

Shigeyoshi Itohara

Position

Senior Team Leader, Laboratory for Behavioral Genetics
RIKEN Brain Science Institute,
2-1 Hirosawa, Wako-shi, Saitama, 351-01, Japan
phone: 81-48-467-5156, fax: 81-48-467-5180



Education

B. Sci. Department of Veterinary Science, Faculty of Agriculture, Yamaguchi University, 1976 (Veterinary Medicine)
M. Sci. Graduate School of Yamaguchi University, 1978 (Veterinary Medicine)

Degree

D. V. M. 1976
Ph. D. Faculty of Agriculture, The University of Tokyo, 1987 (veterinary science, by dissertation)

Appointments

1978-1988 Researcher, National Institute for Animal Health (NIAH)
1988-1991 Postdoctoral fellow, Howard Hughes Medical Institute, Center for Cancer Research, MIT (supervisor, Prof. Susumu Tonegawa)
1991-1992 Senior Researcher, Laboratory of Biophysics, NIAH
1992-1993 Laboratory head, Laboratory of Immunogenetics, NIAH
1993-1997 Associate Professor, Institute for Virus Research, Kyoto University
1997-2010 Team Leader, Laboratory for Behavioral Genetics, RIKEN BSI
2010-present Senior Team Leader, Laboratory for Behavioral Genetics, RIKEN BSI
2004-2007 Visiting Professor, University of Tokyo
2007-present Adjunctive Professor, Graduate School of Agricultural and Life Sciences, University of Tokyo
2007-present Visiting Professor, Department of Life Science and Medical Bio-Science, Waseda University

Editorial Boards

2008-present Associate Editor, Frontiers in Behavioral Neuroscience

Current Professional Society Memberships

Molecular and Cellular Cognition Society (Council member since 2002)
Society for Neuroscience
The Japan Neuroscience Society
The Molecular Biology Society of Japan
The Japanese Society of Veterinary Science (Council member since 1992)
Japanese Association for Laboratory Animal Science

PUBLICATIONS

Original papers (selected)

