# Michael J. Caterina M.D., Ph.D.

Curriculum Vitae

## PROFESSIONAL APPOINTMENTS

9/99 – 3/04 **Assistant Professor**, Department of Biological Chemistry, Johns Hopkins University School of Medicine

9/99 – 3/04 **Assistant Professor**, Department of Neuroscience, Johns Hopkins University School of Medicine (Secondary Appointment)

4/04-date **Associate Professor**, Department of Biological Chemistry, Johns Hopkins University School of Medicine

4/04-date **Associate Professor**, Department of Neuroscience, Johns Hopkins University School of Medicine (Secondary Appointment)

12/06-date **Member**, Center for Sensory Biology, Johns Hopkins University School of Medicine

## PERSONAL DATA

Address: 408 Biophysics Building
Department of Biological Chemistry
725 North Wolfe St.
Baltimore, MD 21205

Phone: (410) 502-5457
Fax: (410) 955-5759
email: caterina@jhmi.edu

## EDUCATION AND TRAINING

1983-1987 **B.S. in Biology with Honors** (Vertebrate Physiology)
Pennsylvania State University, University Park, PA (Dr. Theodore Hollis, advisor) Thesis title: Thoracic aortic albumin concentrations increase linearly with plasma histamine concentrations in the rat.

1987-1995 **M.D**., Johns Hopkins University School of Medicine

1987-1995 **Ph.D., Biochemistry, Cellular and Molecular Biology**
Dept. Biological Chemistry, Johns Hopkins University School of Medicine (Dr. Peter Devreotes, advisor) Thesis title: Activation and desensitization of the cyclic AMP receptor, cAR1, from Dictyostelium

1995-1999 **Postdoctoral Fellow**, Department of Cellular and Molecular Pharmacology, University of California San Francisco (Dr. David Julius, advisor)

## RESEARCH ACTIVITIES

## PUBLICATIONS

**Selected Peer-Reviewed Primary Research Publications**

1. Johnson, R.L., Vaughan, R.A., **Caterina, M.J.**, Van Haastert, P.J.M., and Devreotes, P.N. (1991) Overexpression of the cAMP Receptor cAR1 in *Dictyostelium*. *Biochemistry* **30**, 6982-6986.

2. C**aterina, M.J.,** Milne, J.L.S. and Devreotes, P.N. (1994) Mutation of the third intracellular loop of the cAMP receptor, cAR1 of *Dictystelium* yields mutants impaired in multiple processes. *J.Biol. Chem.*, **269**, 1523-1532.

3. **Caterina, M.J.,** Hereld, D., and Devreotes, P.N. (1995) Occupancy of the cAMP Receptor, cAR1 of *Dictyostelium* Induces a Reduction in Affinity which Depends upon C-terminal serine Residues. *J. Biol Chem*, **279**, 4418-4423.

4. Milne, J.L.S., Wu, L., **Caterina, M.J**., and Devreotes, P.N. (1995) Seven Helix cAMP Receptors Stimulate $Ca^{2+}$ Entry in the Absence of Functional G Proteins in Dictystelium *J. Biol. Chem.*, **270**, 5926-5931.

5. **Caterina, M.J**., Devreotes, P.N., Borleis, J. and Hereld, D. (1995) Agonist-Induced Affinity Reduction is Correlated with Phosphorylation of the Aggregation-Stage cAMP Receptor from *Dictyostelium*. *J. Biol. Chem.*, **270**, 8667-8672.

6. #Kim J.Y. , #**Caterina, M.J**., Milne, J.L.S., Lin, K.C., Borleis, J.A. and Devreotes, P.N. (1997) Random Mutagenesis of the cAMP Chemoattractant Receptor, cAR1, of Dictyostelium:Mutant Classes that Cause Discrete Shifts in Agonist Affinity and Lock the Receptor in a Novel Activational Intermediate. *J.Biol. Chem.*, **272**, 2060-2068. (# denotes equal contribution)

7. Milne, J.L.S., **Caterina, M.J.**, and Devreotes, P.N. (1997) Random Mutagenesis of the cAMP Chemoattractant Receptor, cAR1, of Dictyostelium:: Evidence for Multiple Activation States *J.Biol. Chem.*, **272**, 2069-2076.

