BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Karl Deisseroth, MD PhD	Associate Professor of Bioengineering and Psychiatry
eRA COMMONS USER NAME deisseroth.karl	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION		DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Harvard College	Cambridge, MA	A.B.	9/1988-6/1992	Biochemical Sciences
Stanford University	Stanford, CA	Ph.D.	6/1994-6/1998	Neuroscience; with RW Tsien
Stanford University	Stanford, CA	M.D.	9/1992-6/2000	Clinical Medicine
Stanford University	Stanford, CA	Postdoctoral	7/01-12/04	Physiology; with RC Malenka

A. Positions and Honors

Positions and Employment

2000-2001 MD internship/licensure, Stanford
2000-2004 Psychiatry Residency, Stanford
2004-2005 Clinical Educator/Principal Investigator, Department of Psychiatry, Stanford
2005-2008 Assistant Professor of Bioengineering and Psychiatry, Stanford
2006-pres Diplomate, American Board of Psychiatry and Neurology
2009-pres Associate Professor of Bioengineering and Psychiatry, Stanford

Other Experience and Professional Memberships

1995 Imaging Structure and Function in the Nervous System, Cold Spring Harbor
1997 Methods in Computational Neuroscience, Woods Hole
2003 Mouse Behavioral Analysis, Cold Spring Harbor
1993-pres Society for Neuroscience
2005-pres American College of Neuropsychopharmacology
2004-pres American Psychiatric Association
2005-pres Biomedical Engineering Society
2007-pres Scientific advisor, nonprofits: Michael J Fox and Kinetics Foundations for Parkinson's Research
2007-pres Member, NIH Molecular Neurogenetics study section (MNG)
2008-pres Member, Defense Sciences Research Council (DSRC/DARPA)
2008-pres Cold Spring Harbor and Woods Hole, optogenetics course teaching

Honors

1990-1992 John Harvard Scholarship: Academic Achievement of the Highest Distinction, Harvard
1992 Phi Beta Kappa, Harvard
1992 *Summa cum laude*, Harvard
1992 Highest Honors, Department of Biochemistry and Molecular Biology, Harvard
1997 Stanford Yanofsky Graduate Research Award
2002 National Institute of Mental Health Outstanding Resident Award
2004 American Psychiatric Association Resident Research Award
2004 Charles E. Culpeper Scholarship in Medical Science Award
2005 Klingenstein Fellowship Award and Robert H. Ebert Clinical Scholar Award
2005 Whitehall Foundation Award
2005 NARSAD Young Investigator Award
2005 American Psychiatric Institute for Research and Education Young Faculty Award
2005 McKnight Foundation Technological Innovations in Neuroscience Award
2005 Coulter Foundation Early Career Translational Research Award in Biomedical Engineering

2005	NIH Director's Pioneer Award
2006	Presidential Early Career Award in Science and Engineering (PECASE)
2007	McKnight Foundation Scholar Award
2007	*Top 10 Technologies* Award, MIT Technology Review
2008	William M. Keck Foundation Medical Research Award
2008	*Brilliant 10* Award, Popular Science
2008	Lawrence C. Katz Prize in Neurobiology, Duke University
2008	Schuetze Prize in Neurobiology, Columbia University

Selected invited talks: 2006 NIMH Director's Innovation Seminar Series; 2007 Presidential Lecture, Association for Chemoreception Sciences; 2007 International Neuromodulation Society; 2008 Genetics Society of America; 2008 Salk/Nature/Ipsen Biological Complexity; 2008 Cosyne; 2008 Days of Molecular Medicine, Karolinska Institutet; 2008 World Economic Forum, Davos; 2008 International Congress of Genetics, Berlin; 2008 Bordeaux; 2008 Presidential Lecture ACNP; 2008 Weizmann Institute.