1. Szabadits E, Cserép C, Szonyi A, Fukazawa Y, Shigemoto R, Watanabe M, Itohara S,

- Freund TF, Nyiri G. NMDA receptors in hippocampal GABAergic synapses and their role in nitric oxide signaling. *J Neurosci* 31:5893-5904, 2011.
2. Kawase S, Imai T, Miyauchi-Hara C, Yaguchi K, Nishimoto Y, Fukami S, Matsuzaki Y, Miyawaki A, Itohara S, Okano H. Identification of a novel intronic enhancer responsible for the transcriptional regulation of musashi1 in neural stem/progenitor cells. *Mol Brain* 4:14, 2011.
 3. Kim HS, Seto-Ohshima A, Nishiyama H, Itohara S. Normal delay eyeblink conditioning in mice devoid of astrocytic S100B. *Neurosci Lett* 489:148-153, 2011.
 4. Yang J, Wada A, Yoshida K, Miyoshi Y, Sayano T, Esaki K, Kinoshita MO, Tomonaga S, Azuma N, Watanabe M, Hamase K, Zaitso K, Machida T, Messing A, Itohara S, Hirabayashi Y, Furuya S. Brain-specific Phgdh deletion reveals a pivotal role for L-serine biosynthesis in controlling the level of D-serine, an NMDA receptor co-agonist, in adult brain. *J Biol Chem* 285:41380-41390, 2010.
 5. Gomi H, Sassa T, Thomson RF, and Itohara S. Involvement of cyclin-dependent kinase-like 2 in cognitive function required for contextual and spatial learning in mice. *Frontiers Behav Neurosci* doi: 10.3389/fnbeh.2010.00017, 2010.
 6. Ushiki-Kaku Y, Endo R, Iwamaru Y, Shimizu Y, Imamura M, Masujin K, Yamamoto T, Hattori S, Itohara S, Irie S, and Yokoyama T. Tracing of conformational transition of abnormal prion proteins during interspecies transmission by using novel antibodies. *J Biol Chem* 285:11931-11936, 2010.
 7. Tanabe Y, Hirano A, Iwasato T, Itohara S, Araki K, Yamaguchi T, Ichikawa T, Kumanishi T, Aizawa Y, Takahashi H, Kakita A and Nawa H. Molecular characterization and gene expression of a novel zinc-finger protein, HIT-4, expressed in rodent brain. *J Neurochem* 112:1035-1044, 2010.
 8. Gomi H, Yokoyama T and Itohara S. Role of GFAP in morphological retention and distribution of reactive astrocytes induced by scrapie encephalopathy in mice. *Brain Res* 1312:156-167, 2010.
 9. Kojima N, Hanamura K, Yamazaki H, Ikeda T, Itohara S and Shirao T. Genetic disruption of the alternative splicing of drebrin gene impairs context-dependent fear learning in adulthood. *Neuroscience* 165:138-150, 2010.
 10. Singer P, Yee BK, Feldon J, Iwasato T, Itohara S, Grampp T, Prenosil G, Benke D, Mohler H and Boison D. Altered mnemonic functions and resistance to N-METHYL-d-Aspartate receptor antagonism by forebrain conditional knockout of glycine transporter 1. *Neuroscience* 161:635-54, 2009.
 11. Sano Y, Ornthanalai VG, Yamada K, Homma C, Suzuki H, Suzuki T, Murphy NP and Itohara S. X11-like protein deficiency is associated with impaired conflict resolution in mice. *J Neurosci* 29:5884-96, 2009.
 12. Amano K, Fujii M, Arata S, Tojima T, Ogawa M, Morita N, Shimohata A, Furuichi T, Itohara S, Kamiguchi H, Korenberg JR, Arata A, and Yamakawa K. DSCAM deficiency causes loss of pre-inspiratory neuron synchronicity and perinatal death. *J Neurosci* 29, 2984-2996, 2009.
 13. Endo S, Shutoh F, Dinh TL, Okamoto T, Ikeda T, Suzuki M, Kawahara S, Yanagihara D, Sato Y, Yamada K, Sakamoto T, Kirino Y, Hartell NA, Yamaguchi K, Itohara S, Nairn AC, Greengard P, Nagao S, and Ito M. Dual involvement of G-substrate in motor learning revealed by gene deletion. *Proc Natl Acad Sci USA* 106: 3525-3530, 2009.
 14. Kishioka A, Fukushima F, Ito T, Kataoka H, Mori H, Ikeda T, Itohara S, Sakimura K, and Mishina M. A novel form of memory for auditory fear conditioning at a low-intensity unconditioned stimulus. *PLoS ONE* 4: e4157, 2009.
 15. Tanaka M, Yamaguchi K, Tatsukawa T, Theis M, Willecke K, and Itohara S. Connexin43 and Bergmann glial gap junctions in cerebellar function. *Frontiers Neurosci* 2:225-233, 2008.