8. **Caterina, M.J**., Schumacher, M., Tominaga, M.,, Rosen, T.A., Levine, J.D. and Julius, D. (1997) The capsaicin receptor, a heat-activated ion channel in the pain pathway *Nature*, **389**, 816-824. (cover article)

9. Tominaga, M., **Caterina**, M.J., Malmberg, A.B., Rosen, T.A., Gilbert, H., Skinner, K., Raumann, B.E., Basbaum, A.I. and Julius, D. (1998) The cloned capsaicin receptor integrates multiple pain-producing stimuli. *Neuron*, **21**, 531-543. (cover article)

10. **Caterina, M.J**., Rosen, T.A., Tominaga, M., Brake, A.J., and Julius, D. (1999) A capsaicin receptor homologue with a threshold for noxius heat. *Nature*, **398**, 436-441.

11. **Caterina, M.J.**, Leffler, A., Malmberg, A., Martin,W., Trafton, J., Petersen-Zeitz, K.R., Koltzenberg, M., Basbaum,A. and Julius, D. (2000) Impaired nociception and pain sensation in mice lacking the capsaicin receptor. *Science* **288**, 306-313. (cover article)

12. McNamara, N., Khong, A., McKemy, D., **Caterina, M.**, Boyer, J., Julius, D. and Basbaum, C. (2001) ATP transduces signals from ASGM1, a glycolipid that functions as a bacterial receptor *Proc. Natl. Acad. Sci., U.S.A.,* **98**, 9086–9091 .

13. Birder, L.A., Kanai, A.J., de Groat, W.C., Kiss, S., Nealen, M.L., Burke, N.E., Dineley, K.E., Watkins, S., Reynolds, I.J. and **Caterina, M.J.** Vanilloid Receptor Expression Suggests a Sensory Role for Urinary Bladder Epithelial Cells (2001) *Proc. Natl. Acad. Sci., U.S.A.,* **98**, 13396–13401.

14. Guler, A., Lee, H., Iida, T., Shimizu, I. Tominaga, M., and **Caterina, M.** Heat-evoked activation of the ion channel, TRPV4 (2002) *J. Neurosci.* **22**, 6408-6414.

15. Birder LA, Nakamura Y, Kiss S, Nealen ML, Barrick S, Kanai AJ, Wang E, Ruiz G, De Groat WC, Apodaca G, Watkins S, **Caterina M.J.** Altered urinary bladder function in mice lacking the vanilloid receptor TRPV1. (2002) *Nature Neurosci.* **5**, 856-860.

16. Birder, L.A., Nealen, M.L., Kiss, S., de Groat, W.C., **Caterina, M.J.**, Wang, E., Apodaca, G. and Kanai, A.J. (2002) {beta}-Adrenoceptor Agonists Stimulate Endothelial Nitric Oxide Synthase in Rat Urinary Bladder Urothelial Cells *J. Neurosci.* **22**, 8063-8070.

17. Nealen, M., Thut, P., Gold, M. and **Caterina, M**. TRPM8 is expressed in a subset of cold-responsive trigeminal neurons from rat. (2003) *J. Neurophysiology* **90**, 515-520.

18. Chung, M.K., Lee, H. and **Caterina, M.J.** Warm Temperatures Activate TRPV4 in Mouse 308 Keratinocytes (2003) *J. Biol. Chem.* **278**, 32037-32046

19. Chung M.K., Lee H., Mizuno A., Suzuki M., **Caterina M.J.** TRPV3 and TRPV4 mediate warmth-evoked currents in primary mouse keratinocytes. (2004) *J Biol. Chem.* **279**, 21569-21575.

20. Chung M.K., Lee H., Mizuno A., Suzuki M., **Caterina M.J.** 2-aminonethoxydiphenyl borate activates and sensitizes the heat-gated ion channel, TRPV3 (2004) *J. Neurosci.* **24**, 5177-5182.

21. Zhang N., Rogers T.J., **Caterina, M.** and Oppenheim J.J. Pro-inflammatory Chemokines, such as CCL3, Desensitizes μ-opioid Receptors on Dorsal Root Ganglia Neurons (2004) *J. Immunology* **173**, 594-599.

