BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
Zylka, Mark J.	Associate Professor Dept. of Cell Biology & Physiology UNC Neuroscience Center
eRA COMMONS USER NAME (credential, e.g., agency login)	

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
Virginia Tech	B.S.	6/94	Biochemistry
Harvard Medical School	Ph.D.	11/99	Neurobiology
California Institute of Technology	Postdoc.	11/05	Neurobiology

A. Personal Statement

Dr. Zylka received his B.S. in Biochemistry from Virginia Tech, spent three summers at the NIH as an IRTA student in Dr. David Klein's lab and then completed his Ph.D. in Neurobiology from Harvard. While in graduate school with Dr. Steven Reppert, he identified several of the core circadian "clock" genes and determined at a mechanistic level how these genes contribute to circadian rhythms in mammals. He then did his postdoctoral work at Caltech in Dr. David Anderson's laboratory. While at Caltech, Dr. Zylka co-discovered a large family of G protein-coupled receptors called *Mrgprs* that are exclusively found in sensory neurons of rodents and humans. These receptors are now being studied as therapeutic targets for pain and itch. Half of Dr. Zylka's lab at UNC is focused on identifying and studying a number of new molecules for the treatment of chronic pain. As examples, his lab found that Prostatic acid phosphatase (PAP) and ecto-5'-nucleotidase (NT5E, CD73) were expressed in pain-sensing neurons and function outside the cell to rapidly generate adenosine from AMP. His lab also found that purified versions of PAP and NT5E have potent and long-lasting antinociceptive effects in animal models of chronic pain. These antinociceptive effects are entirely due to activation of adenosine receptors. Future studies are aimed at using recombinant PAP protein and adenosine receptor agonists as analgesics, as well as to validate several other molecular targets for the treatment of chronic pain. Lastly, Dr. Zylka, in collaboration with Drs. Ben Philpot and Bryan Roth, found that topoisomerase inhibitors epigenetically unsilence *Ube3a*—a gene that is mutated in Angelman syndrome. Dr. Zylka's research has expanded to include a heavy focus on autism and neurodevelopmental disorders, including the identification of what could be a unifying transcriptional mechanism for autism.

B. Positions and Honors.

Positions and Employment

1991-1994 IRTA Summer Research, NIH, NICHD
(Mentor: David C. Klein)
1994-1999 Graduate Student, Department of Neurobiology, Harvard Medical School
(Mentor: Steven M. Reppert)
2000-2003 Postdoctoral Scholar in Biology, Division of Biology, Caltech
(Mentor: David J. Anderson)
2003-2005 Associate, Howard Hughes Medical Institute, Division of Biology, Caltech
2006-2011 Assistant Professor, Cell and Molecular Physiology, University of North Carolina, Chapel Hill
2006-present Member, UNC Neuroscience Center
2007-present Director, UNC Bacterial Artificial Chromosome (BAC) Engineering Core Facility
2010-present Member, Intellectual & Developmental Disabilities Research Center at UNC
2010-present Adjunct Assistant Professor, Division of Medicinal Chemistry and Natural Products, UNC
2012-present Associate Professor, Cell and Molecular Physiology, University of North Carolina, Chapel Hill

Other Experience and Professional Memberships

1992-present American Association for the Advancement of Science
2005-present Society for Neuroscience
2009-present International Association for the Study of Pain
2010-present Senior Editor of The Open Pain Journal
2010 Ad hoc grant reviewer, Veterans Affairs Merit review study section
2010 Ad hoc grant reviewer, NIH Blueprint for Neuroscience Grand Challenge study section
2011, 2012 Ad hoc grant reviewer, NIH Somatosensory & Chemosensory Systems (SCS) study section
2012 Ad hoc grant reviewer, NIH ZRG1-IFCN special emphasis panel
2012 Ad hoc grant reviewer, NIH MDCN-P 57 special emphasis panel
2012-present Rita Allen Foundation Scholars Planning Committee
2012-present International Association for the Study of Pain (IASP) Presidential Task Force – to make recommendations on the future directions of IASP

Honors

1991-1994 President's List (4.0 GPA) for seven of eight semesters
1994 American Chemical Society Award, outstanding senior in the graduating biochemistry class
1994 Alpha Zeta Outstanding Senior in graduating biochemistry class
1994 Phi Sigma Society National Res. Award, achievement in biological science
1994 Barry Goldwater National Scholar in Mathematics, Science and Engineering
1996-1999 Predoctoral NRSA, National Research Service Award
1997 Albert J. Ryan Fellow for excellence in Graduate research at Harvard
2000-2003 Damon Runyon-Walter Winchell Foundation Postdoctoral Fellowship
2006-2008 NARSAD Young Investigator Award
2006-2008 Alfred P. Sloan Research Fellowship
2006-2009 Klingenstein Fellowship Award in the Neurosciences
2007-2010 Searle Scholar
2007-2010 Rita Allen Foundation-Milton E. Cassel Scholar* (**awarded only to highest-ranked scholar*)
2010 Virginia Tech distinguished alumnus award

