

Curriculum Vitae
Marie E. Burns, Ph.D.

Department of Ophthalmology & Vision Science
Center for Visual Sciences and Center for Neuroscience
University of California, Davis
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Education

1992 Bachelor of Science, Biochemistry, Susquehanna University (Selinsgrove, PA).
1994 Master of Science, Neurobiology, Duke University.
1996 Doctor of Philosophy, Neurobiology and Cell & Molecular Biology,
Duke University.

Academic Positions

1992 - 1996 Graduate student, laboratory of Dr. George Augustine
Department of Neurobiology, Duke University
1996 - 2000 Postdoctoral fellow, laboratory of Dr. Denis Baylor
Department of Neurobiology, Stanford University
2001 - 2004 Assistant Professor, Department of Psychiatry and Behavioral Sciences
2001 - Member, Center for Neuroscience, UC Davis
Member, Neuroscience Graduate Group
Member, Biochemistry and Molecular Biology Graduate Group
2004 - 2007 Tenure: Associate Professor, Department of Psychiatry and Behavioral Sciences
2007 - Associate Professor, Department of Ophthalmology & Vision Science
2007 - Director, Center for Visual Sciences, UC Davis
2009 - Professor, Department of Ophthalmology & Vision Science

Awards and Honors

1992 Valedictorian, Susquehanna University, Selinsgrove, PA
2002-2005 E. Matilda Ziegler Foundation for the Blind Award
2002-2004 Alfred P. Sloan Research Fellow
2004-2005 Ad Hoc member, Biology and Disease of the Posterior Eye (BDPE) study section
2006-2010 Regular member, BDPE study section
2008-2010 Chair, BDPE study section
2009 Cogan Award, Association for Research in Vision and Ophthalmology

Professional Associations

Member, Association for Research in Vision and Ophthalmology
Member, Society for Neuroscience
Member, Biophysical Society

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Journal Reviewer

Nature
Science
Neuron
Nature Neuroscience
Journal of Neuroscience
Journal of General Physiology
Journal of Physiology
Biophysical Journal
European Journal of Neuroscience
Proceedings of the National Academy of Sciences

Invited talks (last 5 years only)

4/2004 Invited speaker, Second annual RGS colloquium, American Society for
Pharmacology and Experimental Therapeutics (ASPET), Washington DC.
11/2004 Dept of Pharmacology, University of Texas at Houston.
11/2004 Smith-Kettlewell Eye Institute, San Francisco, CA.
2/2005 Joint Seminars in Neuroscience, University of California, Los Angeles.
3/2005 Dept of Pharmacology, Georgetown University.
4/2006 Vision Colloquium series, University of Pennsylvania.
4/2006 Dept of Pharmacology, University of Minnesota.
9/2006 Dept of Neuroscience, Johns Hopkins University.
3/2007 Dept of Neurobiology, Duke University.
3/2007 Dept of Vision Science, University of Alabama Birmingham.
6/2007 Invited speaker, Gordon Research Conference "Phosphorylation and G protein
mediated signaling networks" Biddeford, ME (declined).
6/2007 Invited session chair and speaker, FASEB Summer research conference "Biology
and Chemistry of Vision"; Snowmass, CO.
1/2009 Visiting Professor, Department of Ophthalmology, Columbia University

Research Articles

1. Burton, J.L., **Burns, M.E.**, Gatti, E., Augustine, G.J., and DeCamilli, P. (1994). Specific interactions of Mss4 with members of the Rab GTPase subfamily. *EMBO J.* 13, 5547-5558.
2. **Burns, M.E.** and Augustine, G.J. (1995). Synaptic structure and function: Dynamic organization yields architectural precision. *Cell* 83, 187-194.
3. **Burns, M.E.**, Beushausen, S., Chin, G., Tang, D., DeBello, W.M., Dresbach, T., O'Connor, V., Schweizer, F.E., Wang, S.S.-H., Whiteheart, S.W., Hawkey, L., Betz, H., and Augustine, G.J.