16. Sakatani S, Seto-Ohshima A, Shinohara Y, Yamamoto Y, Yamamoto H, Itohara S, Hirase H. Neural-activity-dependent release of S100B from astrocytes enhances kainate-induced gamma oscillations in vivo. *J Neurosci* 28:10928-10936, 2008.
17. Imayoshi I, Sakamoto M, Ohtsuka T, Takao K, Miyakawa T, Yamaguchi M, Mori K, Ikeda T, Itohara S, and Kageyama R. Roles of continuous neurogenesis in the structural and functional integrity of the adult forebrain. *Nat Neurosci* 11:1153-1161, 2008.
18. Kojima N, Borlikova G, Sakamoto T, Yamada K, Ikeda T, Itohara S, Niki H, and Endo S, Inducible cAMP early repressor acts as a negative regulator for kindling epileptogenesis and long-term fear memory. *J Neurosci* 28:6459-6472, 2008.
19. Iwasato, T., Inan, M., Kanki, H., Erzurumlu, R., *Itohara, S., and *Crair M.C. Cortical adenylyl cyclase 1 is required for thalamocortical synapse maturation and proper layer IV neuronal morphology during barrel map development. *J Neurosci* 28:5931-5943, 2008.
(*: co-correspondence authors)
20. *Tanaka M, Yamaguchi K, Tatsukawa T, Nishioka C, Nishiyama H, Theis M, Willecke K, and *Itohara S. Lack of connexin43-mediated Bergmann glial gap junctional coupling does not affect cerebellar long-term depression, motor coordination, or eyeblink conditioning. *Frontiers Behav Neurosci* 2:1, 2008.
(*: co-correspondence authors)
21. Li T, Ren G, Lusardi T, Wilz A, Lan JQ, Iwasato T, Itohara S, Simon RP, and Boison D. Adenosine kinase is a target for the prediction and prevention of epileptogenesis in mice. *J Clin Invest* 118: 571-582, 2008.
22. Kobayakawa K, Kobayakawa R, Matsumoto H, Oka Y, Imai T, Ikawa M, Okabe M, Ikeda T, Itohara S, Kikusui T, Mori K, and Sakano H. Innate versus learned odour processing in the mouse olfactory bulb. *Nature* 450: 503-508, 2007.
23. Niimi K, Nishimura-Akiyoshi S, Nakashiba T, and Itohara S. Monoclonal Antibodies Discriminating Netrin-G1 and Netrin-G2 Neuronal Pathways. *J Neuroimmunol* 192: 99-104, 2007.
24. Imai Y, Inoue H, Kataoka A, Hua-Qin W, Masuda M, Ikeda T, Tsukita K, Soda M, Kodama T, Fuwa T, Honda Y, Kaneko S, Matsumoto S, Wakamatsu K, Ito S, Miura M, Aosaki T, Itohara S, and Takahashi R. Pael receptor is involved in dopamine metabolism in the nigrostriatal system. *Neurosci Res* 59: 413-425, 2007.
25. Satoh Y, Endo S, Ikeda T, Yamada K, Ito M, Kuroki M, Hiramoto T, Imamura O, Kobayashi Y, Watanabe Y, Itohara S and Takishima K. ERK2 knockdown mice show deficits in long-term memory; ERK2 has a specific function in learning and memory. *J Neurosci* 27: 10765-10776, 2007.
26. Niemann S*, Kanki H*, Fukui Y, Takao K, Fukaya M, Hynynen MN, Churchill MJ, Shefner JM, Bronson RT, Brown RH Jr, Watanabe M, Miyakawa T, Itohara S, and Hayashi Y. Genetic ablation of NMDA receptor subunit NR3B in mouse reveals motoneuronal and nonmotoneuronal phenotypes. *Eur J Neurosci* 26: 1407-1420, 2007.
(*: co-first authors)
27. Nishimura-Akiyoshi S, Niimi K, Nakashiba T, and Itohara S. Axonal netrin-Gs transneuronally determine lamina-specific subdendritic segments. *Proc Natl Acad Sci USA* 104: 14801-14806, 2007.
28. Gomi H, Mori K, Itohara S, and Izumi T. Rab27b is expressed in a wide range of exocytic cells and involved in the delivery of secretory granules near the plasma membrane. *Mol Biol Cell* 18: 4377-4386, 2007.
29. Iwasato T, Katoh H, Nishimaru H, Ishikawa Y, Inoue H, Saito YM, Ando R, Iwama M, Takahashi R, Negishi M, and Itohara S. Rac-GAP α -Chimerin Regulates Motor-Circuit Formation as a Key Mediator of EphrinB3/EphA4 Forward Signaling. *Cell* 130: 742-753, 2007.
30. Tian L, Stefanidakis M, Ning L, Van Lint P, Nyman-Huttunen H, Libert C, Itohara S,

