

CURRICULUM VITAE

Jerrel Louis Yakel, Ph.D.

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Biographical: Nationality- American (of Native American descent)

Education: Ph.D. - University of California, Los Angeles, 1988.
Department of Biology. Thesis Advisor - Meyer B. Jackson
B.S. - Oregon State University, Corvallis, Oregon, 1982
Major: Developmental Biology

Positions Held:

7/93 to present	NIEHS/NIH Senior Investigator Ion Channel Physiology Group Leader Laboratory of Neurobiology (LN) NIEHS, F2-08 P.O. Box 12233 Research Triangle Park, N.C. 27709
4/91 to 7/93	Postdoctoral Associate Vollum Institute, OHSU 3181 S.W. Sam Jackson Park Road Portland, OR 97201 Advisor- Thomas Soderling, Associate Director
9/88 to 4/91	Postdoctoral Associate Laboratoire de Neurobiologie Ecole Normale Supérieure 46 rue d'Ulm 75230 Paris Cedex 05 France Advisor- Hersch Gerschenfeld
9/83 to 9/88	Research Associate / Graduate Student UCLA Dept. of Biology 405 Hilgard Ave. Los Angeles, CA. 90024 Advisor- Meyer Jackson

Other appointment:

6/00 to present Adjunct Assistant Professor
Department of Neurobiology
Duke University Medical Center

Research Interests and Experience:

Employing electrophysiological patch-clamp and two-electrode voltage-clamp techniques to study the properties of ligand- (i.e. 5-HT₃, nicotinic and glutamate) and voltage-activated ion channels in a variety of preparations, including brain slices, dissociated neurons and clonal cell lines, and expressed channels and receptors in *Xenopus* oocytes.

Fellowships and Awards:

Andrea Marie Andrade Memorial Scholarship, 1977.
Dorothy Danforth Compton Fellowship, 1983-1987.
Graduate Affirmative Action Research Grant, 1985-1986.
Dissertation Year Fellowship, 1987-1988.
Otto Scherbaum Award for the most outstanding graduate student research,
UCLA Department of Biology, 1988.
NIH French CNRS Program postdoctoral fellowship, 1988.
NSF Long-Term Research Program postdoctoral fellowship, 1989.
NATO-NSF Postdoctoral Fellowships in Science, 1990.
FORD Foundation Postdoctoral Fellowship, 1991
Society for Neuroscience Travel Fellowship for Minorities, 1992
National Research Service Award, NIH (NRSA), 1992
Human Frontiers Short-Term Fellowship, 1995
Fellow of the American Association for the Advancement of Science (AAAS), 2008
E. E. Just Lecturer Award, American Society of Cell Biology, 2009

Societal Memberships and Panels:

Advisory Committee Member for Society for Neuroscience's Minority Neuroscience Fellowship Program (MNFP)
Advisory Committee Member (Former) for Society for Neuroscience's Minority Education, Training, and Professional Advancement Committee (METPAC)
Advisory Committee Member (Former) for the Minority Fellowship Program, American Psychological Association
Society for Neuroscience
Serotonin Club
SACNAS- Society for the Advancement of Chicanos and Native Americans in Science
Panelist Chair for the Ford Foundation Predoctoral Fellowship Program administered by the National Research Council
Panelist for the Howard Hughes Medical Institute Fellowship Program administered by the National Research Council
Neuroscience Scholars Fellowship Committee of Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)
Physiological Society (UK)
NIH Academy Advisory Committee
American Association for the Advancement of Science (AAAS)

Editorial Boards:

Journal of Physiology (Reviewing Editor, 2007-2009; Senior Editor, 2010-
Journal of Molecular Neuroscience (2004-
Frontiers in Neuropharmacology, Associate Editor (2009-

Ad Hoc Reviewer:

Nature Neuroscience, Science, Journal of Neuroscience, Journal of Physiology, PNAS, TIPS,
Journal of Neurophysiology, Physiological Reviews, British Journal of Pharmacology, European Journal
of Neuroscience, Neuroscience, Molecular Pharmacology, Neuropharmacology, Hippocampus, Journal of
Membrane Biology, Journal of Neurochemistry, Receptors and Channels, Biophysical Journal, Learning
and Memory, Journal of General Physiology, Neuroscience Letters, Journal of Biological Chemistry,
Progress in Neurobiology, Neurobiology of Aging, FASEB Journal