22. Woodbury CJ, Zwick M, Wang S, Lawson JJ, **Caterina MJ**, Koltzenburg M, Albers KM, Koerber HR, and Davis BM. Nociceptors lacking TRPV1 and TRPV2 have normal heat responses (2004) *J Neurosci*. **24**, 6410-5

23. Iida, T., Shimizu, I., Nealen, M.L., Campbell, A., and **Caterina M.** Attenuated fever response in mice lacking TRPV1 (2005) *Neurosci. Lett*. **378**, 28-33.

24. Lee, H., Iida, T., Mizuno, A., Suzuki, M., **Caterina M.J.** Altered thermal preference in mice lacking TRPV4 (2005) *J. Neurosci*. **25** 1304-10.

25. Zhang N., Inan S., Cowan A., Sun R., Wang J., Rogers T.J., **Caterina M**., and Oppenheim, J.J. A Pro-inflammatory chemokine, CCL3, sensitizes the heat- and capsaicin-gated ion channel, TRPV1 (2005) *Proc. Natl. Acad. Sci., USA* 102,4536-41.

26. Chung M.K., Guler A.D., and **Caterina M.J.** (2005) Biphasic currents evoked by chemical or thermal activation of the heat-gated ion channel, TRPV3. *J. Biol Chem*. 280, 15928-15941.

27. Pogatzki-Zahn E., Shimizu I., **Caterina, M.**, and Raja S.N. (2005) Heat hyperalgesia after incision requires TRPV1 and is distinct from pure inflammatory pain. *Pain,* 115, 296-307.

28. Shimizu I., Iida T., Guan Y., Zhao C., Raja SN, Jarvis M.F., Cockayne D.A., and **Caterina M.J.** (2005) Enhanced thermal avoidance in mice lacking the ATP receptor P2X3 *Pain*, 116, 96-108.

29. Shimizu I., Iida T., Horiuchi N. and **Caterina M.J.** (2005) 5-Iodoresiniferatoxin evokes hypothermia in mice and is a partial TRPV1 agonist *in vitro J. Pharm. Exp. Ther.*, 314:1378-85.

30. Sidhaye V.K., Guler A.D., Schweitzer K.S., D'Alessio F., **Caterina M.J.** and King L.S. (2006) Transient receptor potential vanilloid 4 regulates aquaporin-5 abundance under hypotonic conditions. *Proc. Natl. Acad. Sci., USA* 103(12):4747-52.

31. Birder L., Negoita F., Lee H., de Groat W., Kanai A., Barrick S., Meyers S., and **Caterina, M.J.** (2007) Activation of Urothelial-TRPV4 by 4a-PDD contributes to altered bladder reflexes in the rat *J Pharmacol Exp Ther*. 323(1):227-35.

32. Tan PL, Barr T, Inglis PN, Mitsuma N, Huang SM, Garcia-Gonzalez MA, Bradley BA, Coforio S, Albrecht PJ, Watnick T, Germino GG, Beales PL, **Caterina MJ**, Leroux MR, Rice FL, Katsanis N. (2007) Loss of Bardet Biedl syndrome proteins causes defects in peripheral sensory innervation and function. *Proc Natl Acad Sci U S A.* 104:17524-9. (cover article)

33. Chung M.K., Guler A.D. and **Caterina M.J.** (2008) TRPV1 exhibits dynamic ionic selectivity during agonist stimulation *Nature Neuroscience* IN PRESS

34. Sidhaye V.K., Schweitzer K.S., **Caterina M.J.**, Shimoda L., King L.S. (2008) Shear-induced regulates AQP5 and airway epithelial barrier function. *Proc. Natl. Acad. Sci. (USA)* Mar 4;105(9):3345-50.

**Non-peer reviewed articles**

1. Montell, C., Birnbaumer, L., Flockerzi, V., Bindels, R.J., Bruford, E.S., **Caterina, M.J.,** Clapham, D.E., Hartneck, C., Heller, S., Julius, D., Kojima, I., Mori, Y., Penner, R., Prawitt, D., Sharenberg, A.M., Schultz, G., Shimizu, N., and Zhu, M.X. (2002) A unified nomenclature for the superfamily of TRP cation channels. *Mol. Cell* **9**, 229-231.

**Invited Editorials and Reviews**

1. **Caterina, M.J.** and Devreotes, P.N. (1991) Molecular Insights into Eukaryotic Chemotaxis. *FASEB J.*, **5**, 3078-3085.