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- (1996). Proteins involved in synaptic vesicle docking and fusion. Cold Spring Harbor Symp. on Quantitative Biology. 60, 337-348.
4. Augustine, G.J., **Burns, M.E.**, DeBello, W.M., Pettit, D.L., and Schweizer, F.E. (1996). Exocytosis: Proteins and Perturbations. Ann. Rev. Pharmacol. Toxicol. 36, 659-701.
5. Dresbach, T. **Burns, M.E.**, O'Connor, V., DeBello, W.M., Betz, H., and Augustine, G.J. (1998). A neuronal Sec1 homolog regulates neurotransmitter release at the squid giant synapse. J. Neuroscience 18, 2923-32.
6. **Burns, M.E.** Sasaki, T., Takai, Y., and Augustine, G.J. (1998) Rabphilin-3A: A multi-functional coordinator of synaptic vesicle traffic. J. Gen. Physiol. 111, 243 - 255 .
7. Baylor, D.A. and **Burns, M.E.** (1998). Control of rhodopsin activity in vision. Eye 12, 521 - 525.
8. Tsang*, S.H., **Burns,* M.E.**, Calvert, P.D., Gouras, P., Baylor, D.A., Goff, S.P., Arshavsky, V.Y. (1998). Role for the target enzyme in deactivation of photoreceptor G-Protein *in vivo*. Science 282, 117 - 121.
* co-first authors.
9. Chen*, C.-K., **Burns,* M.E.**, Spencer, M., Nieme, G., Chen, J., Hurley, J.B., Baylor, D.A., and Simon, M.I. (1999). Impaired structure and function in transgenic mouse rods lacking rhodopsin kinase. Proc. Natl. Acad. Sci. USA 96, 3718-3722.
* co-first authors.
10. **Burns, M.E.** and Augustine, G.J. (1999) Functional studies of presynaptic proteins at the squid giant synapse. In Neurotransmitter Release, Ed. by H. Bellen. p .237 – 264.
11. Augustine, G.J., **Burns, M.E.**, DeBello, W.M., Hilfiker, S., Morgan, J.R., Schweizer, F.E., Tokumaru, H., Umayahara, K. (1999). Proteins involved in synaptic vesicle trafficking. J. Physiol. 520, 33-41.
12. Chen, C.-K., **Burns, M.E.**, He, W., Wensel, T.G., Baylor, D.A., and Simon, M.I. (2000). Slowed recovery of rod photoresponse in mice lacking the GTPase accelerating protein RGS9-1. Nature 403, 557-560.
13. Mendez, A., **Burns, M.E.**, Roca, A., Lem, J., Wu, L.-W., Simon, M.I., Baylor, D.A., and Chen, J. (2000). Rapid and reproducible deactivation of rhodopsin requires multiple phosphorylation sites. Neuron 28, 153-164.
14. **Burns, M.E.** and Baylor, D.A. (2001). Activation, deactivation, and adaptation in vertebrate photoreceptor cells. Ann. Rev. Neuroscience 24, 779-805.