Publications (Peer-Reviewed):

1. **Yakel, J.L.**, L.O. Trussell & M.B. Jackson (1988) Three serotonin responses in cultured mouse hippocampal and striatal neurons. *J. Neurosci.* 8:1273-1285.
2. **Yakel, J.L.** & M.B. Jackson (1988) 5-HT₃ receptors mediate rapid responses in cultured hippocampus and a clonal cell line. *Neuron* 1:615-621.
3. **Yakel, J.L.**, X.M. Shao & M.B. Jackson (1990) The selectivity of the channel coupled to the 5-HT₃ receptor. *Brain Res.* 533:46-52.
4. Gerschenfeld, H.M., D. Paupardin-Tritsch & **J.L. Yakel** (1991) Muscarinic enhancement of the voltage-dependent calcium current in an identified snail neuron. *J. Physiol.* 434:85-105.
5. Shao, X.M., **J.L. Yakel** & M.B. Jackson (1991) Differentiation of NG108-15 cells alters the channel conductance and desensitization kinetics of the 5-HT₃ receptor. *J. Neurophysiol.* 65:630-638.
6. **Yakel, J.L.**, X.M. Shao & M.B. Jackson (1991) Activation and desensitization of the 5-HT₃ receptor in a rat glioma X mouse neuroblastoma hybrid cell. *J. Physiol.* 436:293-308.
7. **Yakel, J.L.** (1991) The neuropeptide FMRFa both inhibits and enhances the Ca²⁺ current in dissociated *Helix* neurons via independent mechanisms. *J. Neurophysiol.* 65:1517-1527.
8. Kavanaugh, M.P., R.S. Hurst, **J. Yakel**, M.D. Varnum, J.P. Adelman & R.A. North (1992) Multiple subunits of a voltage-dependent potassium channel contribute to the binding site for tetraethylammonium. *Neuron* 8:493-497.
9. **Yakel, J.L.** (1992). Inactivation of the Ba²⁺ current in dissociated *Helix* neurons: Voltage-dependence and the role of phosphorylation. *Pflügers Arch.* 420:470-478.
10. Hurst, R.S., M.P. Kavanaugh, **J. Yakel**, J.P. Adelman & R.A. North (1992) Cooperative interactions among subunits of a voltage-dependent potassium channel: Evidence from expression of concatenated cDNAs. *J. Biol. Chem.* 267:23742-23745.