2. **Caterina, M.J.** and Julius, D. (1999) Sense and specificity: a molecular identity for nociceptors. *Curr. Opin. Neurobiol.* **9**, 525-530.

3. **Caterina, M.J.**, Julius, D. The vanilloid receptor: a molecular gateway to the pain pathway. (2001) *Ann. Rev. Neurosci.* **24**, 487-517.

4. **Caterina, M.** Quenching fire with fat: phosphatidylinositides as putative regulators of pain (2001) *Trends Pharm. Sci.* **22**, 602-604 (cover article)

5. **Caterina, M.J.** Vanilloid receptors take a TRP beyond the sensory neuron, *Pain* (2003) **105**, 5-9.

6. Tominaga M. and **Caterina M.J.** Thermosensation and Pain (2004) *J. Neurobiology* **61**, 3-12.

7. **Caterina MJ**, Montell C. Take a TRP to beat the heat. (2005) *Genes Dev.* **19**, 415-418.

8. Lee H, **Caterina MJ.** TRPV channels as thermosensory receptors in epithelial cells. (2005) *Pflugers Arch.* 451:160-167.

9. **Caterina MJ.** (2006) Transient Receptor Potential Ion Channels as Participants in Thermosensation and Thermoregulation. *Am J Physiol Regul Integr Comp Physiol.* 292(1):R64-76

10. **Caterina M.J.** (2007) Sticky Spices. *Nature* 445(7127):491-2. (News and Views)

11. Lumpkin, E.A. and **Caterina M.J.** (2007) Mechanisms of Sensory Transduction in the Skin. *Nature* 445(7130):858-65. (Insights)

12. Chung M.K. and **Caterina M.J.** TRP channel knockout mice lose their cool. *Neuron* (2007) May 3;54(3):345-7 (Preview)

13. Montell C and **Caterina MJ.** (2007) Thermoregulation: Channels that Are Cool to the Core. *Curr Biol.* 17(20):R885-R887.

14. **Caterina M.J.** (2008) On the Thermoregulatory Perils of TRPV1 Antagonists. *Pain,* 136:3-4

**Book Chapters**

1. Johnson, R.L., Vaughan, R.A., **Caterina, M.J.** and Devreotes, P.N. (1989) Adaptation of chemoattractant elicited responses in Dictystelium discoideum. In *Activation and Desensitization of Transducting Pathways, NATO ASI Series,* **44**, 22-36.

2. **Caterina M.J.** (2004) Ion Channels and Thermotransduction in Transduction in Sensory Cells, wiley-VCH Verlag Gmb H& Co. KgaA, Weinheim, Germany, Stefan Frings, Jon Bradley, Eds. 2004 pp. 335-249.

3. **Caterina, M.J.,** Gold, M. S. and Meyer, R.A. (2005) Molecular Biology of Nociceptors in *The Neurobiology of Pain*, Oxford University Press, Stephen Hunt and Martin Koltzenburg, Eds. pp. 1-33.

4. **Caterina M.J.** (2005) Pathological Changes in the Nociceptor: Alterations in TRPV1 Activity and Expression, in: *Handbook of Clinical Neurology*, Elsevier, Edinburgh, Fernando Cervero and Troels Jensen, Eds., pp. 221-230.

5. **Caterina M.J.** and Park U. (2006) TRPV1, A Polymodal Sensor in the Nociceptor Terminal, in: The Nociceptor Membrane, Academic Press, San Diego, Uhtaek Oh, Ed., pp 114 – 150.

6. Gold M.S. and **Caterina M.J.** (2007) Molecular Biology of the Nociceptor/ Transduction In: Handbook of the Senses. Elsevier. A.I. Basbaum Ed. IN PRESS

**Patents**

United States Patent #6,335,180 Nucleic acid sequences encoding capsaicin receptor and uses thereof. Awarded January 1, 2002 Inventors: David Julius, Michael Caterina and Anthony Brake

**Editorial Activities**

**Editorial Board –** *Journal of Neuropathic Pain and Symptom Palliation* (2004-date)
**Deputy Editor** – *Molecular Pain* (2005-date)
**Associate Editor**, *Experimental Neurology* (2006)
**Associate Editor**, *Journal of Neuroscience* (2007-date)
**Ad hoc reviewer -** Nature, Science, Cell, Nature Chemical Biology, Neuron, Nature Neuroscience, Journal of Neuroscience, Journal of Biological Chemistry, Pain, Journal

of Pharmacology and Experimental Therapeutics, Journal of Neurobiology, Proceedings of the National Academy of Sciences, European Journal of Neuroscience, Neuroscience, Neuropharmacology, Biochemical Pharmacology, Lancet, Molecular Pain.

