

Joshua Patrick Johansen

Date of birth: June 23rd, 1973

Current Position

Head, Laboratory for the Neural Circuitry of Learning and Memory and Visiting Assistant Professor, University of Tokyo
RIKEN Center for Brain Science
2-1 Hirosawa, Wako-shi, Saitama, 351-0198, Japan



Education

- | | |
|----------------|---|
| 10/2007-8/2011 | New York University
Postdoctoral fellowship |
| 6/2007 | University of California, Los Angeles
Completed Ph.D. in Neuroscience |
| 1996-1998 | University of Colorado, Boulder
Bachelor of Arts in Psychology, 1998, Magna Cum Laude |

Awards and Honors

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| 2008 | Ruth L. Kirschstein NRSA (NIH) postdoctoral fellowship |
| 2007 | UCLA Kavan Award for excellence in neuroscience research |
| 2006 | Society for Neuroscience Travel Award |
| 2004 | National Science Foundation Graduate Research Fellowship |
| 1998 | Honors Thesis, Magna Cum Laude Psychology, CU Boulder |
| 1998 | Howard Hughes Summer Undergraduate Research Fellowship |
| 1996 | Undergraduate Research Opportunities Fellowship |

Research Background

- 2018-present **RIKEN Center for Brain Science**
Team Leader
- 2015-present **University of Tokyo**
Visiting Assistant Professor
- 2011-2018 **RIKEN Brain Science Institute**
Team Leader
- 2007-2011 **New York University**
Worked in the lab of Joseph LeDoux examining aversive teaching signal regulation of amygdala plasticity and fear learning using optogenetic, immunocytochemical, electrophysiological, molecular and behavioral pharmacological approaches.
- 2003-2007 **University of California Los Angeles**
Worked in the lab of Tad Blair studying aversive teaching signal processing and plasticity in the amygdala and periaqueductal gray using electrophysiological, pharmacological and behavioral approaches.
- 1998-2003 **University of California San Francisco**
Worked in the lab of Howard Fields studying neural mechanisms of pain and aversive teaching signals using behavioral and electrophysiological techniques.
- 1997-1998 **University of Colorado, Boulder**
Student researcher in the Linda Watkins/Steven Maier laboratory. Studied the effects of stress on pain modulatory systems.
- 1997-1998 **University of Colorado, Boulder**
Student researcher in David Miklowitz's laboratory conducting research on bipolar patients and their families.

Publications

Yeh, L.-F., Watanabe, M., Sulkes-Cuevas, J. **Johansen, J.P.** Dysregulation of aversive signaling pathways: a novel circuit endophenotype for pain and anxiety disorders. *Current Opinion in*

Neurobiology 2017, 48: 37-44

Uematsu, A., Tan, B.Z., Ycu, E.A., Sulkes, J., Koivumaa, J., Junyent, F., Kremer, E.J., Witten, I.B., Deisseroth, K. and **Johansen, J.P.** Modular Organization of the Brainstem Noradrenaline System Coordinates Opposing Learning States. *Nature Neuroscience*. 2017, 20(11) 1602-1611
Featured in News and Views in Nature Neuroscience 20(11), 1517-1519

Ozawa, T., Ycu, E.A., Kumar, A., Yeh, L-F., Ahmed, T., Koivumaa, J., and **Johansen, J.P.** A feedback neural circuit for calibrating aversive memory strength. *Nature Neuroscience* 2017, 20(1): 90-97

Schiff, H.C., **Johansen, J.P.**, Hou, M., Bush, D.E., Smith, E.K., Klein, J.E., LeDoux, J.E., Sears, R.M. β -Adrenergic Receptors Regulate the Acquisition and Consolidation Phases of Aversive Memory Formation Through Distinct, Temporally Regulated Signaling Pathways.
Neuropsychopharmacology 2017, 42(4): 895-903

Madarasz, T.J., Diaz-Mataix, L., Akhand, O., Ycu, E.A., LeDoux, J.E., **Johansen, J.P.** Evaluation of ambiguous associations in the amygdala by learning the structure of the environment. *Nature Neuroscience*, 2016, 19, 965–972