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15. Mendez, A., **Burns, M.E.**, Dizhoor, A.M. Baehr, W., Palczewski, K., Baylor, D.A. and Chen, J. (2001). Role of guanylate cyclase activating proteins (GCAPs) in setting the flash sensitivity of rod photoreceptors. *Proc. Natl. Acad. Sci.* 98, 9948-9953.
16. **Burns, M.E.**, Mendez, A., Chen, J, and Baylor, D.A. (2002). Dynamics of cyclic GMP synthesis in retinal rods. *Neuron* 36, 81-91.
17. **Burns, M.E.** and Lamb, T.D. (2003). Visual Transduction by Rod and Cone Photoreceptors In Visual Neurosciences, L.M. Chalupa and J.H. Werner, Eds. MIT Press. Cambridge, MA. pp. 215-233.
18. Krispel, C.M., Chen, C.-K., Simon, M.I. and **Burns, M.E.** (2003). Prolonged photoresponses and defective adaptation in rods of G β 5^{-/-} mice. *J. Neurosci.* 23, 6965-6971.
19. **Burns, M.E.** and Wensel, T.G. (2003). From molecules to behavior: new clues to the function of RGS9-2 in the striatum. *Neuron* 38, 853-856.
20. Martemyanov, K.A., Lishko, P.V., Calero, N., Keresztes, G.T., Sokolov, M., Strissel, K.J., Leskov, I.B., Hopp, J.A., Kolesnikov, A.V., Chen, C.-K., Lem, J., Heller, S., **Burns, M.E.**, and Arshavsky, V.Y. (2003). Interaction between the DEP domain and a SNARE-like protein determines subcellular targeting of RGS9 in vivo. *J. Neurosci.* 23, 10175-10181.
21. Krispel, C.M., Chen, C.-K., Simon, M.I. and **Burns, M.E.** (2003). Novel form of adaptation in mouse retinal rods speeds recovery of phototransduction. *J. Gen. Physiol.* 122, 703-712.
22. Keresztes, G., Martemyanov, K.A., Krispel, C.M., Mutai, H., Yoo, P.J., Maison, S.F., **Burns, M.E.**, Arshavsky, V.Y., and Heller, S. (2004). Absence of the RGS9/G β 5 GTPase activating complex in photoreceptors of the R9AP knockout mouse. *J. Biol. Chem.* 279, 1581-1584.
23. Makino, C.L., Dodd, R.L., Chen, J., **Burns, M.E.**, Roca, A., Simon, M.I. and Baylor, D.A. Recoverin regulates light-dependent phosphodiesterase activity in retinal rods. (2004). *J. Gen. Physiol.* 123, 729-741.
24. **Burns, M.E.** and Arshavsky, V.Y. (2005). Beyond counting photons: Trials and trends in vertebrate phototransduction. *Neuron* 48, 387-401.
25. **Burns, M.E.**, Mendez, A., Chen, C.-K., Almuete, A., Quillinan, N., Simon, M.I., Baylor, D.A., and Chen, J. (2006). Deactivation of phosphorylated and nonphosphorylated rhodopsin by arrestin splice variants. *J. Neurosci.* 26, 1036-1044.
26. Moussaif, M., Rubin, W.W., Kerov, V., Reh, R., Chen, D., Chen, C.-K., Hurley, J.B., **Burns, M.E.** and Artemyev, N.O. (2006). Phototransduction in a transgenic mouse model of Nougaret night blindness. *J. Neurosci.* 26, 6863-6872.

