

## **Kenji W. Koyano, Ph.D.**

Post-doctoral Fellow (NIH Special Volunteer)  
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### **Personal Information**

Citizenship: Japan  
Language: English, Japanese

### **Employment**

2014-present Postdoc (NIH Special Volunteer), NIMH/NIH  
(advisor: Dr. David Leopold)

2013-2014 Assistant Professor, The University of Tokyo, Graduate School of Medicine  
(advisor: Dr. Yasushi Miyashita)

2011-2013 Research Associate, The University of Tokyo, Graduate School of Medicine  
(advisor: Dr. Yasushi Miyashita)

2008-2011 Postdoc, The University of Tokyo, Graduate School of Medicine  
(advisor: Dr. Yasushi Miyashita)

### **Education**

2004-2008 Ph.D. The University of Tokyo, Graduate School of Medicine  
(advisor: Prof. Yasushi Miyashita)

- 2002-2004 M.MSc. The University of Tokyo, Medical Science Graduate Program  
(advisor: Prof. Yasushi Miyashita)
- 1998-2002 B.L.A. The University of Tokyo, College of Arts and Sciences  
(advisor: Prof. Makoto Asashima)

### **Honors and Awards**

- 2014-2015 Research Fellowship from Uehara Memorial Foundation
- 2008-2011 JSPS Research Fellowship for Young Scientists (PD)
- 2005-2008 JSPS Research Fellowship for Young Scientists (DC1)
- 2004-2005 First-class scholarship from JASSO
- 2003-2004 First -class scholarship from Japan Scholarship Foundation

### **Professional Skills:**

- Behavioral training of monkeys: pair-association task, DMS task and gaze-fixation task.
- Electrophysiology: extracellular single-unit recording and local field potential recording from alert/anesthetized monkeys.
- Surgery: headpost/recording-chamber implantation, dura scraping, electrode bundle implantation (primary surgeon). Scleral search coil implantation, subdural ECoG electrode implantation (secondary surgeon).
- MRI: structural image acquisition and functional image acquisition from behaving/anesthetized monkeys.
- Histology: intracardiac perfusion, cryostat sectioning, Nissl staining, neutral red staining, histochemistry, immunohistochemistry of monkeys and rats.
- Analysis: neurophysiological data analysis with Matlab, statistical data analysis with Matlab and SAS. Imaging data analysis with Matlab. Histological data analysis with Neurolucida.
- Experimental set-up: behavioral training hardware systems and electrophysiological recording hardware systems. Programming of behavior control system with Presentation/MonkeyLogic software. Programming of data acquisition system with Labview/TDT RpvdsEx software.