Harasawa, I., **Johansen, J.P.**, Fields, H.L., Porreca, F., Meng, I.D. Alterations in the rostral ventromedial medulla after the selective ablation of mu-opioid receptor expressing neurons.
Pain 2016, 157(1): 166-173

Uematsu, A., Tan, B.Z., **Johansen, J.P.** Projection specificity in heterogeneous locus coeruleus cell populations: implications for learning and memory. *Learning & Memory* 2015 22:444-451

Johansen, J.P., Diaz-Mataix, L., Hamanaka, H. Ozawa, T., Ycu, E., Koivumaa, J., Kumar, A., Hou, M., Deisseroth, K., Boyden, E. & LeDoux, J.E. Hebbian and neuromodulatory mechanisms interact to trigger associative memory formation. *Proceedings of the National Academy of Sciences* 2014, 111(51):E5584-92

Herry, C & **Johansen, J.P.** Encoding of fear learning and memory in distributed neural circuits.
Nature Neuroscience 2014, 17(12):1644-54

Ozawa, T. & **Johansen, J.P.** Neural circuits: interacting interneurons regulate fear learning.
Current Biology 2014, 24 (15):R690-3

Johansen, J.P. Anxiety is the sum of its parts. *Nature* 2013, 496 (7444):174-5

Johansen, J.P., Wolf, S.B.E., Luthi, A. & LeDoux, J.E. Controlling the elements: an optogenetic approach to understanding the neural circuits of fear. *Biological Psychiatry* 2012, 71(12): 1053-60

Johansen, J.P., Ostroff, L., Cain, C.K., LeDoux, J.E. Molecular mechanisms of fear learning and

memory. *Cell* 2011, 147: 509-524

McNally, G.P., **Johansen, J.P.** & Blair, H.T. Placing prediction into the fear circuit. *Trends in Neuroscience* 2011, 13: 283-292

Johansen, J.P., Tarpley, J.W., Ledoux, J.E., Blair, H.T. Neural substrates for expectancy-modulated fear learning in the amygdala and periaqueductal gray. *Nature Neuroscience* 2010, 13: 979-986

Johansen, J.P., Hamanaka, H., Monfils, M.H., Behnia, R., Deisseroth, K., Blair, H.T., LeDoux, J.E. Optical activation of lateral amygdala pyramidal cells instructs associative fear learning. *Proceedings of the National Academy of Sciences* 2010, 107(28): 12692-12697
Featured in Nature Photonics 4, 581 2010

Schiller, D & **Johansen, J.P.** Prelimbic prefrontal neurons drive fear expression: a clue for extinction--reconsolidation interactions. *Journal of Neuroscience* 2009; 29(43):13432-4

Meng, I. D., **Johansen, J. P.**, Fields, H. L. Kappa opioids inhibit physiologically identified medullary pain modulating neurons and reduce morphine antinociception. *Journal of Neurophysiology* 2005; 93(3): 1138-44

Johansen, J.P. & Fields, H.L. Glutamatergic activation of anterior cingulate cortex produces an aversive teaching signal. *Nature Neuroscience* 2004; 7(4):398-403.

Meng, I.D. & **Johansen, J. P.** Antinociception and modulation of rostral ventromedial medulla neuronal activity by local infusion of a cannabinoid agonist. *Neuroscience* 2004; 124(3):685-93

Johansen, J. P., Fields, H L, Manning, B M. The affective component of pain in rodents: Direct evidence for a contribution of the anterior cingulate cortex. *Proceedings of the National Academy of Sciences* 2001; 98(14)8077-8082.
Featured in Nature Reviews Neuroscience 2, 536 (2001)

Frerking, M; Schmitz, D; Zhou, Q; **Johansen, J.**; Nicoll, RA. Kainate receptors depress excitatory synaptic transmission at CA3 -> CA1 synapses in the hippocampus via a direct presynaptic action. *Journal of Neuroscience*, May 1, 2001, 21(9):2958-2966.