B. Selected peer-reviewed publications

1. Zwelling L.A., Mayes J., *Deisseroth K.*, Hinds M., Grant G., Pathak S., Ledley F.D., Vyas R., Hittelman W. (1990). A restriction fragment length polymorphism for human topoisomerase II: possible relationship to drug-resistance. ***Cancer Communications***. 2(11):357-61.
2. Zwelling L.A., Mayes J., Hinds M., Chan D., Altschuler E., Carroll B., Parker E., *Deisseroth K.*, Radcliffe A., Seligman M., et al. (1991) Cross-resistance of an amsacrine-resistant human leukemia line to topoisomerase II reactive DNA intercalating agents. Evidence for two topoisomerase II directed drug actions. ***Biochemistry*** 30(16):4048-55.
3. Hinds M., *Deisseroth K.*., Mayes J., Altschuler E., Jansen R., Ledley F.D., Zwelling L.A. (1991). Identification of a point mutation in the topoisomerase II gene from a human leukemia cell line containing an amsacrine-resistant form of topoisomerase II. ***Cancer Research*** 51(17):4729-31.
4. *Deisseroth K.*, Bito H., Schulman H., and Tsien R.W. (1995). A molecular mechanism for metaplasticity. ***Current Biology*** 5, 1334-1338.
5. *Deisseroth K.*, Bito H., and Tsien R.W. (1996). Signalling from synapse to nucleus: postsynaptic CREB phosphorylation during multiple forms of hippocampal synaptic plasticity. ***Neuron*** 16, 89-101.
6. Bito H., *Deisseroth K.*, and Tsien R.W. (1996). CREB phosphorylation and dephosphorylation: a Ca^{2+}- and stimulus duration- dependent switch for hippocampal gene expression. ***Cell*** 87, 1203-1214.
7. Bito H., *Deisseroth K.*, and Tsien R.W. (1997) Ca^{2+}-dependent regulation in neuronal gene expression. ***Current Opinion in Neurobiology*** 7:419-29.
8. *Deisseroth K.*, Heist E.K., and Tsien R.W. (1998). Translocation of calmodulin to the nucleus supports CREB phosphorylation in hippocampal neurons. ***Nature*** 392, 198-202.
9. Zühlke R., Pitt G.S., *Deisseroth K.*, Tsien R.W., and Reuter H. (1999). Calmodulin supports both inactivation and facilitation of L-type calcium channels. ***Nature*** 399, 159-162.
10. Gr aef I.A., Mermelstein P.G., Stankunas K., Neilson J.R., *Deisseroth K.*, Tsien R.W., and Crabtree, G. (1999). Interplay of L-type calcium channels and GSK-3 in regulating the localization and activity of NF-ATc4 in hippocampal neurons. ***Nature*** 401, 703-708.
11. Mermelstein P.G., Bito H., *Deisseroth K.*, and Tsien R.W. (2000). Critical dependence of cAMP response element-binding protein phosphorylation on L-type calcium channels supports a selective response to EPSPs in preference to action potentials. ***Journal of Neuroscience*** 20, 266-273.
12. Wu G.-Y., *Deisseroth K.*, and Tsien R.W. (2001). Activity-dependent CREB phosphorylation: convergence of a fast, sensitive calmodulin kinase pathway and a slow, less sensitive mitogen-activated protein kinase pathway. ***PNAS*** 98, 2808-13.
13. Wu G.-Y., *Deisseroth K.*, and Tsien R.W. (2001). Spaced stimuli stabilize MAPK pathway activation and its effects on dendritic morphology. ***Nature Neuroscience*** 4, 151-158.
14. Mermelstein PG., *Deisseroth K.*, Dasgupta N., Isaksen A., and Tsien R.W. (2001). Calmodulin priming: nuclear translocation of calmodulin complex and memory of prior neuronal activity. ***PNAS*** 98, 15342-7.
15. *Deisseroth K.* and Tsien R.W. (2002). Dynamic multiphosphorylation passwords for activity-dependent gene expression. ***Neuron*** 34, 179-182.
16. *Deisseroth K.*, Mermelstein P.G., Xia H. and Tsien R.W. (2003). Signaling from synapse to nucleus: the logic behind the mechanisms. ***Current Opinion in Neurobiology*** 13:3, 354-365.