- Mishina M, Rauvala H, Gahmberg CG. Activation of NMDA receptors promotes dendritic spine development through MMP-mediated ICAM-5 cleavage. *J Cell Biol* 178: 687-700, 2007.
31. Ogiwara I, Miyamoto H, Morita N, Atapour N, Mazaki E, Inoue I, Takeuchi T, Itohara S, Yanagawa Y, Obata K, Furuichi T, Hensch TK, and Yamakawa K. Na(v)1.1 localizes to axons of parvalbumin-positive inhibitory interneurons: a circuit basis for epileptic seizures in mice carrying an Scn1a gene mutation. *J Neurosci* 27: 5903-5914, 2007.
 32. Mizoguchi H, Yamada K, Mouri A, Niwa M, Mizuno T, Noda Y, Nitta A, Itohara S, Banno Y, and Nabeshima T. Role of matrix metalloproteinase and tissue inhibitor of MMP in methamphetamine-induced behavioral sensitization and reward: implications for dopamine receptor down-regulation and dopamine release. *J Neurochem* 102: 1548-1560, 2007.
 33. Sadakata T, Washida M, Iwayama Y, Shoji S, Sato Y, Ohkura T, Katoh-Semba R, Nakajima M, Sekine Y, Tanaka M, Nakamura K, Iwata Y, Tsuchiya KJ, Mori N, Detera-Wadleigh SD, Ichikawa H, Itohara S, Yoshikawa T, and Furuichi T. Autistic-like phenotypes in Cadps2-knockout mice and aberrant CADPS2 splicing in autistic patients. *J Clin Invest* 117, 931-943, 2007.
 34. Earnheart JC, Schweizer C, Crestani F, Iwasato T, Itohara S, Mohler H, and Lüscher B. GABAergic control of adult hippocampal neurogenesis in relation to behavior indicative of chronic trait anxiety and depression states. *J Neurosci* 27, 3845-3854, 2007.
 35. Mizoguchi H, Yamada K, Niwa M, Mouri A, Mizuno T, Noda Y, Nitta A, Itohara S, Banno Y and Nabeshima T. Reduction of methamphetamine-induced sensitization and reward in matrix metalloproteinase-2 and -9 deficient mice. *J Neurochem* 100, 1579-1588, 2007.
 36. Sadakata T, Kakegawa W, Sashida M, Katoh-Semba R, Mizoguchi A, Shutoh F, Okamoto T, Tanaka M, Sekine Y, Itohara S, Yuzaki M, Nagao S and Furuichi T. Impaired cerebellar development and function in mice lacking CAPS2, a protein involved in neurotrophin release. *J Neurosci* 27, 2472-2482, 2007.
 37. Sakatani S, Seto-Ohshima A, Itohara S, and Hirase H. Impact of S100B on local field potential patterns in anesthetized and kainic acid induced seizure conditions *in vivo*. *Eur J Neurosci* 25, 1144-1154, 2007.
 38. Tanaka KF, Takebayashi H, Yamazaki Y, Ono K, Naruse M, Iwasato T, Itohara S, Kato H, and Ikenaka K. The murine model of Alexander disease: analysis of GFAP aggregate formation and its pathological significance. *Glia* 55, 617-631, 2007.
 39. Sano Y, Nakaya T, Pedrini S, Takeda S, Iijima-Ando K, Iijima K, Mathews PM, Itohara S, Gandy S, and Suzuki T. Physiological mouse brain A β levels are not related to the phosphorylation state of threonine-668 of Alzheimer's APP. *PLoS ONE* 1: e51, 2006.
 40. Kitao Y, Imai Y, Ozawa K, Kataoka A, Ikeda T, Soda M, Nakimawa K, Kiyama H, Stern DM, Hori O, Wakamatsu K, Ito S, Itohara S, Takahashi R, and Ogawa S. Pael receptor induces death of dopaminergic neurons in the substantia nigra via endoplasmic reticulum stress and dopamine toxicity, which is enhanced under condition of parkin inactivation. *Hum Mol Genet* 16: 50-60, 2007.
 41. Yokoyama T, Shimada K, Masujin K, Iwamaru Y, Imamura M, Ushiki YK, Kimura KM, Itohara S, and Shinagawa M. Both host prion protein 131-188 subregion and prion strain characteristics regulate glycoform of PrP(Sc). *Arch Virol.*, 152, 603-609, 2007.
 42. Sano Y, Syuzo-Takabatake A, Nakaya T, Saito Y, Tomita S, Itohara S, and Suzuki T. Enhanced amyloidogenic metabolism of APP in the X11L-deficient mouse brain. *J Biol Chem.*, 281: 37853-37860, 2006.
 43. Nakaji K, Ihara M, Takahashi C, Itohara S, Noda M, Takahashi R, and Tomimoto H. Matrix metalloproteinase-2 plays a critical role in the pathogenesis of white matter lesions after chronic cerebral hypoperfusion in rodents. *Stroke* 37: 2816-2823, 2006.
 44. Inoue K, Mikuni-Takagaki Y, Oikawa K, Itoh T, Inada M, Noguchi T, Park JS, Onodera T, Krane SM, Noda M, Itohara S. A crucial role for MMP-2 in osteocytic canalicular formation