Invited Lectures

January, 2018	Winter Conference on Brain Research Symposium (Chair, Whistler, Canada) Instructive signals for aversive learning and memory
November, 2017	Society for Neuroscience Symposium (Chair, Washington D.C.,USA): From salient experience to learning and memory: instructive signals for aversion and reward "Feedback circuits for calibrating aversive learning signals"

September, 2017	Massachusetts Institute of Technology (Boston, Massachusetts) "Brain circuits for triggering and reversing emotional memories"
September, 2017	New York University (New York, USA) "Brain circuits for triggering and reversing emotional memories"
September, 2017	Tokyo Metropolitan Institute of Medical Science "
September, 2017	European Brain, Behaviour Society Meeting (Bilbao, Spain) "Distinct Noradrenaline Cell Populations Coordinate Emotional and Flexible Learning States"
August, 2017	Hokkaido University Summer School "Teaching the Brain to Fear" and "Brain Circuits for Fear and Safety Learning"
August, 2017	Gordon Conference: Amygdala in health and disease (Massachusetts, USA) "Distinct Noradrenaline Cell Populations Coordinate Emotional and Flexible Learning States"
June, 2013	Spring Hippocampal Research Conference Symposium (Chaired, Taormina, Italy): Connecting ensemble activity in the hippocampus to behavior "Hippocampal encoding during aversive decision making"
April, 2017	Asian College of Neuropsychopharmacology (Bali, Indonesia) "Distinct noradrenaline cell populations coordinate the balance between fear and extinction learning"
February, 2017	University of California, San Francisco Invited Talk (San Francisco, USA) "Brain circuits for triggering and reversing emotional memories"
January, 2017	Boston University Invited Talk (Boston, USA) "Brain Circuits for triggering and reversing emotional memories"
December, 2016	Arrowhead 10 years on: What have we learned and what is there still to learn about the neural bases of decision-making? (Sydney, Australia) "Meta-organization in the locus coeruleus noradrenaline system coordinates emotional and flexible learning states"
November, 2016	Nature Conference on Neural Circuitry of Emotion (Shenzhen, China) "Multiplexed signaling across distinct noradrenaline cell populations coordinates opposing emotional learning functions"
August, 2016	Tsukuba Global Science Week Meeting (Tsukuba, Japan) "Meta-organization in the brainstem noradrenaline system coordinates adaptive learning"
July, 2016	Japan Neuroscience Society Meeting (Chaired, Yokohama, Japan): Long range circuit interactions controlling learned behaviors "Functional specificity based on efferent connectivity in the locus coeruleus noradrenaline system"
July, 2016	FENS Symposium (Chaired, Copenhagen, Denmark): Fear extinction: from engrams to circuits "Regulation of fear & extinction learning through distinct neuromodulatory circuits"
June, 2016	Pain Mechanisms and Therapeutics (Taormina, Italy) "Neural circuit mechanisms for triggering and controlling the

