

AYANO MATSUSHIMA

Personal Information

Name: Ayano Matsushima

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Education

B.A., M.D. in Medicine, March 2010
Hokkaido University School of Medicine

Ph.D. in Physiology, March 2013
Department of Physiology,
Hokkaido University Graduate School of Medicine
Advisor: Masaki Tanaka (Chair of Neurophysiology)

Research Experience

1. April 2006-March 2010
M.D. section, Medical Scientist Training Program,
Faculty of Medicine, Hokkaido University
(Advisor: Masaki Tanaka, Dept of Neurophysiology)
2. April 2010 - March 2013
Ph.D. section, Medical Scientist Training Program,
Graduate School of Medicine, Hokkaido University
(Advisor: Masaki Tanaka, Dept of Neurophysiology)
3. April 2012 - March 2013
Research Fellow (DC2) of Japan Society for the Promotion of Science
4. April 2013 – March 2014
MD-PhD Research Associate
Graduate School of Medicine, Hokkaido University
5. April 2014 – December 2016
Project Assistant Professor
Graduate School of Medicine, Tokyo University
6. January 2017 – present
Postdoctoral Fellow
McGovern Institute for Brain Research, MIT

Honors and Awards

- 2005 **Nitobe Award**, Hokkaido University
- 2008 **Otowa Award**, Hokkaido University School of Medicine
- 2009 **Award of excellence, JASSO's Student of the Year 2012**, Japan Student Services Organization
- 2010-2012 **Teijin Kumura Scholarship**, Teijin Scholarship Foundation
- 2012-2013 **DC2 Research Fellowship**, Japan Society for the Promotion of Science
- 2012 **Poster Prize for Young Scientists** Comprehensive Brain Science Network
- 2013 **Otsuka Award**, Hokkaido University
- 2013 Recipient of **L'Oreal - UNESCO / Japan Young Researchers' Fellowship 2013**
- 2014 Recipient of **AXA Research Fund Post-Doctoral Fellowship 2014**
- 2019 - Recipient of **Post-Doctoral Fellowship** the Nancy Lurie Marks Family Foundation

Peer-reviewed primary publications

1. Miyazaki, T., Yamasaki, M., Uchigashima, M., **Matsushima, A.** and Watanabe, M. (2011). Cellular expression and subcellular localization of secretogranin II in the mouse hippocampus and cerebellum. *Eur J Neurosci* *33*, 82-94.
2. **Matsushima, A.**, and Tanaka, M. (2012). Neuronal correlates of multiple top-down signals during covert tracking of moving objects in macaque prefrontal cortex. *J Cogn Neurosci* *24*, 2043-2056.
3. **Matsushima, A.**, and Tanaka, M. (2013). Retrospective and prospective information coding by different neurons in the prefrontal cortex. *Neuroreport* *24*, 73-78.
4. **Matsushima, A.**, and Tanaka, M. (2014a). Manipulation of object choice by electrical microstimulation in macaque frontal eye fields. *Cereb Cortex* *24*, 1493–1501.
5. **Matsushima, A.**, and Tanaka, M. (2014b) Different neuronal computations of spatial working memory for multiple locations within versus across visual hemifields. *J Neurosci*, *34*:16, 5621-5626.
6. **Matsushima, A.**, and Tanaka, M. (2014c) Differential neuronal representation of spatial attention dependent on relative target locations during multiple object tracking. *J Neurosci*, *34*:30, 9963-9969.
7. Nonaka, M., Kim, R., Sharry, S., **Matsushima, A.**, Takemoto-Kimura, S., Bito, H. (2014d) Towards a better understanding of cognitive behaviors regulated by gene expression downstream of activity-dependent transcription factors. *Neurobiol Learn Mem.* *115*, 21-29.
8. **Matsushima, A.**, and Graybiel, A.M. (2020) Combinatorial Developmental Controls on Striatonigral Circuits. *Cell Rep.*, *31*, 107778

Other publications

1. **Matsushima, A.** (2008). Lecture note for Dr. Sakaguchi at ASCONE 2007 “Representation and Planning of Motor Commands”. *The Brain & Neural Netw* 15, 209-226.
2. **Matsushima, A.**, and Tanaka, M. (2012). Spatial attention. In *Brain Science Dictionary*, K. Tanaka, K. Mikoshiba, ed. (International Neuroinformatics Coordination Facility, Japan: Online dictionary)
3. **Matsushima, A.**, and Tanaka, M. (2012). Neuronal mechanisms to ignore. *Hokkaido J Med Sci* 87, 282
4. **Matsushima, A.**, and Tanaka, M. (2013). Neuronal mechanisms for object selection. *Hokkaido J Med Sci* 88, 143
5. **Matsushima, A.**, and Tanaka, M. (2014). Chapter 39 “The Control of Gaze” In Japanese translation of “Principals of Neural Science, 5th ed.” (I. Kanazawa & Y. Miyashita, Editors), Medical Science International, Tokyo.
6. **Matsushima, A.** (2015) Neuronal Correlates of Efficient but Limited Capacity of Cognition. *The Brain & Neural Netw*, 22:1, 03-15.