- and bone metabolism. *J Biol Chem* 281: 33814-33824, 2006.
45. Araya R, Noguchi T, Yuhki M, Kitamura N, Higuchi M, Saido TC, Seki K, Itohara S, Kawano M, Tanemura K, Takashima A, Yamada K, Kondoh Y, Kanno I, Wess J, Yamada M. Loss of M(5) muscarinic acetylcholine receptors leads to cerebrovascular and neuronal abnormalities and cognitive deficits in mice. *Neurobiol Dis* 24: 334-344, 2006.
 46. Cappello S, Attardo A, Wu X, Iwasato T, Itohara S, Wilsch-Brauninger M, Eilken HM, Rieger MA, Schroeder TT, Huttner WB, Brakebusch C, Gotz M. The Rho-GTPase cdc42 regulates neural progenitor fate at the apical surface. *Nat Neurosci* 9: 1099-1107, 2006.
 47. Weisstaub NV, Zhou M, Lira A, Lambe E, Gonzalez-Maeso J, Hornung JP, Sibille E, Underwood M, Itohara S, Dauer WT, Ansorge MS, Morelli E, Mann JJ, Toth M, Aghajanian G, Sealfon SC, Hen R, and Gingrich JA. Cortical 5-HT_{2A} receptor signaling modulates anxiety-like behaviors in mice. *Science* 313: 536-540, 2006.
 48. Park J-S, Onodera T, Nishimura S, Thompson RF, and Itohara S. Molecular evidence for two-stage learning and partial laterality in eyeblink conditioning of mice. *Proc Natl Acad Sci USA* 103: 5549-5554, 2006.
 49. Kanki H, Suzuki H, and Itohara S. High-efficiency CAG-FLPe deleter mice in C57BL/6J background. *Exp Anim* 55, 137-141, 2006.
 50. Shutoh F, Ohki M, Kitazawa H, Itohara S, and Nagao S. Memory trace of motor learning shifts transsynaptically from cerebellar cortex to nuclei for consolidation. *Neuroscience* 139: 767-777, 2006.
 51. Gomi H, Mizutani S, Kasai K, Itohara S, and Izumi T. Granuphilin molecularly docks insulin granules to the fusion machinery. *J Cell Biol.*, 171, 99-109, 2005.
 52. Miyashita T, Nishimura-Akiyoshi S, Itohara S, and Rockland KS. Strong expression of NETRIN-G2 in the monkey claustrum. *Neuroscience* 136, 487-496, 2005.
 53. Meerabux JMA, Ohba H, Fukasawa M, Suto Y, Aoki-Suzuki M, Nakashiba T, Nishimura S, Itohara S, and Yoshikawa T. Human netrin-G1 isoforms show evidence of differential expression. *Genomics* 86, 112-116, 2005.
 54. Gu X, Li C, Wei W, Lo V, Gong S, Li SH, Iwasato T, Itohara S, Li XJ, Mody I, Heintz N, and Yang XW. Pathological cell-cell interactions elicited by a neuropathogenic form of mutant huntingtin contribute to cortical pathogenesis in HD Mice. *Neuron* 46: 433-444, 2005.
 55. Lee LJ, Iwasato T, Itohara S, and Erzurumlu RS. Exuberant thalamocortical axon arborization in cortex-specific NMDAR1 knockout mice. *J Comp Neurol* 485: 280-292, 2005.
 56. Ihara M, Kinoshita A, Yamada S, Tanaka H, Tanigaki A, Kitano A, Goto M, Okubo K, Nishiyama H, Ogawa O, Takahashi C, Itohara S, Nishimune Y, Noda M, and Kinoshita M. Cortical organization by the septin cytoskeleton is essential for structural and mechanical integrity of mammalian spermatozoa. *Dev Cell* 8: 343-352, 2005.
 57. Higuchi M, Tomioka M, Takano J, Shirotani K, Iwata N, Masumoto H, Maki M, Itohara S, and Saido TC. Distinct mechanistic roles of calpain and caspase activation in neurodegeneration as revealed in mice overexpressing their specific inhibitors. *J Biol Chem* 280: 15229-15237, 2005.
 58. Takano J, Tomioka M, Tsubuki S, Higuchi M, Iwata N, Itohara S, Maki M, and Saido TC. Calpain mediates excitotoxic DNA fragmentation via mitochondrial pathways in adult brains: Evidence from calpastatin-mutant mice. *J Biol Chem* 280: 16175-16184, 2005.
 59. Aoki-Suzuki M, Yamada K, Meerabux J, Iwayama-Shigeno Y, Ohba H, Iwamoto K, Takao H, Toyota T, Suto Y, Nakatani N, Dean B, Nishimura S, Seki K, Kato T, Itohara S, Nishikawa T, and Yoshikawa T. Family-based association study and gene expression analyses of netrin-G1 and -G2 genes in schizophrenia. *Biol Psychiatry* 57, 382-393, 2005.
 60. Michishita M, Ikeda T, Nakashiba T, Ogawa M, Tashiro K, Honjo T, Doi K, Itohara S, and Endo S. Expression of Btcl2, a novel member of Btcl gene family, during development of

