
BIOGRAPHICAL SKETCH

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NAME Douglas G. McMahon PhD	POSITION TITLE Professor of Biological Sciences and Pharmacology		
eRA COMMONS USER NAME DMCMAHON			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of Virginia, Charlottesville, VA	BA	1976-1980	Biology
Northwestern University, Evanston, IL	PhD Prog	1980-1981	Biology
University of Virginia, Charlottesville, VA	PhD	1981-1986	Biology
Harvard University, Cambridge, MA	Post-doctoral	1986-1990	Neurobiology

A. Positions and Honors

Positions and Employment

1981-1986 Research Assistant, Department of Biology, University of Virginia
1986-1990 Postdoctoral Fellow, Dept. of Cellular and Developmental Biology, Harvard University
1987 Grass Fellow, Marine Biological Laboratory, Woods Hole, MA.
1990-1996 Assistant Professor, Department of Physiology, University of Kentucky
1996-2001 Associate Professor, Department of Physiology, University of Kentucky
2001-2002 Director, University of Kentucky NIH Institutional Training Grant, "Cellular and Molecular Neuroscience of Sensory Systems"
2001 -2002 Donald T. Frazier Professor, Department of Physiology, University of Kentucky
2002-present Professor, Department of Biological Sciences, Vanderbilt University
2005-2008 Director of Graduate Studies, Department of Biological Sciences, Vanderbilt University
2008-present Professor, Department of Pharmacology, Vanderbilt University
2009-present Director of Graduate Studies, Neuroscience Program, Vanderbilt University Medical Center

Other Experience and Professional Memberships

1990 Member, Grass Foundation Fellowship Review Panel
1996 AD-HOC Reviewer NIH Visual Sciences C Study Section
1997-98 Member, NIH Neurological Sciences 2 Study Section
1998-2002 Member, NIH Integrative Functional and Cellular Neuroscience 3 Study Section
1997-1999 Member, Fight for Sight Foundation Fellowship Review Committee
2000 Member, NIMH Conte Neuroscience Center Review Panel
2000-2002 Chair, NIH Integrative Functional and Cellular Neuroscience 3 Study Section
2004-2007 AD HOC Reviewer, NIH BDPE Study Section
2007 Chair, IFCN-C Special Emphasis Panel, NIH
2008 AD HOC Reviewer, NIH ICP1 Study Section

Honors

1980 Bachelor of Arts Degree with Distinction, University of Virginia
1985 Gwathmey Fellowship, Society of Fellows, University of Virginia
1986 Andrew Fleming Award for Dissertation Research, Dept. of Biology, University of Virginia
1986 Donald B. Lindsley Prize in Behavioral Neuroscience, Society for Neuroscience
1996 University of Kentucky College of Medicine Research Award
2000 University of Kentucky University Research Professorship
2000 University of Kentucky Charles Wethington Research Scholar
2007 NIMH Silvio O. Conte Investigator
2008 Chancellor's Award for Research, Vanderbilt University