11. **Yakel, J.L.**, R.A. Warren, S.M. Reppert & R.A. North (1993) Functional expression of adenosine A_{2b} receptor in *Xenopus* oocytes. *Mol. Pharm.* 43:277-280.
12. **Yakel, J.L.**, A. Lagrutta, J.P. Adelman & R.A. North (1993) Single amino acid substitution affects desensitization of the 5-HT₃ receptor expressed in *Xenopus* oocytes. *P.N.A.S.* 90:5030-5033.
13. **Yakel, J.L.**, P. Vissavajjhala, V. Derkach, D. Brickey, & T.R. Soderling (1995) Identification of a CaM-Kinase II regulatory phosphorylation site in non-NMDA glutamate receptors. *P.N.A.S.* 92:1376-1380.
14. Gilon, P., G.St.J. Bird, X. Bian, **J.L. Yakel**, and J.W. Putney, Jr. (1995) The Ca²⁺-mobilizing actions of a Jurkat cell extract on mammalian cells and *Xenopus laevis* oocytes. *J. Biol. Chem.* 270:8050-8055.
15. Gilon, P., & **Yakel, J.L.** (1995) Activation of 5-HT₃ receptors expressed in *Xenopus* oocytes does not increase cytoplasmic Ca²⁺ levels. *Receptors and Channels* 3:83-88.
16. **Yakel, J.L.** (1996) Desensitization of the 5-HT₃ receptor expressed in *Xenopus* oocytes: Dependence on voltage and primary structure. *Behav. Brain Research* 73:269-272.
17. Andjus, P., Khiroug, L., **Yakel, J.L.**, Cherubini, E., & Nistri, A. (1996) Changes in intracellular calcium induced by NMDA in cultured hippocampal neurons require exogenous glycine. *Neurosci. Lett.* 210:25-28.
18. Gilon, P., **Yakel, J.**, Gromada, J., Zhu, Y., Henquin, J-C., & Rorsman, P. (1997) G-protein-dependent inhibition of L-type Ca²⁺ currents by acetylcholine in mouse pancreatic B-cells. *J. Physiology* 499:65-76.
19. **Yakel, J.L.** (1997) Calcineurin regulation of synaptic function: From ion channels to transmitter release and gene transcription. *Trends in Pharmacological Sciences* 18:124-134.
20. Zhu, Y., & **Yakel, J.L.** (1997) Modulation of Ca²⁺ currents by various G protein-coupled receptors in sympathetic neurons of male rat pelvic ganglia. *J. Neurophysiol.* 78:780-789.
21. Zhu, Y., & **Yakel, J.L.** (1997) Calcineurin modulates G protein-mediated inhibition of N-type calcium channels in rat sympathetic neurons. *J. Neurophysiol.* 78:1161-1165.
22. Jones, S., & **Yakel, J.L.** (1997) Functional nicotinic ACh receptors on interneurons in the rat hippocampus. *J. Physiology* 504:603-610.
23. Jones, S., & **Yakel, J.L.** (1998) Ca²⁺ influx through voltage-gated Ca²⁺ channels regulates 5-HT₃ receptor channel desensitization in rat glioma X mouse neuroblastoma hybrid NG108-15 cells. *J. Physiology* 510:361-370.
24. van Hooft, J.A., Spier, A.D., **Yakel, J.L.**, Lummis, S.C.R., & Vijverberg, H.P.M. (1998) Promiscuous coassembly of serotonin 5-HT₃ and nicotinic α4 receptor subunits into Ca²⁺ permeable ion channels. *P.N.A.S.* 95:11456-11461.

25. Kriegler, S., Sudweeks, S., & **Yakel, J.L.** (1999) Communication: The nicotinic $\alpha 4$ receptor subunit contributes to the lining of the ion channel pore when expressed with the 5-HT₃ receptor subunit. *Journal of Biological Chemistry*. 274: 3934-3936.
26. Jones, S., & **Yakel, J.L.** (1999) Inhibitory interneurons in the hippocampus: sites for rapid regulation of information flow by neurotransmitters. *Cell Biochem. Biophys.* 31:207-218.
27. Kriegler, S., Sudweeks, S., & **Yakel, J.L.** (1999) MTSEA potentiates 5-HT₃ receptors containing the nicotinic $\alpha 4$ subunit. *Neuropharmacology* 38: 1913-1915.
28. Jones, S., Sudweeks, S. & **Yakel, J.L.** (1999) Nicotinic receptors in the brain: correlating physiology with function. *Trends in Neurosciences* 22: 555-561.
29. Sudweeks, S., & **Yakel, J.L.** (2000) Functional and molecular characterization of neuronal nicotinic ACh receptors in rat CA1 hippocampal neurons. *J. Physiology* 527: 515-528.
30. Shao, Z. & **Yakel, J.L.** (2000) Single channel properties of neuronal nicotinic ACh receptors in stratum radiatum interneurons of rat hippocampal slices. *J. Physiology* 527: 507-513.
31. Pettit, D.L., Shao, Z. & **Yakel, J.L.** (2001) β -Amyloid₁₋₄₂ peptide directly modulates nicotinic receptors in the rat hippocampal slice. *J. Neuroscience (Rapid Communication)* 21:RC120:1-5.
32. Khiroug, S.S., Harkness, P.C., Lamb, P.W., Sudweeks, S.N., Khiroug, L., Millar, N.S., & **Yakel, J.L.** (2002) Rat nicotinic ACh receptor $\alpha 7$ and $\beta 2$ subunits co-assemble to form functional heteromeric nicotinic receptor channels. *J. Physiology* 540: 425-434.
33. Sudweeks, S.N., van Hooft, J.A., & **Yakel, J.L.** (2002) Serotonin 5-HT₃ Receptors in Rat CA1 Hippocampal Interneurons: Functional and Molecular Characterization. *J. Physiology* 544:715-726.
34. van Hooft, J.A. & **Yakel, J.L.** (2003) 5-HT₃ receptors in the CNS: 3b or not 3b? *Trends in Pharmacological Sciences* 24:157-160.
35. Jones, S., & **Yakel, J.L.** (2003) Casein kinase II (protein kinase CK2) regulates serotonin 5-HT₃ receptor channel function in NG108-15 cells. *Neuroscience* 119: 629-634.
36. Khiroug, L., Giniatullin, R., Klein, R.C., Fayuk, D. & **Yakel, J.L.** (2003) Functional mapping and Ca²⁺ regulation of nicotinic acetylcholine receptor channels in rat hippocampal CA1 neurons. *J. Neuroscience* 23: 9024-9031.
37. **Yakel, J.L.** & Shao, Z. (2004) Functional and Molecular Characterization of Neuronal Nicotinic ACh Receptors in Rat Hippocampal Interneurons. *Progress in Brain Research* 145: 95-107.
38. Khiroug, S., Khiroug, L., & **Yakel, J.L.** (2004) Rat nicotinic ACh receptor $\alpha 2\beta 2$ channels: Comparison of functional properties with $\alpha 4\beta 2$ channels in *Xenopus* oocytes. *Neuroscience* 124: 817-822.
39. Klein, R.C. & **Yakel, J.L.** (2004) Inhibition of nicotinic acetylcholine receptors by Apolipoprotein E-derived peptides in rat hippocampal slices. *Neuroscience (Rapid Report)* 127: 563-567.