**Advisory Boards/Consulting**
Hydra Biosciences, 2005-date
Merck Research Laboratories, 2007
ENDO Pharmaceuticals, 2008

**ORGANIZATIONAL ACTIVITIES**
**Institutional Administrative Appointments**
Co-Director, Graduate Program in Biological Chemistry 2003-date

Admissions Committee – Biological Chemistry Graduate Program 2000-date

Admissions Committee – Biological Chemistry, Cellular and Molecular Biology Graduate Program 2002

Admissions Committee, M.D., Ph.D. Program 2004-date

Steering Committee, Neuroscience Graduate Program, 2004-date

Medical School Council 2003-2007

Building Design Committee, Institute for Basic Biomedical Sciences 2004-2005

Seminar Coordinator, Department of Biological Chemistry 2003-2005

M.A., Ph.D. Committee 2003-date

Medical Curriculum Review Mind/Brain Subcommittee – 2005

Member, Center for Sensory Biology (one of 8 founding members) – 2006

Graduate Education Committee – 2008

**Professional Societies**
Society for Neuroscience –Member 2001-date
International Association for Pain Research – Member 2002-date
American Pain Society – Member 2002-date

**Conference Organizer**
**Session Chair**, American Pain Society Annual Meeting, 2001, Atlanta
**Session Chair**, American Pain Society Annual Meeting, 2003, Chicago
**Session Chair** Society for Neuroscience Annual Meeting Washington, DC 11/05
**Co-Chairman**, FASEB Meeting on Calcium and Cell Function, (2006)

**Co-Chairman**, FASEB Meeting on Calcium and Cell Function, (to be held 2008).

**Review Groups**

**Ad hoc reviewer**, National Institutes of Health Center for Scientific Review Special Emphasis Panel ZRG1 IFCN-5 (03) 2001
**Ad hoc reviewer**, National Cancer Institutes Subcommittee C, RPRB (R2) PO1 review committee (Michael Small SRA) October, 2004
**Ad hoc reviewer**, National Institutes of Health Center for Scientific Review Special Emphasis Panel 2005/01 ZRG1 IFCN-K (02) (M) (Joseph Rudolf SRA) November, 2004
**Ad hoc reviewer**, National Institute of Neurological Disease and Stroke NSDC Study Section (Andrea Sawczuk SRA) June 2005
**Ad hoc reviewer**, National Institutes of Health Neurogenesis and Cell Fate Study Section (Lawrence Baizer SRA) June 2005, Aug 2006, Feb 2007, March 2007, March 2008
**Ad hoc reviewer**, National Institutes of Health Special Emphasis Panel (Joseph Rudolph SRA) December 2005
**Ad hoc reviewer**, National Institutes of Health Special Emphasis Panel (Lawrence Baizer SRA) December 2005
**Ad hoc reviewer**, National Institutes of Health , Neurogenesis and Cell Fate Study Section (Mary Custer SRA) August 2006
**Ad hoc reviewer**, National Institutes of Health, Limited Competition for Dietary Supplement Research Centers: Botanicals, (Martina Schmidt SRA) November 2006
**Ad hoc reviewer**, National Institutes of Health, Neurogenesis and Cell Fate (Lawrence Baizer SRA) February 2007
**Ad hoc reviewer**, National Institutes of Health ZRG1 MDCN-D 02 M, Regulation of Axonal Growth and Synaptic Plasticity MDCN-D (02) (Lawrence Baizer SRA), March 2007
**Ad hoc reviewer**, National Institutes of Health, Special Emphasis Panel ZRG1 MDCN-N (03) Carol Hamelink, SRA) July 2007
**Ad hoc reviewer,** National Institutes of Health Special Emphasis Panel ZRG1 MDCN-D 02 M (Lawrence Baizer SRA) March, 2008
**Review Committee** – Blaustein Pain Research Program, Johns Hopkins School of Medicine 2004-date
**Reviewer**, Wellcome Foundation Postdoctoral Fellowships 2003-date
**Reviewer**, American Pain Society Small Grants Program 2006-date
**Member**, International Association for the Study of Pain Junior Investigator Grants Program 2006-date
**Reviewer**, Beckman Young Investigators Program, 2006-date