## **Journal Publications**

- 10) Takeda M, Koyano KW, Hirabayashi T, Adachi Y, Miyashita Y. (2015) Top-down regulation of laminar circuit via inter-area signal for successful object memory recall in monkey temporal cortex. *Neuron*. 86(3) pp. 840-852.
- 9) Hirabayashi T, Tamura K, Takeuchi D, Takeda M, Koyano KW, Miyashita Y. (2014) Distinct neuronal interactions in anterior inferotemporal areas of macaque monkeys during retrieval of object association memory. *J Neurosci*. 34(28). pp.9377-9388
- 8) Yaguchi M, Ohashi Y, Tsubota T, Sato A, Koyano KW, Wang N, Miyashita Y. (2013) Characterization of the properties of seven promoters in the motor cortex of rats and monkeys after lentiviral vector-mediated gene transfer. *Hum Gene Ther Methods*. 24(6). pp. 333-344.
- 7) Matsui T, Koyano KW, Tamura K, Osada T, Adachi Y, Miyamoto K, Chikazoe J, Kamigaki T, Miyashita Y. (2012) fMRI activity in the macaque cerebellum evoked by intracortical microstimulation of the primary somatosensory cortex: evidence for polysynaptic propagation. *PLoS One*. 7(10). pp. e47515-47515.
- 6) Koyano KW, Machino A, Takeda M, Matsui T, Fujimichi R, Ohashi Y, Miyashita Y. (2011) In vivo visualization of single-unit recording sites using MRI-detectable elgiloy deposit marking. *Journal of Neurophysiology* 105(3). pp. 1380-1392.
- 5) Matsui T, Tamura K\*, Koyano KW\*, Takeuchi D, Adachi Y, Osada T, Miyashita Y. (2011) Direct Comparison of Spontaneous Functional Connectivity and Effective Connectivity Measured by Intracortical Microstimulation: An fMRI Study in Macaque Monkeys. *Cerebral Cortex* 21(10) pp. 2348-2356. \* Contributed equally to this work
- 4) Ohashi Y, Tsubota T, Sato A, Koyano KW, Tamura K, Miyashita Y. (2011) A bicistronic lentiviral vector-based method for differential transsynaptic tracing of neural circuits. *Molecular and Cellular Neuroscience* 46(1). pp.136-147.
- 3) Fujimichi R, Naya Y, Koyano KW, Takeda M, Takeuchi D, Miyashita Y. (2010) Unitized representation of paired objects in area 35 of the macaque perirhinal cortex. *European Journal of Neuroscience* 32(4). pp. 659-667.
- 2) Matsui T,\*, Koyano KW\*, Koyama M, Nakahara K, Takeda M, Ohashi Y, Naya Y, Miyashita Y. (2007) MRI-based localization of electrophysiological recording sites within the cerebral cortex at single-voxel accuracy. *Nature Methods*, 4(2), pp. 161-168. \*Contributed equally to this work

- 1) Koyano KW, Tokuyama W, Miyashita Y. (2005) Deeply located granule cells and mitral cells undergo apoptosis after transection of the central connections of the olfactory bulb in the adult rat. *Neuroscience*, 131(2), pp. 293-302.

## **Meeting Abstracts**

- 28) Takeda M, Koyano KW, Hirabayashi T, Adachi Y, Ishii T, Miyashita Y (2015) Inter-area signal targeting translaminal processing during successful memory retrieval in macaque temporal cortex. *The Society for Neuroscience Abstract*, online, 792.05.
- 27) Hirabayashi T, Tamura K, Takeuchi D, Takeda M, Koyano KW, Miyashita Y. (2014) Microcircuits for hierarchical coding of object-object association across inferotemporal areas of macaques. *The Society for Neuroscience Abstract*, online, 674.07.
- 26) Koyano KW, Takeda M, Matsui T, Ohashi Y, Hirabayashi T, Kakizawa K, Watanabe T, Miyashita Y. (2013) MRI-assisted single-unit recording revealed precise neuronal map in the perirhinal cortices of macaque monkeys performing a visual pair-association task. *The Society for Neuroscience Abstract*, online, 552.05.
- 25) Takeda M, Koyano KW, Hirabayashi T, Ishii T, Watanabe T, Miyashita Y. (2013) Across-areal signal flow between area 36 and TE of macaques performing the pair-association task. *The Society for Neuroscience Abstract*, online, 669.02.
- 24) Hirabayashi T, Takeuchi D, Tamura K, Takeda M, Koyano KW, Miyashita Y. (2013) Directional signal flow between different classes of memory neurons during retrieval of object association memory in macaque inferior temporal cortex. *The Society for Neuroscience Abstract*, online, 602.06.
- 23) Yaguchi M, Ohashi Y, Tsubota T, Sato A, Koyano KW, Wang N, Matsuyama M, Sekine T, Miyashita Y. (2013) EGFP expressions in the cerebral cortex of rats and monkeys under control of various promoters after lentiviral transduction. *The Society for Neuroscience Abstract*, online, 676.06.
- 22) Takeda M, Koyano KW, Miyashita Y. (2013) Across-areal analysis of mnemonic backward signal flow between area 36 and TE of macaques. *Neuro2013 Abstract*, online. O3-7-1-4.
- 21) Yaguchi M, Ohashi Y, Tsubota T, Sato A, Koyano KW, Wang N, Matsuyama M, Sekine T, Miyashita Y. (2013) Comparison of seven promoters in the rat and monkey cerebral cortices using lentiviral vectors. *Neuro2013 Abstract*, online. P1-2-243.