C. Peer-reviewed publications (in chronological order, selected from 50 publications; # = co-senior authors).

1. **Zylka, M.J.**, Rice, F.L., Anderson, D.J. (2005). Topographically distinct epidermal nociceptive circuits revealed by axonal tracers targeted to *Mrgprd*. Neuron *45*,17-25.
2. Campagnola, L., Wang, H., **Zylka, M.J.** (2008). Fiber-coupled light-emitting diode for localized photostimulation of neurons expressing channelrhodopsin-2. J. Neurosci Methods *169*, 27-33.
3. **Zylka, M.J.**[#], Sowa, N.A., Taylor-Blake, B., Twomey, M.A., Herrala, A., Voikar, V., Vihko, P.[#] (2008). Prostatic acid phosphatase is an ectonucleotidase and suppresses pain by generating adenosine. Neuron *60*, 111-122. PMCID: PMC2629077. *(This paper was the featured cover article and received worldwide press coverage).* # = co-senior authors.
4. Sowa, N.A., Vadakkan, K., **Zylka, M.J.** (2008) Recombinant mouse PAP has pH-dependent ectonucleotidase activity and acts through A_1-adenosine receptors to mediate antinociception. PLOS One, 4(1): e4248. doi:10.1371/journal.pone.0004248. PMCID: PMC2617779.
5. Larsen, R.S., **Zylka, M.J.**, Scott, J.E. (2009) A high throughput assay to identify small molecule modulators of prostatic acid phosphatase. Current Chemical Genomics, 3:42-49. PMCID: PMC2808025.
6. Cavanaugh, D., Lee, H., Lo, L., Shields, S., **Zylka, M.J.**, Basbaum, A.I., Anderson, D.J. (2009) Distinct subsets of unmyelinated primary sensory fibers mediate behavioral responses to noxious thermal and mechanical stimuli. Proc. Natl. Acad. Sci. USA, 106:9075-9080. PMCID: PMC2683885.
7. Rau, K., McIlwrath, S., Wang, H., Lawson, J. Jankowski, M., **Zylka, M.J.**, Anderson, D.J., Koerber, H.R. (2009) Mrgprd enhances excitability in specific populations of cutaneous murine polymodal nociceptors. J. Neurosci. 29:8612-8619. PMCID: PMC2756673.
8. Wang, H. **Zylka, M.J.** (2009) Mrgprd-expressing polymodal nociceptive neurons innervate most known classes of substantia gelatinosa neurons. J. Neurosci. 29:13202-13209. PMCID: PMC2789299.

9. Sowa, N.A., Taylor-Blake, B., **Zylka, M.J.** (2010) Ecto-5'-nucleotidase (CD73) inhibits nociception by hydrolyzing AMP to adenosine in nociceptive circuits. J. Neurosci. 30:2235-2244. PMCID: PMC2826808. (*highlighted in Faculty of 1000 Biology*)
10. Sowa, N.A., Voss, M.K., **Zylka, M.J.** (2010) Recombinant ecto-5'-nucleotidase (CD73) has long lasting antinociceptive effects that are dependent on adenosine A1 receptor activation. Mol. Pain 6:20. PMCID: PMC2874211.
11. Sowa, N.A., Street, S.E., Vihko, P., **Zylka, M.J.** (2010) Prostatic acid phosphatase reduces thermal sensitivity and chronic pain sensitization by depleting phosphatidylinositol 4,5-bisphosphate. J. Neurosci. 30:10282-10293. PMCID: PMC2920622.
12. Street, S.E., Walsh, P.L., Sowa, N.A., Taylor-Blake, B., Guillot, T.S., Vihko, P., Wightman, R.M., **Zylka, M.J.** (2011) PAP and NT5E inhibit nociceptive neurotransmission by rapidly hydrolyzing nucleotides to adenosine. Mol. Pain 7:80. PMCID: PMC3210096.
13. Huang, H.S., Allen, J.A., Mabb, A.M., King, I.F., Miriyala, J., Taylor-Blake, B., Sciaky, N., Dutton, J.W. Jr., Lee, H.M., Chen, X., Jin, J., Bridges, A.S., **Zylka, M.J.**[#], Roth, B.L.[#], Philpot, B.D.[#] (2012) Topoisomerase inhibitors unsilence the dormant allele of Ube3a in neurons. Nature. 481:185-189. PMCID: PMC3257422.
14. Rittiner, J.E., Korboukh, I., Hull-Ryde, E.A., Jin, J., Janzen, W.P., Frye, S.V., **Zylka, M.J.** (2012) AMP is an adenosine A1 receptor agonist. J. Biol. Chem. 287:5301-5309. PMCID: PMC3285310.
15. McCoy, E.S., Taylor-Blake, B., Street, S.E., Pribisko, A.L., Zheng, J., **Zylka, M.J.** (2013) Peptidergic CGRPα primary sensory neurons encode heat and itch and tonically suppress sensitivity to cold. Neuron 78:138-151. PMCID: PMC3628403. *(This paper was the cover article.)*
16. King, I.F., Yandava, C.N., Mabb, A.M., Hsiao, J.S., Huang, H-S., Pearson, B.L., Calabrese, J.M., Starmer, J., Parker, J.S., Magnuson, T., Chamberlain, S.J., Philpot, B.D., **Zylka, M.J.** (2013) Topoisomerases facilitate transcription of long genes linked to autism. Nature, doi:10.1038/nature12504