

CURRICULUM VITAE

GREGORY J. QUIRK, PH.D.

Departments of Psychiatry and Anatomy & Neurobiology

University of Puerto Rico School of Medicine

P.O. Box 365067

San Juan, Puerto Rico 00936-5067

Tel: (787) 999-3058, Fax: (787) 999-3057

Email: gregoryjquirk@gmail.com

Lab: <http://www.md.rcm.upr.edu/quirk/>

EDUCATION/EMPLOYMENT

- 1982 B.A. in Neuroscience, Northwestern University, Evanston, IL (Mentor: A. Routtenberg)
- 1990 Ph.D. in Neuroscience, SUNY Downstate Medical Center, Brooklyn, NY (Mentor: R.U. Muller)
- 1990-1992 *Research Instructor*, Dept. Anatomy, SUNY Downstate Medical Center, Brooklyn, NY
- 1992-1993 *Fulbright Fellow*, Dept. Physiology, Univ. of Honduras Med. Sch., Tegucigalpa, Honduras
- 1993-1997 *Postdoctoral Fellow*, Center for Neural Science, NYU, New York (Mentor: J.E. LeDoux)
- 1997-2001 *Assistant Professor*, Dept. Physiology, Ponce School of Medicine, Ponce, Puerto Rico
- 2001-2004 *Associate Professor*, Dept. Physiology, Ponce School of Medicine, Ponce, Puerto Rico
- 2004- 2007 *Professor*, Dept. Physiology, Ponce School of Medicine, Ponce, Puerto Rico
- 2007- present *Professor (w/tenure)*, Dept. Psychiatry, Univ. Puerto Rico School Medicine, San Juan, PR
- 2008- present *Professor (Joint Appt)*, Dept. Anatomy & Neurobiology, Univ. Puerto Rico, San Juan, PR

REVIEW ACTIVITIES AND GOVERNMENT SERVICE

- 1997 NIH-CSR Special Emphasis Panel ZRG-1 (Behavioral Neuroscience)
- 1997-99 Fulbright Senior Scholars Reviewer
- 2001-05 Member, NIH-CSR Study Section ICP-1 (International and Cooperative Projects)
- 2002-05 Society for Neuroscience (SFN) Membership Committee
- 2003-06 SFN Minority Neuroscience Fellowship Steering Committee
- 2003-09 SFN International Affairs Cmte/U.S. National Cmte of Nat. Acad. of Science (Vice-Chair)
- 2006 NIH-CSR Special Emphasis Panels ZRG1 BBBP-J (Animal Ethology and Learning); ZMH1-ERB-Y (Diversity T32 Training Grants).
- 2006 Guest Editor, *Biological Psychiatry* Special Issue on Extinction
- 2005-07 Section Editor, *Neuroscience* (Behavioral Neuroscience Section, published by IBRO)
- 2008 NIH-CSR Special Emphasis Panels ZRG1 BBBP-J (Animal Ethology and Learning); ZRG1 F02A-H (Fellowships: Behavioral Neuroscience).
- 2008-13 NIH-CSR Study Section Learning & Memory (LAM) (Chair, 2011-2013)
- 2011 NIMH RDoC Workshop on Negative Valence
- 2009-13 Chair, US/Canada Regional Committee of International Brain Research Organization
- 2009-18 Reviewer, Faculty of 1000 Medicine
- 2014-18 NIH-CSR Special Emphasis Panels ZRG1 IFCN-T (02) (Chair), ZMH1ERB-S (01), ZRG1-IFCN-B (90) (Chair), ZRG1 BDCN-W (90), ZRG1 IFCN-B (55), ZRG1-BDCN-W (90).
- 2010-18 Associate Editor: Journal of Neuroscience (SfN), NPJ Science of Learning.
Editorial Boards: Neuroscience; Learning & Memory, Frontiers.

HONORS

- 1992 Fulbright Scholar
- 1998 FIRST Award, National Institute of Mental Health (NIMH)

1999	Presidential Early Career Award for Scientists and Engineers, by President Clinton
2003	Award of Excellence in Teaching and Research, Ponce School of Medicine
2005	Alpha Omega Alpha Honor Medical Society, Beta Chapter of Puerto Rico
2006	Distinguished Lecturer, NIMH Mood and Anxiety Disorders Lecture Series
2007	Adler Lecturer, University of Pennsylvania, Biological Basis of Behavior Program
2008	Elected to American College of Neuropsychopharmacology (ACNP)
2009	Co-Chair, Gordon Research Conference on the Amygdala (July 11-16, Colby College)
2012	Elected AAAS Fellow
2014	Thompson-Reuters Highly Cited Researcher (top 1% in Neuroscience & Behavior)
2014	MERIT Award (Method to Extend Research in Time), NIH
2016	Special Recognition Award, Puerto Rico Science and Technology Trust
2017	Promoted to ACNP Fellow