- 20) Matsui T, Koyano KW, Tamura K, Watanabe T, Takeuchi D, Adachi Y, Osada T, Miyashita Y. (2011) Similarities and differences of functional connectivity as measured by spontaneous correlation of fMRI signals and effective connectivity as measured by simultaneous intracortical microstimulation and fMRI. *Neuroscience Research*, 71 Suppl. 1, p. e88.
- 19) Ohashi Y, Tsubota T, Sato A, Koyano KW, Tamura K, Matsuyama M, Yaguchi M, Wang N, Miyashita Y. (2011) Selective visualization of rodent and macaque neural circuits using transsynaptic and stationary markers driven by a 2A-based bicistronic lentiviral vector. *Neuroscience Research*, 71 Suppl. 1, p.e411.
- 18) Koyano KW, Machino A, Takeda M, Matsui T, Fujimichi R, Ohashi Y, Miyashita Y. (2010) In vivo reconstruction of recorded neuron positions on magnetic resonance images using elgiloy metal deposit markers. *The Society for Neuroscience Abstract*, online, 817.7.
- 17) Matsui T, Tamura K, Koyano KW, Watanabe T, Takeuchi D, Adachi Y, Osada T, Miyashita Y. (2010) Comparison of spontaneous functional connectivity and effective connectivity as measured by electrical microstimulation in macaque monkeys. *The Society for Neuroscience Abstract*, online, 645.15.
- 16) Matsui T, Tamura K, Koyano KW, Takeuchi D, Watanabe T, Adachi Y, Osada T, Miyashita Y. (2010) Polysynaptic neuronal connectivity of S1 cortex revealed by simultaneous electrical microstimulation and fMRI in macaque monkeys. *The Journal of Physiological Sciences*, 60 Suppl. 1, p. S60.
- 15) Koyano KW, Matsui T, Machino A, Takeda M, Fujimichi R, Ohashi Y, Miyashita Y. (2009) Metal deposit mark of elgiloy electrode is detectable using high-field MRI: an in vivo method to localize the recording sites. *The Journal of Physiological Sciences*, 59 Suppl. 1, p. 528.
- 14) Fujimichi R, Takeda M, Naya Y, Koyano KW, Takeuchi D and Miyashita Y. (2009) Characterization of neuronal activities in area 35 of macaque perirhinal cortex during a pair association task. *The Journal of Physiological Sciences*, 59 Suppl. 1, p. 506.
- 13) Fujimichi R, Takeda M, Koyano KW, Naya Y, Takeuchi D and Miyashita Y. (2009) Neuronal representation of stimulus-stimulus associations in area 35 of macaque perirhinal cortex. *The society for Neuroscience Abstract*, online, 98.5.
- 12) Ohashi Y, Tsubota T, Sato A, Koyano KW, Tamura K and Miyashita Y. (2009) Transneuronal circuit tracing of the rat cerebellar pathways with a bicistronic lentiviral vector co-expressing green fluorescent protein and wheat germ agglutinin. *The society for Neuroscience Abstract*, online, 388.7.
- 11) Koyano KW, Takeda M, Fujimichi R, Ohashi Y, Miyashita Y. (2008) MRI-based in vivo detection of recording sites marked by electrolysis of an elgiloy electrode. *Neuroscience Research*, 61 Suppl. 1, p. S64.