40. Fayuk, D. & **Yakel, J.L.** (2004) Regulation of nicotinic acetylcholine receptor channel function by acetylcholinesterase inhibitors in rat hippocampal CA1 interneurons. *Mol. Pharm.* 66: 658-666.
41. Lamb, P.W., Melton, M.A. & **Yakel, J.L.** (2005) Inhibition of neuronal nicotinic acetylcholine receptor channels expressed in *Xenopus* oocytes by β -amyloid₁₋₄₂ peptide. *J. Mol. Neuroscience* 27: 13-22.
42. Giniatullin, R., Nistri, A. & **Yakel, J.L.** (2005) Desensitization of Nicotinic ACh Receptors: Shaping Cholinergic Signaling. *Trends in Neurosciences* 28: 371-378.
43. Fayuk, D. & **Yakel, J.L.** (2005) Ca²⁺ permeability of nicotinic acetylcholine receptors in rat hippocampal CA1 interneurons. *J. Physiology* 566: 759-768.
44. Klein, R.C. & **Yakel, J.L.** (2005) Paired-pulse potentiation of α 7-containing nAChRs in rat hippocampal CA1 stratum radiatum interneurons. *J. Physiology* 568: 881-889.
45. Gay, E.A., Klein, R.C. & **Yakel, J.L.** (2006) Apolipoprotein E-derived peptides block α 7 neuronal nicotinic acetylcholine receptors expressed in *Xenopus* oocytes. *J. Pharm. Exp. Ther.* 316: 835-842.
46. Klein, R.C. & **Yakel, J.L.** (2006) Functional somato-dendritic α 7-containing nicotinic acetylcholine receptors in the rat basolateral amygdala complex. *J. Physiology* 576: 865-872.
47. Fayuk, D. & **Yakel, J.L.** (2007) Dendritic Ca²⁺ signaling due to activation of α 7-containing nicotinic acetylcholine receptors in rat hippocampal neurons. *J. Physiology* 582: 597-611.
48. Gay, E.A., Bienstock, R. J., Lamb, P.W. & **Yakel, J.L.** (2007) Structural determinates for apolipoproteinE-derived peptide interaction with the α 7 nicotinic acetylcholine receptor. *Mol. Pharm* 72:838-849.
49. Gay, E.A. & **Yakel, J.L.** (2007) Gating of nicotinic ACh receptors; new insights into structural transitions triggered by agonist binding that induce channel opening. *J. Physiology (Topical Review)* 584: 727-733.
50. Gay, E.A., Giniatullin, R., Skorinkin, A. & **Yakel, J.L.** (2008) Aromatic residues at position 55 of rat α 7 nAChRs are critical for maintaining rapid desensitization. *J. Physiology* 586:1105-1115.
51. Poisik, O.V., Shen, J., Jones, S. & **Yakel J. L.** (2008) Functional α 7-containing Nicotinic Acetylcholine Receptors Localize to Cell Bodies and Proximal Dendrites in the Rat Substantia Nigra pars Reticulata. *J. Physiology* 586: 1365-1378.
52. Gay, E.A., Klein, R.C., Melton, M.A., Blackshear, P.J. & **Yakel, J.L.** (2008) Inhibition of Native and Recombinant Nicotinic Acetylcholine Receptors by the Myristoylated Alanine-Rich C Kinase Substrate Peptide. *J. Pharm. Exp. Ther.* 327: 884-890.
53. Shen, J., Tu, B. & **Yakel, J.L.** (2009) Inhibition of α 7-containing nicotinic ACh receptors by muscarinic M₁ ACh receptors in rat hippocampal CA1 interneurons in slices. *J. Physiology* 587: 1033-1042.