**RECOGNITION**

**Awards, Honors**

Evan Pugh Scholar, The Pennsylvania State University, 1987
NIH Medical Scientist Training Program Grant, 1987-1995
McGraw Hill Publishing Medical Student Award, 1988
Lange Publishing Medical Student Award, 1988
Franklin Paine Mall Award in Anatomy and Cell Biology, 1988

Alpha Omega Alpha Medical Honor Society, 1995
Gate Pharmaceuticals Medical Student Award, 1995
Postdoctoral Fellowship, U.C.S.F. Cardiovascular Research Institute, 1995-1996
Postdoctoral Fellowship, American Cancer Society, 1996-1999
Young Investigator Award, National Alliance For Research on Schizophrenia and Depression, 1996-1998
Keith Killam Memorial Award in Receptor Pharmacology, Western Pharmacology Society 2000
Searle Scholars Program, 2001
Beckman Young Investigator, 2001
W. M. Keck Foundation Distinguished Young Scholar in Medical Research, 2001
NARSAD Freedman Award Honorable Mention 2001
Patrick D. Wall Young Investigator Award, International Association for the Study of Pain, 2005

**Invited Talks, Panels**

As Graduate Student

Dictyostelium International Conference, Vancouver, Canada 1994

As Postdoctoral Fellow

European Neuroscience Association Satellite Meeting on Peripheral Mechanisms of Pain Sensation, Berlin, Germany, 7/98
Japanese Biochemical Society Annual Meeting, Nagoya, Japan, 10/98
American Pain Society Annual Meeting, San Diego, CA 11/98
Ion channels in Nociception Meeting, San Francisco, CA 1999
Duke University Department of Cell Biology, Durham, NC 1999
University of Wisconsin Department of Physiology, Madison, WI 1999
Harvard Medical School Department of Biological Chemistry and Molecular Pharmacology. Boston, MA 1999
Harvard University Department of Molecular and Cellular Biology, Cambridge, MA 1999
University of Chicago Department of Pharmacological and Physiological Sciences, Chicago, IL 1999
Johns Hopkins School of Medicine Department of Biological Chemistry, Baltimore, MD 1999
Ohio State University Department of Neuroscience, Columbus, OH 1999

As Assistant Professor

Pulmonary Research Service, Johns Hopkins Univ. School of Medicine 2/00
Blaustein Pain Research Center, Johns Hopkins Univ. School of Medicine 2/00
Department of Neurology and Neurosurgery, Johns Hopkins Univ. School of Medicine 4/00, 11/00
Department of Cell Biology and Anatomy, Johns Hopkins Univ. School of Medicine 4/00
Spring Pain Research Conference, Cayman Islands 5/00
Merck Research Laboratories, Rahway, NJ 7/00
American Pain Society Annual Meeting, Atlanta, GA (Session Chair) 10/00

Laboratory of Cellular and Molecular Biology , National Cancer Institute, Bethesda, MD 11/00
Department of Pharmacology, Univ. of Pittsburgh School of Medicine 12/00
Carnegie Institute of Embryology, Johns Hopkins University 12/00
Johns Hopkins University Hearing Center 12/00
University of Alabama, Birmingham Dept. of Physiology 1/01
Western Pharmacology Society Meeting, (Killliam Award Lecture) Vancouver, Canada 3/01
Johns Hopkins Board of Advisors 4/01
Johnson and Johnson Meeting on Visceral Pain Mechanisms, New Brunswick, NJ 5/01
National Institutes of Drug Abuse, Baltimore, MD 10/01
Baylor University School of Medicine, Dept. Neuroscience, Houston, TX 2/02
BCMB Recruitment Weekend, Johns Hopkins Sch. Medicine 2/02
Endo Pharmaceuticals Round Table Discussion on Analgesic Drugs, Baltimore, MD 3/02
Johns Hopkins School of Medicine Department of Neurology and Neurosurgery 3/02
Uniformed Health Services University, Bethesda, MD 5/02
Johns Hopkins University Department of Biology 10/02
3Dimensional Pharmaceuticals, Exton, PA 11/02
Johns Hopkins School of Medicine, Renal Division, Department of Medicine 12/02
BCMB Recruitment Weekend, Johns Hopkins Sch. Medicine 2/03
Symposium Keynote Speaker, Society of Toxicology Annual Meeting, Salt Lake City, UT 3/03
American Pain Society Annual Meeting, Chicago, IL (Session chair) 3/03
Federated Association of Societies for Experimental Biology Annual Meeting, San Diego CA (presented by graduate student Michele Nealen) 4/03
Albany Medical College, Albany, NY 6/03
Merck Research Laboratories, Rahway, NJ 1/03
Japanese Society for Neuroscience Annual Meeting (presented by graduate student Hyosang Lee) 7/03
American Chemical Society Annual Meeting, New York, NY 9/03
Peter E. Dresel Memorial Lecture in Pharmacology, Dalhousie University, Halifax, Nova Scotia, Canada 10/03
Emory University, Department of Pharmacology, 12/03