PROFESSIONAL ORGANIZATIONS

Society for Neuroscience (International Affairs Cmte, Membership Cmte, Miledi School Planning Cmte, Latin American Training Advisory Group)
 American Physiological Society
 American College of Neuropsychopharmacology (Fellow)
 American Association for the Advancement of Science (Fellow)
 International Brain Research Organization (2009-12, Chair, US/Canada Regional Committee for IBRO)

TEACHING AND MENTORING

Medical Neuroscience Course: (2000-present). Lectures on excitable membranes, sensory systems, motor system, limbic system, cognition, and emotion.

Graduate Neuroscience Courses: Introduction to Cognitive Neuroscience and Brain Imaging, Special Topics in the Limbic System, Synaptic Pharmacology and Membrane Biophysics, weekly lab meetings, weekly journal clubs.

Mentoring:

Completed: 10 PhDs (M.R. Milad, E. Santini, K. Lebron, I. Vidal-Gonzalez, A. Burgos-Robles; D. Sierra-Mercado, C. Bravo-Rivera, J. Rodriguez-Romaguera, L. Rosas-Vidal, K. Quiñones-Laracuenta), 5 PsyDs (D. Anglada-Figueroa, B. Cintron, P. Hernandez-Poudevida, L. Olivera-Figueroa, M. Castro), 10 Post-Doctoral Fellows (D. Arroyo, J. Franco-Chavez, K. A. Corcoran, G. Garcia, D. Mueller, J. Peters, F. Sotres Quiñones -Bayon, F. Amador, F. H. Do Monte, F. Martinez-Rivera).

ADMINISTRATION

Institutional Committees in Puerto Rico: Institutional Review Board (IRB), Space Committee, Graduate School Steering Committee, Faculty Search committee, RCMI Internal Advisory committee, Psychiatry Research committee, Young Faculty mentoring committee, Key Activity Director, RCMI Pilot Projects Program.

Outside Puerto Rico: SFN International Affairs committee, IBRO North American Regional committee, IBRO Return Home Fellowship committee, SFN Membership committee, ACNP Advocacy committee, SFN Miledi Training School committee (Chair), SFN Minority Fellowship Steering committee.

ACTIVE RESEARCH GRANTS

1998-23 NIMH, R37-MH058883-22 (PI: Quirk) "Prefrontal-Amygdala Interactions in Fear Conditioning" (MERIT Award, formerly R01-MH058883, five-year MERIT

- Extension awarded 2018)
- 2015-20 NIMH, P50-MH106435-01 (PD: Haber, PI: Quirk) “Cingulate/prelimbic nodes mediating persistent avoidance” (Project 5, CONTE Center for Research in OCD).
- 2015-20 NSF, PAF06754 (PD: Yoon, PI: Quirk) “International Program for the Advancement of Neurotechnology (IPAN)”.
- (Funding currently \$900,000 per year in research grants and fellowships (direct+indirect))

COLLABORATORS

Suzanne N. Haber, PhD, Dept. of Anatomy and Neurobiology, Univ. Rochester (neuroanatomy)

Benjamin D. Greenberg, MD, PhD, Brown University (clinical research in OCD, PTSD)

Satish Nair, PhD, Dept. of Electrical and Computer Engineering, University of Missouri-Columbia (computational modeling of fear circuits).

James T. Porter, PhD, Dept. of Physiology, Ponce School of Medicine (patchclamp recording)

Karen G. Martinez, MD, Dept. of Psychiatry, UPR (human fear conditioning, clinical populations)

CONFERENCES AND SYMPOSIA ORGANIZED

Conference: Deep brain stimulation: Mechanisms of action in mood and anxiety disorders, February 11, 2011, University of Puerto Rico School of Medicine, San Juan, Puerto Rico.

Symposium: Erasing Fear with Extinction. Society for Neuroscience Annual Meeting 2010, San Diego, CA

Conference: Deep Brain Stimulation for use in Anxiety Disorders. Feb 25-27, 2010, Melia Resort, Rio Grande, Puerto Rico

Gordon Conference 2009: The Amygdala in Health and Disease (Co-Organizer with D. Paré), Colby College, ME

Social Issues Roundtable: Global Neuroscience - Neuroethics and the Burden of Nervous System Disorders, Society for Neuroscience Annual Meeting, Washington, DC, 2008

Scientific Panel: “Neural Mechanisms of Extinction: Translating from Rats to Humans”, American College of Neuropsychopharmacology Annual Meeting, 2005 (co-organized with Dr. Scott L. Rauch).