B. Selected peer-reviewed publications (in reverse-chronological order).

1. Sun, Z., Zhang, D.Q., McMahon, D.G. (2009) Zinc modulation of hemi-gap-junction channel currents in retinal horizontal cells. *J. Neurophysiol.*, 101; doi:10.1152/jn.90581.2008.
2. Ciarleglio, C.M., Gamble, K.L., Axley, J.C., Strauss, B.R., Cohen, J.Y., Colwell, C.S. and McMahon, D.G. (2009) Population encoding by circadian clock neurons organizes circadian behavior. *J. Neurosci.*, 29(6):1670-1676.
3. Meng, S., Ryu, S., Zhao, B., Zhang, D.Q., Driever, W. and McMahon, D.G. (2009) Targeting retinal dopaminergic neurons in tyrosine hydroxylase-driven-green fluorescent protein transgenic zebrafish. *Mol. Vis.*, 14:2475-83.
4. Ruan, G.-X., Allen, G.C., Yamazaki, S. and McMahon, D.G. (2008) An autonomous circadian clock in the inner mouse retina regulated by dopamine and GABA. *PLoS Biol* 14:6(10):e249.
5. Zhang, D.Q., Wong, K.Y., Sollars, P.J., Berson, D.M., Pickard, G.P. and McMahon, D.G. (2008) Intra-retinal signaling by ganglion cell photoreceptors to dopaminergic amacrine neurons. *PNAS*, 105, 14181-6.
6. Gamble, K.L., Allen, G.C., Zhou, T. and McMahon, D.G. (2007) Gastrin-releasing peptide mediates light-like resetting of the suprachiasmatic nucleus circadian pacemaker through cAMP response element-binding protein and *Per1* activation. *J. Neurosci.*, 27(44), 12078-12087.
7. Zhang, D.Q., Zhou, T. and McMahon, D.G. (2007) Functional heterogeneity of retinal dopaminergic neurons underlying their multiple roles in vision. *J. Neurosci.*, 27(3), 692-699.
8. Kuhlman, S.J. and McMahon, D.G. (2006) Encoding the ins and outs of circadian pacemaking. *J. Biol. Rhythms.*, 21(6), 470-481.
9. Fog, J.U., Khoshbouei, H., Holy, M., Owens, W.A., Sen, N., Nikandrova, Y., Bowton, E., McMahon, D.G., Colbran, R.J., Daws, L.C., Sitte, H.H., Javitch, J.A., Galli, A. and Gether, U. (2006) Calmodulin kinase II interacts with the dopamine transporter C terminus to regulate amphetamine-induced reverse transport. *Neuron*, 51(4), 417-429.
10. Ohta, H., Mitchell, A. and McMahon, D.G. (2006) Constant light disrupts the developing mouse biological clock. *Ped. Res.*, 60, 304-308.
11. Ruan, G.X., Zhang, D.Q., Zhou, T., Yamazaki, S. and McMahon, D.G. (2006) Circadian organization of the mammalian retina. *PNAS*, 103(25), 9703-9708.
12. Zhang, D.Q., Sun, Z. and McMahon, D.G. (2006) Modulation of A-type potassium currents in retinal horizontal cells by extracellular calcium and zinc. *Vis. Neurosci.* 23(5), 825-832.
13. Pitts G.R., Ohta H. and McMahon D.G. (2006) Daily rhythmicity of large-conductance Ca²⁺-activated K⁺ currents in suprachiasmatic nucleus neurons. *Brain Res.* 1071(1), 54-62.
14. Maywood E.S., Reddy A.B., Wong G.K., O'Neill J.S., O'Brien J.A., McMahon D.G., Harmar A.J., Okamura H. and Hastings M.H. (2006) Synchronization and maintenance of timekeeping in suprachiasmatic circadian clock cells by neuropeptidergic signaling. *Curr. Biol.* 16(6), 599-605.
15. Hastings, M.H., Reddy, A.B., McMahon, D.G. and Haywood, E.S. (2005) Analysis of circadian mechanisms in suprachiasmatic nucleus by transgenesis and biolistic transfection. *Methods in Enzymology*, 393, 570-592.
16. Kahlig, K.M., Binda, F., Khoshbouei, H., Blakely, R.D., McMahon, D.G., Javitch, J.A. and Galli, A. (2005) Amphetamine induces dopamine efflux through a dopamine transporter channel. *PNAS*, 102(9), 3495-3500.
17. Ohta, H., Yamazaki, S. and McMahon, D.G. (2005) Constant light desynchronizes mammalian clock neurons. *Nat. Neurosci.*, 8(3), 267-9.
18. Zhang, D.Q., Zhou, T., Ruan, G.X. and McMahon, D.G. (2005) Circadian rhythm of *Period 1* clock gene expression on NOS amacrine cells of the mouse retina. *Brain Res.*, 1050(1-2), 101-109.
19. Kuhlman, S.J. and McMahon, D.G. (2004) Rhythmic regulation of membrane potential and potassium current persists in SCN neurons in the absence of environmental input. *Eur. J. Neurosci.*, 20(4), 1113-1117.
20. Zhang, D.Q., Stone, J. F., Zhou, T., Ohta, H. and McMahon, D.G. (2004) Characterization of genetically labeled catecholamine neurons in the mouse retina. *Neuroreport*, 15(11), 1761-1765.
21. Quintero, J.E., Kuhlman, S.J. and McMahon, D.G. (2003) The biological clock nucleus: a multiphasic oscillator network regulated by light. *J. Neurosci.*, 23(22), 8070-8076.
22. Witkovsky, P., Veisenberger, E., LeSauter, J., Yan, L., Johnson, M., Zhang, D.Q., McMahon, D.G. and Silver, R. (2003) Cellular location and circadian rhythm of expression of the biological clock gene *Period1* in the mouse retina. *J. Neurosci.*, 23(20), 7670-7676.