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27. Krispel, C.K., Chen, D., Chen, Y-J., Melling, N., Martemyanov, K.A., Quillinan, N., Arshavsky, V.Y., Wensel, T.G., Chen, C.-K., and **Burns, M.E.** (2006). RGS expression rate-limits recovery of rod photoresponses. *Neuron* 51, 409-416.
28. Chan, S., Rubin, W.W., Mendez, A., Liu, X., Song, X., Hanson, S.M., Craft, C.M., Gurevich, V.V., **Burns, M.E.**, and Chen, J. (2007). Functional comparisons of visual arrestins in rod photoreceptors of transgenic mice. *Invest Ophthalmol Vis Sci.* 48,:1968-75.
29. Krispel, C.M., Sokolov, M., Chen, Y.-M., Song, H., Herrmann, R., Arshavsky, V.Y. and **Burns, M.E.** (2007). Phosducin regulates the expression of transducin $\beta\gamma$ subunits in rod photoreceptors and does not contribute to phototransduction adaptation. *J. Gen. Physiol.* 130, 303-312.
30. Kerov, V., Rubin, W.W., Natochin, M., Melling, N.A., **Burns, M.E.** and Artemyev, N.O. (2007). N-terminal fatty acylation of transducin profoundly influences its localization and the kinetics of photoresponse in rods. *J. Neurosci.* 27, 10270-7.
31. Lobanova, E.S., Finkelstein, S., Herrmann, R., Chen, Y.-M., Kessler, C., Michaud, N.A., Trieu, L.H., Strissel, K.J., **Burns, M.E.** and Arshavsky, V.Y. (2008). Knockout of rod transducin γ subunit leads to drastic down-regulation of transducin α and β subunits and progressive photoreceptor loss. *J. Neurosci.* 28, 3510-20.
32. Martemyanov, K.A., Krispel, C.M., Lishko, P.V., Yoo, P.J., **Burns***, **M.E.** and Arshavsky, V.Y. (2008). Functional comparison of RGS9 splice isoforms in a living cell. *Proc. Natl. Acad. Sci.* 105, 20988-20933.
33. Song, X., Vishnivetskiy, S.A., Gross, O.P., Emelianoff, K., Mendez, A., Chen, J., Gurevich, E.V., **Burns***, **M.E.**, and Gurevich*, V.V. (2009). Enhanced arrestin mutant facilitates photoresponse recovery and protects rod photoreceptors in the absence of rhodopsin phosphorylation. *Current Biol.* 19, 700-5.
34. **Burns, M.E.** and Pugh, Jr. E.N. (2009). RGS9 concentration matters in rod phototransduction. *Biophysical J.* (in press).
35. Gross, O.P. and **Burns, M.E.** (2009). Arrestin expression controls the duration of rhodopsin lifetime in intact rods. (submitted).
36. Larsen, D.D., Luu, J.D., **Burns, M.E.**, and Krubitzer, L. (2009). Cortical Organization and Connections in Congenitally Blind Mice. (submitted).
37. **Burns, M.E.** (2009). Deactivation mechanisms of rod phototransduction: The Cogan Lecture. (submitted).

* Co-first or co-corresponding author

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Research Support (Current)

Title: "Deactivation mechanisms of rod phototransduction"

Role: PI (50% effort)

Source: National Eye Institute (R01 EY14047; 5/2002-4/2011)

This grant investigates the mechanisms that turn off the G protein cascade of mammalian rod photoreceptors.

Research Support (Past)

Title: "Temporal regulation of G protein signaling in neurons"

Principle investigator: Marie E. Burns (5% effort)

Source: Alfred P. Sloan Scholars Program (9/02 – 8/04; \$20,000/yr)

This fellowship was studied the regulation of G protein signaling at synapses, using imaging and electrophysiological recording.

Title: "Deactivation mechanisms of cone photoreceptors"

Principle investigator: Marie E. Burns (20% effort)

Source: E. Matilda Ziegler Foundation for the Blind, Inc. (7/02-6/05; \$70,000/yr)

This award developed methods for studying cone photoreceptors using imaging and electrophysiological methods.

Research training record

A. Medical students and MD/PhD students

1. Claudia Krispel (2001-2006; MD/PhD degree)
Currently Ophthalmology resident physician at UC Davis
2. Nelson Conley (2006; MD research fellowship)
3. Omar Mohammadaly (2006-2007; MD research fellowship)
4. Christopher Fortenbach (2008-; MD/PhD degree candidate)
Currently in first year of medical school

B. Graduate students

1. Katrina Emelianoff (2001-2004; MS in Biochemistry and Molecular Bio)
Currently in industry
2. Yen-Ming Chen (2003-2006; MS in Biochemistry and Molecular Bio)
Currently in medical school in Taiwan.
3. Owen Gross (2004-2006; PhD student in physics, 2006-present neuroscience)
4. Jim Long (2005-present; PhD student in neuroscience)