<u>As Associate Professor</u>
University of Oregon Health Sciences Center, Vollum Institute, 5/04
FASEB Conference on Calcium Signaling, Snowmass, CO 6/04
London Pain Consortium Seminar Series, London UK 6/04
KU Leuven, Leuven, Belgium 6/04
Hydra Biosciences, Cambridge, MA 7/04
State University of New York, Stony Brook, Dept. of Neurobiology Stony Brook, NY 10/04
Society for Neuroscience Annual Meeting Minisymposium, San Diego, CA 10/04
Johnson and Johnson Pain Research Division, La Jolla, CA 10/04
Center for Mol. Medicine, University of Cologne Meeting on Homeostasis and the Hypothalamus, Cologne, Germany 11/04

Indiana University School of Medicine, Indianapolis IN 2/05
Medical College of Wisconsin, Milwaukee, WI 2/05
University of Southern California, Los Angeles, CA 2/05
Duke University School of Medicine, Durham, NC 3/05
University of North Carolina School of Medicine, Chapel Hill, NC 3/05
Neuroscience Student Invited Speaker, University of Virginia Sch. Medicine, Charlottesville, VA 3/05
35th International Congress of Physiological Sciences, Symposium, San Diego, CA 4/05
Northwestern University Chicago, IL 5/05
Gordon Conference on Calcium Signaling, Oxford, UK 7/05
University of Washington, Dept. of Pharmacology, Seattle WA 11/05
Johns Hopkins Sch. Medicine Dept. Anesthesiology and Critical Care Medicine 11/05
2nd International Meeting on Physiology and Pharmacology of Temperature Regulation, Phoenix AZ 3/06
Columbia University School of Medicine, New York, NY 4/06
University of Minnesota, Minneapolis MN 4/06
Johns Hopkins Sch. Medicine Dept. Medicine Pulmonary Division 4/06
Woods Hole Neurobiology Course, Woods Hole, MA 6/06
National Cancer Institute, Bethesda MD 6/06
FASEB Meeting on Calcium and Cell Function, Snowmass CO 7/06
McGill University, Montreal Canada, 12/06
Astra-Zeneca Pharmaceuticals, Montreal Canada 12/06
Biophysical Society Annual Meeting, Baltimore, MD 3/07
Monell Chemical Senses Center, Philadelphia, PA 3/07
Georgetown University, Washington, DC 5/07
Yale University, New Haven, CT 5/7
University of California, Irvine 6/07
Merck Research Labs, West Point, PA 8/07
Keystone Meeting on TRP Channels, Keystone, CO 9/07
Principle Speaker, Keratinocyte Study Group of Japan, Kyoto, Japan 12/07
Johns Hopkins Asthma and Allergy Center, Baltimore, MD 1/08
ENDO Pharmaceuticals Neuropathic Pain Conference, Philadelphia, PA 4/08

## MENTORING AND EDUCATION

**Mentoring – Advisees**

**Michele Nealen**
Ph.D. candidate, Cellular and Molecular Medicine Graduate Program 1999-2003
Ph.D. 12/03 Presently Staff Scientist, Origene, Rockville, Maryland

**Hyosang Lee**
Ph.D. candidate, Biological Chemistry Graduate Program 2000-2006 Presently postdoctoral fellow, California Institute of Technology