strength of aversive memories"
 June, 2016 European Molecular Biology Laboratory (Monterotondo, Italy)
 "Neural circuit mechanisms for the initiation and adaptive control
 of aversive associative learning"
 February, 2016 CiNet Decision Making Symposium (Osaka, Japan) Neural
 mechanisms of decision making: achievements and new directions
 "Neural circuit mechanisms for triggering and reversing aversive
 memories"
 January, 2016 Frontier Brain Research Seminar Series (University of Toyama)
 "Brain circuits for triggering and reversing fear memories"
 December, 2015 International Symposium on Optogenetics (Tokyo, Japan)
 "A feedback neural circuit for calibrating memory strength"
 October, 2015 University of Arizona (Tucson, USA)
 "Neural circuit mechanisms for triggering, regulating and reducing
 fear memories"
 September, 2015 Tohoku Forum for Creativity: Memory and Mind (Sendai, Japan)
 "Bidirectional control of fear memories through distinct functional
 populations of locus coeruleus noradrenaline neurons"
 August, 2015 Mount Sinai School of Medicine (New York, USA)
 "Neural circuit mechanisms for triggering, regulating and reducing
 fear memories"
 August, 2015 Gordon Conference: Amygdala in health and disease
 (Massachusetts, USA) "Functional and anatomical specificity in
 locus coeruleus noradrenaline neurons"
 July, 2015 Japan Neuroscience Society Symposium (Kobe, Japan)
 "Functional and anatomical specificity in locus coeruleus
 noradrenaline neurons"
 June, 2015 Seoul National University (Seoul, Korea)
 "A distributed circuit mechanism for triggering and setting the
 strength of fear memories"
 January, 2015 Universite Paris Descartes (Paris, France)
 "A distributed circuit mechanism for controlling associative
 memory strength"
 January, 2015 Weizmann Institute (Rehovot, Israel)
 "A distributed circuit mechanism for controlling associative
 memory strength"
 December, 2014 CiNet (Osaka, Japan)
 "A neural circuit mechanism for triggering and setting the strength
 of fear memories"
 October, 2014 Friedrich Miescher Institute (Basel, Switzerland)
 "A neural circuit mechanism for triggering and setting the strength
 of fear memories"
 October, 2014 University of Geneva (Geneva, Switzerland)
 "A neural circuit mechanism for triggering and setting the strength

	of fear memories"
September, 2014	Pavlovian Society Meeting (Seattle, USA) "A neural circuit mechanism for triggering and setting the strength of fear memories"
September, 2014	Japan Neuroscience Meeting Symposium (Yokohama, Japan) "A neural circuit mechanism for triggering and setting the strength of fear memories"
August, 2014	Asian-Pacific Society for Neurochemistry Meeting (Kaosiung, Taiwan) "A neural circuit mechanism for triggering and setting the strength of fear memories"
July, 2014	Tokyo University (Tokyo, Japan) "Teaching the brain to fear: from neural circuits and coding to behavior"
June, 2014	iCeMS Conference (Kyoto, Japan) "A neural circuit mechanism for triggering and setting the strength of fear memories"
May, 2014	Biological Psychiatry Symposium (New York, USA) "A neural circuit mechanism for triggering and setting the strength of fear memories"
May, 2014	Korea Advanced Institute of Science & Technology (Daejeon, Korea) "A neural circuit mechanism for triggering and setting the strength of fear memories"
April, 2014	Korea Institute of Science & Technology (Seoul, Korea) "A neural circuit mechanism for triggering and setting the strength of fear memories"
January, 2014	Winter Workshop on Mechanisms of Brain and Mind (Rusutsu, Japan) "A neural circuit mechanism for triggering and setting the strength of fear memories"
January, 2014	Winter Conference on the Neurobiology of Learning and Memory (Utah, USA) "A neural circuit mechanism for triggering and setting the strength of fear memories"
December, 2013	Symposium on in-vivo Monitoring of Molecules in Neuroscience (Nagoya, Japan) "A neural circuit mechanism for triggering and setting the strength of fear memories"
December, 2013	Molecular Biology Society of Japan Symposium (Kobe, Japan) "A neural circuit mechanism for triggering and setting the strength of fear memories"
November, 2013	Society for Neuroscience mini-symposium (chaired): Teaching Signals: Understanding the Neural Systems That Trigger Learning and Change Behavior (San Diego, USA)