International Conference: “Extinction: The Neural Mechanisms of Behavior Change”, the first international conference ever held on the topic of extinction with participants from 18 countries, February 2-6, 2005, Ponce, Puerto Rico.

NIH Workshop: NIMH Workshop on Extinction of Conditioned Fear, June 6, 2003 (co-organized with Dr. Kathleen Anderson, NIMH).

Satellite Workshop: “Neuroscience in Developing Countries”, a yearly workshop organized as a satellite event at the Society for Neuroscience Annual Meeting, 1999-2005 (co-organized with Dr. Gladys E. Maestre).

PAPERS IN PEER-REVIEWED JOURNALS (Total=96, Citations=22,000, h-index=55 (Google Scholar))

1. Diehl MM, Bravo-Rivera C, Rodríguez-Romaguera J, Pagán-Rivera PA, Burgos-Robles A, Roman-Ortiz C, Quirk GJ (2018) Active avoidance requires inhibitory signaling in the rodent prelimbic prefrontal cortex. **eLife** 7:e34657. DOI: <https://doi.org/10.7554/eLife.34657>.
2. Do Monte F, Minier-Toribio A, Quiñones-Laracuente K, Medina-Colón EM, Quirk GJ (2017) Thalamic regulation of sucrose-seeking during unexpected reward omission. **Neuron** 94:388-400.
3. Quirk GJ (2017) Less fear, more diversity. **PLoS Biology** 15(4):e2002079. doi: 10.1371/journal.pbio.2002079.
4. Pare D and Quirk GJ (2017) When scientific paradigms lead to tunnel vision: Lessons from the study of fear. **NPJ Science of Learning**. doi:10.1038/s41539-017-0007-4.

5. Delgado MR, Beer JS, Fellows LK, Huettel SA, Platt ML, Quirk GJ, Schiller D. (2016) Viewpoints: Dialogues on the functional role of the ventromedial prefrontal cortex. **Nature Neuroscience** 19:1545-1552.
6. Do-Monte FH, Quirk GJ, Li B, Penzo, M (2016) Retrieving fear memories, as time goes by... **Molecular Psychiatry** 21:1027-1036.
7. Heilbronner SR, Rodriguez-Romaguera J, Quirk GJ, Groenewegen HJ, Haber SN (2016) Circuit based cortico-striatal homologies between rat and primate. **Biological Psychiatry** 80:509-521.
8. Martínez-Rivera FJ, Rodriguez-Romaguera J, Lloret-Torres ME, Do Monte FH, Quirk GJ, Barreto-Estrada JL. (2016) Bidirectional Modulation of Extinction of Drug Seeking by Deep Brain Stimulation of the Ventral Striatum. **Biological Psychiatry** 80:682-690.
9. Rodriguez-Romaguera J, Greenberg BD, Rasmussen SA, Quirk GJ (2016) An avoidance-based rodent model of exposure with response prevention therapy. **Biological Psychiatry** 80:534-540.
10. Rodriguez-Romaguera J, Greenberg BD, Haber SN, Quirk GJ (2015) A Cross Species Approach to Understanding DBS Modulation of Fear. **Brain Stimulation** 8:986-988.
11. Bravo-Rivera C, Roman-Ortiz C, Montesinos-Cartagena M, Quirk GJ (2015) Persistent active avoidance correlates with activity in prelimbic cortex and ventral striatum. **Frontiers Behav. Neurosci.** 9:184.
12. Quiñones-Laracuente K, Hernández-Rodríguez M.Y., Bravo-Rivera C, Melendez R.I. Quirk GJ (2015) The effect of repeated exposure to ethanol on pre-existing fear memories in rats. **Psychopharmacology** 232:3615-3622.
13. Do-Monte FH, Manzano-Nieves G, Quinones-Laracuente K, Ramos-Medina L, Quirk GJ (2015) Revisiting the role of infralimbic cortex in fear extinction with optogenetics. **J. Neurosci.** 35:3607-3615.
14. Do-Monte FH, Quinones-Laracuente K, Quirk GJ (2015) A temporal shift in the circuits mediating retrieval of fear memory. **Nature** 519:460-463.
15. Rodriguez-Romaguera J, Do-Monte FH, Tanimura Y, Quirk GJ, Haber SN (2015) Enhancement of fear extinction with deep brain stimulation: evidence for medial orbitofrontal involvement. **Neuropsychopharmacology** 40:1726-1733.
16. Martínez KG, Franco-Chavez JA, Milad MR, Quirk GJ (2014) Ethnic differences in physiological responses to fear conditioned stimuli. **PLoS One** 9(12): e114977. doi:10.1371/journal.pone.0114977.
17. Bravo-Rivera C, Roman-Ortiz C, Brignoni-Perez E, Sotres-Bayon F, Quirk GJ (2014) Neural structures mediating expression and extinction of platform-mediated avoidance. **J. Neurosci.** 34:9736-9742.
18. Rosas-Vidal L, Do-Monte FH, Sotres-Bayon F, Quirk GJ (2014) Hippocampal-prefrontal BDNF and memory for fear extinction. **Neuropsychopharmacology** 39:2161-2169.
19. Do-Monte FH, Rodriguez-Romaguera J, Rosas-Vidal LE, Quirk GJ (2013) Deep brain stimulation of the ventral striatum increases BDNF in the fear extinction circuit. **Front Behav Neurosci.** 7:102. doi: 0.3389/fnbeh.2013.00102.
20. Pendyam S, Bravo-Rivera C, Burgos-Robles A, Sotres-Bayon F, Quirk GJ, Nair SS (2013) Fear signaling in the prelimbic-amygdala circuit: A computational modeling and recording study. **J. Neurophysiology** 110:844-861.