- 10) Koyano KW, Machino A, Takeda M, Fujimichi R, Ohashi Y, Matsui T Miyashita Y. (2008) Electrolysis of an elgiloy electrode can create MRI-visible metal deposit marks at recording sites. *The society for Neuroscience Abstract*, online, 885.2.
- 9) Fujimichi R, Takeda M; Naya Y, Koyano KW, Takeuchi D, Miyashita Y. (2008) Neuronal activities in area 35 of macaque perirhinal cortex during a pair association task *Neuroscience Research*, 61 Suppl. 1, p. S53.
- 8) Fujimichi R, Takeda M, Naya Y, Koyano KW, Takeuchi D, Miyashita Y. (2008) Functional characterization of area 35 in the macaque perirhinal cortex during a pair association task. *The society for Neuroscience Abstract*, online, 219.1.
- 7) Koyano KW, Ohashi Y, Matsui T, Takeda M, Nakahara K, Naya Y, Koyama M, Watanabe T, Miyashita Y. (2007) A non-magnetic mini-manipulator for an MRI-based method for localization of a microelectrode tip within monkey cerebral cortex. *The Journal of Physiological Sciences*, 57 Suppl., S71.
- 6) Koyano KW, Matsui T, Naya Y, Koyama M, Takeda M, Nakahara K, Miyashita Y. (2006) Localization of a microelectrode tip within the monkey temporal cortex. *Neuroscience Research*, 55 Suppl. 1, S68.
- 5) Koyano KW, Matsui T, Naya Y, Koyama M, Takeda M, Nakahara K, Miyashita Y. (2006) Localization accuracy of microelectrode tip within the monkey temporal cortex using high-resolution MRI. *The Society for Neuroscience Abstract*, online, 694.13.
- 4) Takeda M, Naya Y, Fujimichi R, Takeuchi D, Koyano KW, Miyashita Y. (2005) Differential influence of distractor stimuli on cue- and target-related delay activities during pair-association task. *The society for Neuroscience Abstract*, online, 621.12.
- 3) Matsui T, Koyano KW, Koyama M, Naya Y, Takeda M, Nakahara K, Miyashita Y. (2005) 4.7 T MRI-based detection of the tip of an electrode in monkey cortex. Abstract Viewer/Itinerary Planner online: *The society for Neuroscience Abstract*, online, 456.10, 2005.
- 2) Koyano KW, Tokuyama W, Miyashita Y. (2005) Predominance of deeply located granule cells in apoptotic cell death after transection of the central connections of the main olfactory bulb in the adult rat. *Japanese Journal of Physiology*, 55 (Suppl), p. S164.
- 1) Koyano K, Tokuyama W, Miyashita Y. (2003) Activation of caspase-3 in the adult rat olfactory bulb following lateral olfactory tract transection. *Neuroscience Research*, 46 Suppl.1, p. S155.

## **Ad Hoc Journal Review**

Neuroscience Research

## **Grant Support**

- 2013-2015      *Principal investigator*, “Functional laminar differentiation of primate cerebral cortices related to associative memory: research with structural MRI and electrophysiology” Grant-in-Aid for Young Scientists from JSPS, 4,160,000 JPY (41,600 USD).
- 2011-2012      *Principal investigator*, “Cortical laminar units for associative memory in primates: a combinational approach with MRI, electrophysiology and histology” Grant-in-Aid for Research Activity start-up from JSPS, 3,120,000 JPY (31,200 USD).
- 2008-2010      *Principal investigator*, “Information flow of associative memory within the laminar structure of monkey cerebral cortices: structural-MRI-based electrophysiological study” Grant-in-Aid for JSPS Fellows, 2,400,000 JPY (24,000 USD)
- 2005-2007      *Principal investigator*, “Laminar mapping of memory neurons within the monkey associative cortex based on high-field MRI structural image” Grant-in-Aid for JSPS Fellows, 2,700,000 JPY (27,000 USD)

## **Teaching**

- 2014              *Lecture*: Overview of Medical Sciences III
- 2012-2014      *Instructor*: Practical training of Physiology
- 2012-2013      *Lecture*: Introduction to Medical Science
- 2002-2011      *Teaching assistant*: Practical training of Physiology

## **References**

Available upon request.