17. *Deisseroth K.*, Singla S., Toda H., Monje M., Palmer T.D., and Malenka R.C. (2004). Excitation-neurogenesis coupling in adult neural stem-progenitor cells**.** ***Neuron*** 42, 535-52.
18. *Deisseroth K.* and Malenka R.C. (2005). GABA excitation in the adult brain: a mechanism for excitation-neurogenesis coupling**.** ***Neuron*** 47, 775-7.
19. Meltzer L., Yabaluri R., and *Deisseroth K.* (2005). A role for circuit homeostasis in adult neurogenesis. ***Trends in Neurosciences*** 28, 653-660.
20. Boyden E.S., Zhang F., Bamberg E., Nagel G. and *Deisseroth K.* (2005). Millisecond-timescale, genetically targeted optical control of neural activity. ***Nature Neuroscience*** 8, 1263-1268.
21. Zhang F., Wang, L.P., Boyden E.S., and *Deisseroth K.* (2006). Channelrhodopsin-2 and optical control of excitable cells. ***Nature Methods*** 3, 785-792.
22. *Deisseroth K.*, Feng G., Majewska A., Ting A.E., Miesenböck G., and Schnitzer M.J. (2006). Next-generation optical technologies for illuminating genetically-targeted brain circuits. ***Journal of Neuroscience*** 26, 10380-6.
23. Arenkiel B.R., Peca J., Davison I.G., Feliciano C., *Deisseroth K.*, Augustine G.J., Ehlers M.D., and Feng G. (2007). In vivo light-induced activation of neural circuitry in transgenic mice expressing ChR2. ***Neuron*** 54, 205-18.
24. Wang H., Peca J., Matsuzaki M., Matsuzaki K., Nogu chi J., Qiu L., Wang D., Zhang F., Boyden E., *Deisseroth K.,* Kasai H., Hall W.C., Feng G., and Augustine G.J. (2007). High-speed mapping of synaptic connectivity using photostimulation in ChR2 transgenic mice. ***PNAS*** 104:8143-8.
25. Zhang F., Wang, L., Brauner M., Liewald J., Kay K., Watzke N., Bamberg E., Nagel G., Gottschalk A., and *Deisseroth K.* (2007). Multimodal fast optical interrogation of neural circuitry. ***Nature*** 446, 633-9.
26. Aravanis A., Wang L.P., Zhang F., Meltzer L., Mogri M., Schneider M.B. and *Deisseroth K.* (2007). An optical neural interface. ***Journal of Neural Engineering*** 4, S143-S156.
27. Zhang F., Aravanis A.M., Adamantidis A., de Lecea L., and *Deisseroth K.* (2007). Circuit-breakers: optical technologies for probing neural signals and systems. ***Nature Reviews Neuroscience*** 8, 577-81.
28. Airan R.D., Meltzer L.A., Roy M., Gong Y., Chen H. and *Deisseroth K.* (2007). High-speed imaging reveals neurophysiological links to behavior in an animal model of depression. ***Science*** 317, 819-823.
29. Adamantidis A., Zhang F., Aravanis A. M., *Deisseroth K.,* and de Lecea L (2007). Neural substrates of awakening probed with optogenetic control of hypocretin neurons. ***Nature****,* 450:420-424.
30. Gradinaru V., Thompson K.R., Zhang F., Mogri M., Kay K., Schneider M.B., and *Deisseroth K.* (2007). Targeting and readout strategies for fast optical neural control *in vitro* and *in vivo*. ***Journal of Neuroscience*** 27:14231-8.
31. Airan R.D., Hu E.S., Vijaykumar R., Roy M., Meltzer L.A., and *Deisseroth K.* (2007). Integration of light-controlled neuronal firing and fast circuit imaging. ***Current Opinion in Neurobiology*** 17:587-592.
32. Hwang R.Y., Zhong L., Xu Y., Johnson T., Zhang F., *Deisseroth K.,* and Tracey W.D. (2007). Nociceptive neurons protect Drosophila larvae from parasitoid wasps. ***Current Biology*** 17:2105-16.
33. Gradinaru V., Thompson K.R., and *Deisseroth K.* (2008) eNpHR: a *Natronomonas* halorhodopsin enhanced for optogenetic applications. ***Brain Cell Biology*** 36:129-39.
34. Douglass A.D., Kraves S., *Deisseroth K*., Schier A.F., and Engert F. (2008) Escape behavior elicited by single ChR2-evoked spikes in zebrafish somatosensory neurons. ***Current Biology*** 18:1133-7.
35. Zhang F., Prigge M., Beyriere F., Tsunoda S.P., Mattis J., Yizhar O., Hegemann P., and *Deisseroth K.* (2008). Red-shifted optogenetic excitation: a tool for fast neural control derived from *Volvox carteri*. ***Nature Neuroscience***, advance online publication April 23, 2008.
36. Berndt A, Yizhar O, Gunaydin LA, Hegemann P, *Deisseroth K.* (2008). Bi-stable neural state switches. ***Nature Neuroscience*****,** online publication *doi:10.1028/nn.2247*; 12:2, 229-34.
37. Airan R.D., Thompson K.R., Fenno L.E., Bernstein H., and *Deisseroth K.* (2009). Temporally precise *in vivo* control of intracellular signaling. ***Nature***, Advance online publication, March 18.
39. Gradinaru V., Mogri M., Thompson K.R., Henderson J.M., and *Deisseroth K.* (2009). Optical deconstruction of Parkinsonian neural circuitry. ***Science***, advance online publication, March 19.
39. Sohal V.S., Zhang F., Yizhar O., and *Deisseroth K.* (2009) Parvalbumin interneurons and gamma oscillations synergistically enhance cortical circuit performance. ***Nature*** *(in press).*
40. Cardin J., Carlén M., Knoblich U., Zhang F., *Deisseroth K.,* Tsai L., Moore C. (2009) Activation of fast-spiking neurons induces gamma oscillations and shapes sensory transmission. ***Nature*** *(in press).*
41. Tsai H.C., Zhang F., Adamantidis A., Stuber G., Bonci A., de Lecea L. and *Deisseroth K.* (2009). Phasic firing in dopamine neurons is sufficient for behavioral conditioning. ***Science*** *(in press*).