- the central nervous system. *Brain Res Dev Brain Res.*, 153, 135-142, 2004.
61. Inaki K, Nishimura S, Nakashiba T, Itohara S, and Yoshihara Y, Laminar organization of the developing lateral olfactory tract revealed by differential expression of cell recognition molecules. *J Comp Neurol* 479, 243-256, 2004.
 62. Iwasato T, Nomura R, Ando R, Ikeda T, Tanaka M, and Itohara S. Dorsal telencephalon-specific expression of Cre recombinase in PAC transgenic mice. *Genesis* 38: 130-138, 2004.
 63. Sassa T, Gomi H, and Itohara S. Postnatal expression of *Cdkl2* in mouse brain revealed by *LacZ* inserted into the *Cdkl2* locus. *Cell Tissue Res* 315, 147-156, 2004.
 64. Shutoh F, Katoh A, Ohki M, Itohara S, Tonegawa S, and Nagao S. Role of protein kinase C family in the cerebellum-dependent adaptive learning of horizontal optokinetic response eye movements in mice. *Eur J Neurosci* 18: 134-142, 2003.
 65. Michishita M, Ikeda T, Nakashiba T, Ogawa M, Tashiro K, Honjo T, Doi K, Itohara S, and Endo S. A novel gene, *Btcl1*, encoding CUB and LDLa domains is expressed in restricted areas of mouse brain. *Biochem Biophys Res Commun* 306: 680-686, 2003.
 66. Nakahara J, Takemura M, Gomi H, Tsunematsu K-i, Itohara S, Asou H, Ogawa M, Aiso S, and Tan-Takeuchi K. Role of radial fibers in controlling the onset of myelination. *J Neurosci Res* 72: 279-289, 2003.
 67. Datwani A, Iwasato T, Itohara S, and Erzurumlu RS. NMDA receptor-dependent pattern transfer from afferents to postsynaptic cells and dendritic differentiation in the barrel cortex. *Mol Cell Neurosci* 21: 477-492, 2002.
 68. Inoue K-i, Ozaki S, Ito K, Shiga T, Iseda T, Kawaguchi S, Ogawa M, Bae S-C, Yamashita N, Itohara S, Kudo N, and Ito Y. Runx3, a mammalian Runt-related gene, controls the axonal projection of proprioceptive dorsal root ganglion neurons. *Nat Neurosci* 5: 946-954, 2002.
 69. Datwani A, Iwasato T, Itohara S, and Erzurumlu RS. Lesion-induced thalamocortical axonal plasticity in the S1 cortex is independent of NMDAR function in excitatory cortical neurons. *J Neurosci* 22: 9171-9175, 2002.
 70. Itoh T, Matsuda H, Tanioka M, Kuwabara K, Itohara S, and Suzuki R. The role of matrix metalloproteinase-2 and matrix metalloproteinase-9 in antibody-induced arthritis. *J Immunol* 169: 2643-2647, 2002.
 71. Takemura M, Gomi H, Colucci-Guyon E, and Itohara S. Protective Role of Phosphorylation in Turnover of Glial Fibrillary Acidic Protein in mice. *J Neurosci* 22: 6972-6979, 2002.
 72. Takemura M, Nishiyama H, and Itohara S. Distribution of phosphorylated glial fibrillary acidic protein in the mouse central nervous system. *Genes Cells* 7: 295-307, 2002.
 73. Nishiyama H, Knöpfel T, Endo S, and Itohara S. Glial protein S100B modulates long term neuronal synaptic plasticity. *Proc Natl Acad Sci USA* 99: 4037-4042, 2002.
 74. Nishiyama H, Takemura M, Takeda T, and Itohara S. Normal development of serotonergic neurons in mice lacking S100B. *Neuroscience Lett* 321: 49-52, 2002.
 75. Shutoh F, Katoh A, Kitazawa H, Aiba A, Itohara S, and Nagao S. Loss of adaptability of horizontal optokinetic response eye movements in mGluR1 knockout mice. *Neurosci Res* 42: 141-145, 2002.
 76. Nakashiba T, Nishimura S, Ikeda T, and Itohara S. Complementary expression and neurite outgrowth activity of netrin-G subfamily members. *Mech Dev* 111: 47-60, 2002.
 77. Tanaka H, Katoh A, Oguro K, Shimazaki K, Gomi H, Itohara S, Matsuzawa T, and Kawai N. Disturbance of hippocampal long-term potentiation after transient ischemia in GFAP deficient mice. *J Neurosci Res* 67: 11-20, 2002.
 78. Oh J, Takahoshi R, Kondo S, Mizoguchi A, Adachi E, Sasahara RM, Nishimura S, Imamura Y, Kitayama H, Alexander DB, Ide C, Horan TP, Arakawa T, Yoshida H, Nishikawa S-i, Itoh Y, Seiki M, Itohara S, Takahashi C, and Noda M. The membrane-anchored MMP-inhibitor RECK is a key regulator of extracellular matrix integrity and antiogenesis.

