit Structure and Function: Cellular Dissection Using Genetic Model Organisms" (Edited by Aruzu Celik & Mathias F. Wernet.) (2017) pp 91–148. Springer; doi: 10.1007/978-3-319-57363-2_4.

Talk (selected)

1. Miyamichi K. Parallel Labeled-line Organization of Sympathetic Outflow for Selective Organ Regulation in mice. 11th Neuroscience Network in Kobe, Kobe, 2025
2. Miyamichi K. Life-Stage-Dependent Neural Circuit Remodeling in Mice: Foundations of Physiological and Behavioral Plasticity. BDR Symposium, Kobe, 2025

3. Miyamichi K. Neural Circuit Remodeling into Oxytocin Neurons Facilitates Pregnancy-Associated Hyperphagia in Female Mice. The World Congress on Neurohypophysial Hormones (WCNH), Atlanta, USA, 2024
4. Miyamichi K. Neural Circuit Dynamics in Life-stage Transition to Parents. BRI 11th international symposium, Niigata (online), Japan, 2021.
5. Miyamichi K. Reorganization in Hypothalamic Neural Circuits Underpinning Parental Behaviors. NGI meeting 2020, Mishima (online), Japan, 2020.
6. Miyamichi K, Ishii KK, Touhara K. Dissecting neural circuits processing a sex pheromone in mice. 17th International Symposium on Olfaction and Taste (ISOT), Yokohama, Japan, 2016.
7. Miyamichi K, Dissecting Local Circuits: Parvalbumin interneurons underlie broad feedback control of olfactory bulb output. Cold Spring Harbor Asia Conferences, Suzhou, China, 2014.