Meeting Presentations

1. **Matsushima, A.**, and Tanaka, M. (2008). Neuronal correlates of covert tracking of a moving object in the primate frontal cortex. P2-j17 (*Poster*), The 31st Annual Meeting of the Japan Neurosc Soc, Tokyo, Japan.
2. **Matsushima, A.**, and Tanaka, M. (2008). Neuronal modulation during covert tracking of a moving object in primate frontal cortex. 264.2. (*Poster*), Neuroscience 2008, Washington, DC.
3. **Matsushima, A.**, and Tanaka, M. (2009). Properties of top-down signals in the primate frontal cortex during covert tracking of a moving object. P1PM-11-14 (*Poster*), The 36th International Congress of Physiological Sciences (IUPS2009), Kyoto, Japan.
4. **Matsushima, A.**, and Tanaka, M. (2009). Top-down control of spatial attention in macaque prefrontal cortex. (*Oral*), The 89th Annual Meeting of Hokkaido Node of Physiol Soc of Japan, Sapporo, Japan.
5. **Matsushima, A.**, and Tanaka, M. (2011). Representation and manipulation of top-down signals in prefrontal cortex during covert tracking of moving objects. Abstracts 83 (*Poster*), The 1st Tohoku International Symposium on Multidisciplinary Neurosc, Sendai, Japan.
6. **Matsushima, A.**, and Tanaka, M. (2011). Manipulation of object section by electrical stimulation to macaque frontal eye fields. (*Oral*), The 91th Annual Meeting of Hokkaido Node of Physiol Soc of Japan, Sapporo, Japan.
7. **Matsushima, A.**, and Tanaka, M. (2011). Manipulation of top-down signals for covert object tracking by electrical stimulation in the primate prefrontal cortex. O4-E-1-3 (*Oral*), The 34th Annual Meeting of the Japan Neurosc Soc, Yokohama, Japan.
8. **Matsushima, A.**, and Tanaka, M. (2011). Manipulation of target choice for covert tracking by electrical microstimulation in the primate frontal eye fields. 272.13. (*Poster*), Neuroscience 2011, Washington, DC.

9. **Matsushima, A.**, and Tanaka, M. (2012). Neuronal mechanisms to remember multiple locations of visual stimuli. System-10(C69) (*Poster*), Summer Workshop of Comprehensive Brain Science Network, Sendai, Japan.
10. **Matsushima, A.**, and Tanaka, M. (2012). Distinct encoding schema dependent on relative locations of objects to be remembered. (*Oral*) The 92th Annual Meeting of Hokkaido Node of Physiol Soc of Japan, Sapporo, Japan.
11. **Matsushima, A.**, and Tanaka, M. (2012). Neuronal correlates of working memory for multiple locations. P1-i11(*Poster*), The 35th Annual Meeting of the Japan Neurosc Soc, Nagoya, Japan.
12. **Matsushima, A.**, Itoh, S., Yoshida, A., Kurkin, S., Yabe, I., Sasaki, H., Tanaka, M. (2013). Novel psychophysical tests for assessment of cerebellar functions. (*Oral*) Annual Meeting of The Research Committee for Ataxic Disease, Tokyo, Japan.
13. **Matsushima, A.**, and Tanaka, M. (2013). Neuronal representation for working memory of multiple locations. (*Invited talk*) Workshop at National Institute for Physiological Sciences “Information processing in the brain by global network”, Okazaki, Japan.
14. **Matsushima, A.**, Itoh, S., Yoshida, A., Kurkin, S., Yabe, I., Sasaki, H., Tanaka, M. (2013). Contribution of the cerebellum to perceptual prediction. P1-2-78 (*Poster*) The 36th Annual Meeting of the Japan Neurosc Soc, Kyoto, Japan.
15. **Matsushima, A.**, and Tanaka, M. (2013) Attentional distribution across multiple objects – investigation of neuronal activities in the macaque prefrontal cortex. (*Oral*) The 93th Annual Meeting of Hokkaido Node of Physiol Soc of Japan, Asahikawa, Japan.
16. **Matsushima, A.**, and Tanaka, M. (2013) Distinct neuronal mechanisms for remembering multiple locations within vs. across visual hemifields. 263.24. (*Poster*), Neuroscience 2013, Washington, DC.
17. **Matsushima, A.**, and Tanaka, M. (2013) Neuronal correlates of efficient but limited capacity of cognition. (*Invited talk*), IST Austria, Klosterneuburg, Austria.
18. Bito H, Kim R, Inoue M, Nonaka M, Ishii Y, Sakai K, Kawashima T, Yagishita-Kyo N, **Matsushima A.**, Kamijo S, Goto M, Kobari S, Okamura M, Endo T, Horigane S, Okuno H, Takemoto-Kimura S, Fujii H. (2016) Postsynaptic mechanisms underlying activity-dependent adaptation of glutamatergic synapses. Symposium. The 93rd Annual Meeting of the Physiological society of Japan, Sapporo, Japan.
19. **Matsushima, A.**, and Graybiel, A. M. (2019) Developmental organization of striosomes and striosome-related circuits. 565.15 (*Poster*), Neuroscience 2019, Chicago, IL.