23. Watanabe, T., Yoshimura, T., McMahon, D.G., and Ebihara, S. (2003) Unimodal circadian rhythm in the suprachiasmatic nucleus of behaviorally splitting mice. *J. Neurosci. Lett.*, 345, 49-52.
24. LeSauter, J., Yan, L., Vishnubhotla, B., Quintero, J., Kuhlman, S., McMahon, D.G. and Silver, R. (2003) A short half-life GFP mouse model for analysis of SCN organization. *Brain Res.*, 964, 279-287.
25. Kuhlman, S.J., Silver, R., Le Sauter, J., Bult-Ito, A. and McMahon D.G. (2003) Phase resetting light pulses induce *Per1* and persistent spike activity in a subpopulation of biological clock neurons. *J. Neurosci.*, 23, 1441-1450.
26. Zhang, D.Q., Ribelayga, C., Mangel, S. and McMahon, D.G. (2002) Suppression by zinc of AMPA receptor mediated synaptic transmission in the retina. *J. Neurophys.*, 88, 1245-1251.
27. Zhang, D.Q. and McMahon, D.G. (2001) Gating of retinal horizontal cell hemi gap junction channels by voltage, Ca²⁺ and retinoic acid. *Mol. Vision*, 7, 247-252.
28. Zhang, D.Q. and McMahon, D.G. (2000) Direct gating by retinoic acid of retinal electrical synapses. *Proc. Natl. Acad. Sci., USA.* 97(26), 14754-14759.
29. Kuhlman, S., Quintero, J.E. and McMahon, D.G. (2000) GFP Fluorescence reports *Period1* circadian gene regulation in the mammalian biological clock. *Neuroreport*, 11(7), 1479-1482.
30. Quintero, J.E. and McMahon, D.G. (1999) Serotonin modulates glutamate responses in isolated suprachiasmatic nucleus neurons. *J. Neurophysiol.*, 82(2), 533-539.
31. Lu, C., Zhang, D.Q. and McMahon, D.G. (1999) Electrical coupling in retinal horizontal cells mediated by distinct voltage-independent gap junctions. *Visual Neuroscience*, 16(5), 811-818.
32. McMahon, D.G. and Schmidt, K.F. (1999) Horizontal cell glutamate receptor modulation by NO: Mechanisms and functional implications for the first visual synapse. *Vis. Neurosci.*, 16(3), 425-433.
33. Wagner, T.L, Beyer, E.C. and McMahon, D.G. (1998) Cloning and functional expression of a novel gap junction channel from the retina of *Danio Aquipinnatus*. *Vis. Neurosci.*, 15(6), 1137-1144.
34. Lu, C. and McMahon, D.G. (1997) Modulation of retinal gap junction channel gating by nitric oxide. *J. Physiol.*, 499(Pt. 3), 689-699.
35. Lu, C. and McMahon, D.G. (1996) Gap junction channel gating at bass retinal electrical synapses. *Visual Neuroscience*, 13(6), 1049-1057.
36. McMahon, D.G. and Ponamareva, L. (1996) Nitric oxide and cGMP modulate retinal glutamate receptors. *J. Neurophysiol.*, 76(4), 2307-2315.
37. McMahon, D.G. (1994) Modulation of electrical synaptic transmission in zebrafish retinal horizontal cells. *J. Neurosci.*, 14(3 Pt 2), 1722-1734.
38. McMahon, D.G. and Brown, D.R. (1994) Modulation of gap junctional channel gating mediates plasticity at a retinal electrical synapse. *J. Neurophysiol.*, 72, 2257-2268.
39. McMahon, D.G., Knapp, A.G. and Dowling, J.E. (1989) Horizontal cell gap junctions: Single channel conductance and modulation by dopamine. *PNAS*, 86, 7639-7643.
40. McMahon, D. G. and Block, G. D. (1987) The Bulla ocular circadian pacemaker I: Pacemaker neuron membrane potential controls phase through a calcium-dependent mechanism. *J. Comp. Physiol.*, 161(3), 335-346.
41. McMahon, D. G. and Block, G. D. (1987) The Bulla ocular circadian pacemaker II: Chronic changes in membrane potential lengthen free running period. *J. Comp. Physiol.*, 161(3), 347-356.

B. Research Support

Ongoing Research Support

R01 EY15815-05 NIH/NEI McMahon (PI) 08/04-07/09.

Circadian Organization of the Retina

This project investigates the role of inner retinal neurons in the retinal circadian clock.

Role: PI

R01 EY09256-18 NIH/NEI McMahon (PI) 04/04-03/10 (no cost extension).

Mechanisms of Retinal Synaptic Plasticity

This project investigates the mechanisms by which connexin channels and dopaminergic neurons mediate adapting signals in retinal neurons and circuits.

Role: PI

P50 MH078028-02 NIH/NIMH McMahon (PI) Project 6 07/07-06/12

Vanderbilt Silvio O. Conte Center for Neuroscience Research, "Genes Controlling Assembly and Function of Serotonin Systems, Center PI: Randy Blakely
Project 6: Interactions of Serotonin and Circadian Signaling.