**Una Park**
Ph.D. candidate Neuroscience Graduate Program 2002-2008.
Postdoctoral fellow, Caterina lab 2008-date.

**Ali Guler**
Ph.D. candidate, Biological Chemistry, Cellular and Molecular Biology Graduate Program 2000-2005 Presently Postdoctoral Fellow, University of Washington

**Tiffany Potter**
Ph.D. Candidate, Cellular and Molecular Medicine Graduate Program
2006- date

**Man Kyo Chung, D.D.S., Ph.D.**
Postdoctoral Fellow 2002-date

**Isao Shimizu Ph.D.**
Postdoctoral Fellow 2001-2003 Associate Manager, Division of Research Management, Dainippon Sumimtomo Pharmaceuticals, Osaka Japan

**Tohko Iida Ph.D.**
Postdoctoral Fellow 2002-2004 Postdoctoral Fellow, Industrial Application Division, Japan Synchrotron Radiation Research Institute (JASRI) Hyogo, Japan

**Susan Huang, Ph.D.**
Postdoctoral Fellow 2004-date

**Clare Munns, Ph.D.**
Postdoctoral Fellow 2008-date

**Jill-Desiree Brederson Ph.D.**
Postdoctoral Fellow 2005-2006 Research Scientist, Abbott Laboratories.

**Teaching – Classroom Instruction**

**Lecturer** - Graduate Biochemistry and Cell Biology Course (2 lectures/year) 2000-2003
**Lecturer** – Pathways and Regulation Course (2 lectures/yr) 2004-date
**Lecturer** – Medical Neuroscience Course (1-2 lecture/year) 2001-date
**Lecturer** – Graduate Neuroscience and Cognition Course (1-2 lectures/year) 2000-date
**Lecturer** – Medical School Molecules and Cells Course (2 lectures/year) 2003-date
**Group Leader** – Medical School Molecules and Cells Course (8 sessions/year) 2001-date
**Lecturer** – Topics in Cellular and Molecular Medicine Course (1 lecture/year) 2000
**Course Coordinator** - Topics in Cellular and Molecular Medicine Course 2001-2004
**Lecturer** – The Neuroscience of Pain Course (Homewood Campus) (1 lecture/year) 2003-2004

**Instructor** – Topics in Biological Chemistry (1 session/year) 2000-date
**Instructor** – BCMB Core Discussion Course (2 sessions/year) 2002
**Instructor** – Neuroscience Core Discussion Course (1 session/year) 2002, 2004, 2005, 2006
**Visiting Instructor** – Topics in Neuroscience (Homewood Campus) (1 session/year) 2001-2005

**C. Research Support**

**Ongoing**
5/15/05-5/14/10 NINDS 1 RO1 NS051551-01
Role: Principal Investigator
Role of TRPV channels in pain and temperature sensation
This proposal is aimed at examining the contribution of heat-gated TRPV ion channels TRPV1, TRPV2, TRPV3 and TRPV4 to the perception of environmental temperatures by sensory neurons and skin keratinocytes.
12/1/06 – 11/31/11 NINDS 1 RO1 NS054902-01
Role: Principal Investigator
Agonist-evoked changes in TRPV ion channel selectivity
This proposal is aimed at exploring the mechanistic basis behind a novel form of ion channel regulation that involves dynamic conformational changes at the channel pore
7/1/07-6/31/12 NIDDK RO1 DK 54824 (PI Lori Birder)
Role: Co-Investigator
Nitric oxide in bladder neural-epithelial signaling
This proposal aims to determine the contribution of TRPV ion channels to the sensory function of epithelial cells in the urinary bladder lumen

**Completed**
7/1/01-6/30/04 Searle Scholars Program Role: Principal Investigator
Title: Molecular Mechanisms Underlying Mammalian Thermosensation
7/1/01-6/30/04 Beckman Young Investigators Program Role: Principal Investigator

Title: Molecular Mechanisms Underlying Mammalian Thermosensation
1/1/01-12/31/09 American Cancer Society Research Scholar Grant RSG-01-063-01-CSM Role: Principal Investigator Title: Vanilloid Receptor Contributions to Pain and Growth-Factor-Evoked Responses (Terminated to allow replacement with 1 RO1 NS051551-01)
7/1/01-6/30/06 W.M. Keck Foundation Distinguished Young Scholar In Medical Research
Role: Principal Investigator Title: Molecular Mechanisms Underlying Mammalian Thermosensation