September, 2013	<p>"Teaching signals for amygdala plasticity mediating fear learning" Pavlovian Society Meeting (Austin, Texas) "Teaching the amygdala to fear: a role for multiple learning rules"</p>
July, 2013	<p>Gordon Conference: Amygdala in Health and Disease (Massachusetts, USA) "Teaching the Amygdala to Fear"</p>
July, 2013	<p>RIKEN Summer Program (Wako, Japan) "Teaching the Amygdala to Fear"</p>
June, 2013	<p>Spring Hippocampal Research Conference (Taormina, Italy) "Amygdala prediction error coding triggers associative learning and sets memory strength"</p>
March, 2013	<p>Scripps Research Institute (San Diego, USA) "Teaching the amygdala to fear"</p>
February, 2013	<p>Columbia University (New York City, USA) "Prediction error coding in amygdala neurons triggers associative learning and regulates memory strength"</p>
February, 2013	<p>Molecular Cellular Cognition Society Meeting (Melbourne, Australia) "Teaching the brain to fear"</p>
October, 2012	<p>Harvard University "Teaching the brain to fear"</p>
September, 2012	<p>National Institute of Physiological Sciences NIPS conference, "Teaching the brain to fear"</p>
May, 2012	<p>Kyoto University, "Teaching the brain to fear"</p>
May, 2012	<p>Osaka University, "Teaching the brain to fear"</p>
February, 2012	<p>University of California, Los Angeles, "Triggering and degrading associative memory formation"</p>
February, 2012	<p>Nagoya University, "Teaching the brain to fear"</p>
January, 2012	<p>Jikei University, "Aversive teaching signals: how the brain remembers bad things"</p>
January, 2012	<p>University of Toyama, "Teaching the brain to fear"</p>
September, 2011	<p>INSERM, Universite Paris Descartes, "Triggering associative memory formation"</p>
September, 2011	<p>University Paris-Sud, "Triggering associative memory formation"</p>
September, 2011	<p>IDIBAPS, Barcelona, "Triggering associative memory formation"</p>
February, 2011	<p>Janelia Farm Research Center, "Triggering associative memory formation"</p>
November, 2010	<p>Riken Brain Science Institute, "Triggering associative memory formation"</p>
November, 2009	<p>Ponce School of Medicine, "Teaching the amygdala to fear: mechanisms of instructive signaling during associative fear conditioning"</p>
October, 2009	<p>University of New England, "Teaching the brain to fear"</p>
April, 2009	<p>University of California Los Angeles, "Punishing the brain: novel</p>

October, 2008	approaches to understanding aversively motivated learning" New York University, "Teaching without the carrot: a neural mechanism for instructive signaling during associative fear learning"
September, 2008	University of California San Francisco, Gallo Center, "A neural mechanism for instructive signaling during associative fear learning"
March, 2008	University Paris Sud, "Teaching the amygdala to fear: neural mechanisms of instructive signaling for associative emotional learning"
November, 2006	University of California Los Angeles, Neuroscience retreat "Aversive prediction error coding in amygdala neurons during fear conditioning"
January, 2004	California Institute of Technology, "The anterior cingulate cortex: teaching without the carrot"
January, 2003	University of California San Francisco, Pain Interest Group "Functional and anatomical analysis of an aversive brain circuit"
January, 2001	University of California San Francisco, Pain Research Group "The affective/motivational component of pain in rodents: direct evidence for a contribution of the anterior cingulate cortex"

Teaching and Mentoring Experience

2017-present	PhD thesis advisor to University of Tokyo graduate student Jessica Cueves-Sulkes
2015-present	PhD thesis advisor to University of Tokyo graduate student Li-Feng Yeh
2015-present	PhD thesis advisor to University of Tokyo graduate student Mayumi Watanabe
2010-2015	PhD thesis co-mentor to NYU graduate student Tamas Madarasz
2009-2013	PhD thesis co-mentor to NYU graduate student Hillary Schiff
2009-2011	Research mentor to NYU undergraduate student Sunny Roy
2008-2009	Research mentor to post-graduate student Doug Girard
2004-2007	Started and ran the Neuroscience Graduate Forum at UCLA

- 2006 Course lecturer in "Neural control of behavior" undergraduate Course at UCLA
- 2006 Teaching Assistant for graduate level "Systems neuroscience" course

Reviewer and Journal Service

Journals: Nature, Science, Nature Neuroscience, Neuron, Journal of Neuroscience, Nature Communications, eLife, Science Advances, Journal of Neurophysiology, Journal of Neuroscience Research, Neuroscience, Frontiers in Behavioral Neuroscience (also on Editorial Board), Molecular Pain, Faculty of 1000 (Faculty Member)