- Cell* 107: 789-800, 2001.
79. Yokoyama T, Kimura KM, Ushiki Y, Yamada S, Morooka A, Nakashiba T, Sassa T, and Itohara S. *In vivo* conversion of cellular prion protein to pathogenic isoforms, as monitored by conformation-specific antibodies. *J Biol Chem* 276: 11265-11271, 2001.
 80. Bergers G, Brekken R, McMahon G, Vu TH, Itoh T, Tamaki K, Tanzawa K, Thorpe P, Itohara S, Werb Z, and Hanahan D. Matrix metalloproteinase-9 triggers the angiogenic switch during carcinogenesis. *Nature Cell Biol* 2: 737-744, 2000.
 81. Iijima K, Ando K, Takeda S, Satoh Y, Seki T, Itohara S, Greengard P, Kirino Y, Nairn AC, and Suzuki T. Neuron-specific phosphorylation of Alzheimer's β -amyloid precursor protein by CDK5. *J Neurochem* 75: 1085-1091, 2000.
 82. Nakashiba T, Ikeda T, Nishimura S, Tashiro K, Honjo T, Culotti JG, and Itohara S. Netrin-G1: a novel GPI-linked mammalian netrin that is functionally divergent from classical netrins. *J Neurosci* 20: 6540-6550, 2000.
 83. Iwasato T, Datwani A, Wolf AM, Nishiyama H, Taguchi Y, Tonegawa S, Knöpfel T, Erzurumlu RS, and Itohara S. Cortex-restricted disruption of NMDAR1 impairs neuronal patterns in the barrel cortex. *Nature* 406: 726-731, 2000.
 84. Katoh A, Kitazawa H, Itohara S, and Nagao S. Impairment of mouse reflex eye movements by inhibition of nitric oxide inhibition synthesis and gene-knockout of neuronal nitric oxide synthase. *Learn Memory* 7: 220-226, 2000.
 85. Sassa T, Gomi H, Sun W, Ikeda T, Thompson RF, and Itohara S. Identification of Variants and Dual Promoters of Murine Serine/Threonine Kinase KKIAMRE. *J Neurochem* 74: 1809-1819, 2000.
 86. Moriya T, Yoshinobu Y, Kouzu Y, Katoh A, Gomi H, Ikeda M, Yoshioka T, Itohara S, and Shibata S. Involvement of glial fibrillary acidic protein (GFAP) expressed in astroglial cells in circadian rhythm under constant lighting conditions in mice. *J Neurosci Res* 60: 212-218, 2000.
 87. Futatsugi A, Kato K, Ogura H, Li S-T, Nagata E, Kuwajima G, Tanaka K, Itohara S, and Mikoshiba K. Facilitation of NMDA-independent LTP and spatial learning in mutant mice lacking ryanodine receptor type 3. *Neuron* 24: 701-713, 1999.
 88. Gomi H, Sun W, Finch CE, Itohara S, Yoshimi K, and Thompson RF. Learning induces a cdc-2 related protein kinase, KKIAMRE. *J Neurosci.*, 19: 9530-9537, 1999.
 89. Kuwahara C, Takeuchi AM, Nishimura T, Haraguchi K, Kubosaki A, Matsumoto Y, Saeki K, Matsumoto Y, Yokoyama T, Itohara S, and Onodera T. Prion protein prevents neuronal cell death. *Nature* 400: 225-226, 1999.
 90. Katoh A, Kitazawa H, Itohara S, and Nagao S. Dynamic characteristics and adaptability of mouse vestibulo-ocular and optokinetic response eye movements and the role of the flocculo-olivary system revealed by chemical lesions. *Proc Natl Acad Sci USA* 95: 7705-7710, 1998.
 91. Itoh T, Tanioka M, Yoshida H, Yoshioka T, Nishimoto N, and Itohara S. Reduced angiogenesis and tumor progression in gelatinase A deficient mice. *Cancer Res* 58: 1048-1051, 1998.
 92. Itoh T, Ikeda T, Gomi H, Nakao S, Suzuki T, and Itohara S. Unaltered secretion of β -amyloid precursor protein in gelatinase A (matrix metalloproteinase 2) deficient mice. *J Biol Chem* 272: 22389-22392, 1997.
 93. Shibuki K, Gomi H, Chen L, Bao S, Kim JJ, Wakatsuki H, Fujisaki T, Fujimoto K, Ikeda T, Chen C, Thompson RF, and Itohara S. Deficient cerebellar long-term depression, impaired eyeblink conditioning and normal motor coordination in GFAP mutant mice. *Neuron* 16: 587-599, 1996.
 94. Gomi H, Yokoyama T, Fujimoto K, Ikeda T, Katoh A, Itoh T, and Itohara S. Mice devoid of the glial fibrillary acidic protein develop normally and are susceptible to scrapie prions. *Neuron* 14: 29-41, 1995.