54. Eddins, D., Klein, R.C., **Yakel, J.L.** & Levin, E.D. (2009) Hippocampal infusions of apolipoprotein E peptides induce long-lasting cognitive impairment. *Brain Res. Bull.* 79:111-115.
55. Tu, B., Gu, Z., Shen, J., Lamb, P.W. & **Yakel, J.L.** (2009) Characterization of a nicotine-sensitive neuronal population in rat entorhinal cortex. *J. Neuroscience* 29:10436–10448.
56. Shen, J.X. & **Yakel, J.L.** (2009) Nicotinic acetylcholine receptor-mediated calcium signaling in the nervous system. *Acta Pharmacol Sin.*30:673-680.
57. Timofeeva, O.A., Eddins, D., **Yakel, J.L.**, Blackshear, P.J. & Levin ED. (2010) Hippocampal infusions of MARCKS peptides impair memory of rats on the radial-arm maze. *Brain Res.* 1308:147-152.
58. **Yakel, J.L.** (2010) Gating of nicotinic ACh receptors: latest insights into ligand binding and function. *J. Physiology* 588:597-602.
59. McCormack, T., Petrovich, R.M., Mercier, K.A., DeRose, E.F., Cuneo, M.J., Williams, J., Johnson, K.L., Lamb, P.W., London, R.E. & **Yakel, J.L.** (2010). Identification and Functional Characterization of a Novel Acetylcholine-binding Protein from the Marine Annelid *Capitella teleta*. *Biochemistry* 49:2279-2287.
60. Seipel, A.T. & **Yakel, J.L.** (2010). The frequency-dependence of the nicotine-induced inhibition of dopamine is controlled by the $\alpha 7$ nicotinic receptor. *J. Neurochemistry*: in press.

Publications (Book Chapters):

1. **Yakel, J.L.**, L.O. Trussell & M.B. Jackson (1988). Cytoplasmic modulation of transmitter gated K channels in cultured mammalian central neurons. In *Calcium and Ion Channel Modulation*, A.D. Grinnell, D.L. Armstrong & M.B. Jackson, eds., pp. 291-302, Plenum Press, New York, NY.
2. **Yakel, J.L.** (1992). 5-HT₃ receptors as cation channels. In *Central and Peripheral 5-HT₃ Receptors*, M. Hamon, ed., pp. 103-128, Academic Press, London, England.
3. Jackson, M.B. & **J.L. Yakel** (1995). The 5-HT₃ receptor channel. *Annu. Rev. Physiol.* 57:447-468.
4. Jones, S., & **Yakel, J.L.** (1998) Functional study of glutamate receptor channels in brain slices. In *Neurodegeneration Methods and Protocols*, J. Harry & H.A. Tilson, eds., pp. 247-256, Humana Press, Totowa, NJ.
5. Jones, S., & **Yakel, J.L.** (1998) Calcium influx through voltage-gated calcium channels regulates 5-HT₃ receptor channel desensitization in NG108-15 cells. *Ann N Y Acad Sci.* 861:253-254.
6. **Yakel, J.L.** (2000) The 5-HT₃ receptor channel: Function, activation and regulation. In *Pharmacology of Ionic Channel Function: Activators and Inhibitors*, M. Endo, ed., pp. 541-560, Springer-Verlag, Berlin, Germany.