C. Undergraduate students

1. Aileen Almuete (2001-2002); now resident physician
2. Nidia Calero (2002-2004)
Currently in PhD neuroscience program at OHSU
3. Niki Spotswood (2004-2007)
Currently in PhD psychology program at UC Davis
4. Nathan Melling (2005 – 2008); now technician in the laboratory

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5. Gurjit Singh (2007-present)
6. Kimberly McManus (Summer 2008 UC Davis McNair Scholars Program)
currently in second year of undergraduate studies at MIT

D. Postdoctoral fellows

1. Naranzotg Tschuluun (2001-2002; now research scientist at UC Davis)
2. William Rubin (2002-2006; now in biotech)
3. DeLaine Larson (3/2009-present)
4. Christine Insinna (9/2009-)

Student Preliminary Individual Exam Committees:

Henry Alitto, Neuroscience Program, 2002

Sarah (Long) Karlen, Neuroscience Program, 2005

Edward Seikel, Biochemistry and Molecular Biology Program, 2006

Georgia Woods, Neuroscience Program, 2007

David Carlson, Biochemistry and Molecular Biology Program, 2008

Travis Hill, Neuroscience program, 2009

Thesis Committees:

Claudia Krispel, Neuroscience Program (2004-2006) Thesis advisor

Edward Seikel, Biochemistry and Molecular Biology Program, 2006 – present

Sarah (Long) Karlen, Neuroscience Program, 2005-2008

Jim Long, Neuroscience Program (2006-present) Thesis advisor

Owen Gross, Neuroscience Program (2007-present) Thesis advisor

Peter Yoo, Neuroscience Program (2007-2008) UCSF (Advisor: Dr. Julie Schnapf)

Georgia Woods, Neuroscience Program, 2007-present

Formal Teaching (last 5 years only)

Freshman Seminar (FRS001): 10 week course with weekly lecture and discussion introducing 1st year undergraduate students to current hypotheses of modern neuroscience while addressing common sociological and philosophical topics, including the notion of self, mental illness, and drug addiction.

Medical Physiology (HPH400): 4 lectures to 1st year medical students; membrane properties of neurons, action potential, synaptic transmission and sensory transduction

Molecular and Cellular Neurobiology (NPB160) Co-Instructor of record (10 weeks, every other year) for upper division course comprised of 2/3 senior undergraduates and 1/3 graduate students, covering topics from ion channel biophysics to simple circuits

Cellular Neuroscience (NSC222) Four lectures to neuroscience graduate students covering membrane properties of neurons, action potential, synaptic transmission and sensory transduction

Topics in Vision (VIS261) Annual lecture to vision trainees (graduate students and postdocs) on phototransduction and photoreceptor adaptation.

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University Service (last 5 years only)

2003-05, 2007-2008	Neuroscience Graduate Group: Preliminary Examination Committee
2003-2005	Member - Department of Psychiatry Research Advisory Committee
2004-2005	Member - Department of Psychiatry Executive Committee
2004-2005	Vice Chair of Research, Department of Psychiatry
2003-2007	Chair - Education Policy Committee, Neuroscience Graduate Group
2003-present	Member - Neuroscience Graduate Group Executive Committee
2005-present	Member, Physician Scientist Training Program Executive Committee, School of Medicine, UC Davis
2007-present	Member, Radiation Use and Authorization committee, UC Davis
2007-present	Director, Center for Visual Sciences (cvs.ucdavis.edu)

Search committees:

- 2002 Center for Neuroscience, Assistant Professor, UC Davis. (Hired Hwai-Jong Cheng)
- 2003 Center for Neuroscience, Assistant Professor, UC Davis. (Hired Karen Zito)
- 2007 Center for Neuroscience and Department of Ophthalmology & Vision Science, Assistant Professor, UC Davis. (Hired Mark Goldman)
- 2008 Department of Physiology and Membrane Biology, Professor, UC Davis. (appointment pending)
- 2009 Center for Neuroscience, Director, UC Davis (in progress).