95. Itohara S, Mombaerts P, Lafaille J, Iacomini J, Nelson A, Clarke AR, Hooper ML, Farr A, and Tonegawa S. T-cell receptor δ gene mutant mice: Independent generation of $\alpha\beta$ T cells and programmed rearrangements of $\gamma\delta$ TCR genes. *Cell* 72: 337-348, 1993.
96. Itohara S, and Tonegawa S. Selection of $\gamma\delta$ T cells with canonical T-cell antigen receptors in fetal thymus. *Proc Natl Acad Sci USA* 87: 7935-7938, 1990.
97. Itohara S, Farr AG, Lafaille JJ, Bonneville M, Takagaki Y, Haas W, and Tonegawa S. Homing of a $\gamma\delta$ thymocyte subset with homogeneous T-cell receptors to mucosal epithelia. *Nature* 343: 754-757, 1990.
98. Itohara S, Nakanishi N, Kanagawa O, Kubo R, and Tonegawa S. Monoclonal antibodies specific to native murine T-cell receptor δ : Analysis of $\gamma\delta$ T cells during thymic ontogeny and in peripheral lymphoid organs. *Proc Natl Acad Sci USA* 86: 5094-5098, 1989.
99. Itohara S, Tomiyama T, Ushimi C, and Sekikawa K. Cooperative regulation of bovine leukemia virus-viral gene expression by two overlapping open reading frames in the XBL region. *J Gen Virol* 69: 797-804, 1988.
100. Itohara S, and Sekikawa K. Molecular cloning of infectious proviral genomes of bovine leukemia virus. *Virology* 159: 158-160, 1987.
101. Itohara S, Hirata K, Inoue M, Hatsuoka M, and Sato A. Isolation of a sarcoma virus from a spontaneous chicken tumor. *Gann* 69: 825-830, 1978.