21. Burgos-Robles A, Bravo-Rivera H, Quirk GJ (2013) Prelimbic and infralimbic neurons signal distinct aspects of appetitive instrumental behavior. **PLOS One** 8(2): e57575. doi:10.1371/journal.pone.0057575.
22. Felmingham KL, Dobson-Stone C, Schofield PR, Quirk GJ, Bryant RA (2013) The BDNF Val66Met polymorphism predicts response to exposure therapy in posttraumatic stress disorder. **Biological Psychiatry** 73:1059-1063.
23. Sotres-Bayon F, Sierra-Mercado D, Pardilla-Delgado E, Quirk GJ (2012) Gating of fear in prelimbic cortex by hippocampal and amygdala inputs. **Neuron** 76:804–812.
24. Martínez KG, Castro-Couch M, Franco JA, Ojeda BA, Segura G, Milad M, Quirk GJ (2012) Correlations between psychological tests and physiological responses during fear conditioning and renewal. **Biology of Mood and Anxiety Disorders** 2(1):16. doi: 10.1186/2045-5380-2-16.
25. Rodriguez-Romaguera J, Do Monte FHM, Quirk GJ (2012) Deep brain stimulation of the ventral striatum enhances extinction of conditioned fear. **Proc. Nat. Acad. Sci.** 109: 8764-8769 (highlighted in *Nature*, 485:418).
26. Linnman C, Zeidan MA, Furtak SC, Pitman RK, Quirk GJ, Milad MR (2012) Resting amygdala and medial prefrontal metabolism predict functional activation of the fear extinction circuit. **American J. Psychiatry** 169:415-423.
27. Milad MR, Quirk GJ (2012) Fear extinction as a model for translational neuroscience. **Annual Reviews Psychology** 63:129-151.
28. Padilla-Coreano N, Do-Monte FH, Quirk GJ (2012) A time-dependent role of midline thalamic nuclei in the retrieval of fear memory. **Neuropharmacology** 62:457-463.
29. Sierra-Mercado D, Padilla-Coreano N, Quirk GJ (2011) Dissociable roles of prelimbic and infralimbic cortices, ventral hippocampus, and basolateral amygdala in the expression and extinction of conditioned fear. **Neuropsychopharmacology** 36:529-538.
30. Fontanez-Nuin DE, Santini E, Quirk GJ, Porter JT (2011) Memory for fear extinction requires mGluR5-mediated activation of infralimbic neurons. **Cerebral Cortex** 21:727-735.
31. Quirk GJ, Paré D, Richardson R, Herry C, Monfils MH, Schiller D, Vicentic A (2010) Erasing fear memories with extinction training. **J. Neuroscience** 30:14993-14997.
32. Mueller D, Bravo-Rivera C, Quirk GJ (2010) Infralimbic D2 receptors are necessary for fear extinction and extinction-related tone responses. **Biological Psychiatry** 68:1055-1060.
33. Peters J, Dieppa-Perea LM, Melendez LM, Quirk GJ (2010) Induction of fear extinction with hippocampal-infralimbic BDNF. **Science** 328:1288-1290.
34. Sotres-Bayon F., Quirk G.J. (2010) Prefrontal cortex and fear: More than just extinction. **Curr. Opinion Neurobiol.** 20:231-235.
35. Quirk G.J., Milad M.R. (2010) Editing out fear. **Nature** 463:36-37.
36. Holmes, A., Quirk G.J. (2010) Pharmacological facilitation of fear extinction and the search for adjunct treatments for anxiety disorders- the case of yohimbine. **Trends in Pharmacological Science** 31:2-7.

37. Burgos-Robles, A., Vidal-Gonzalez, I., Quirk, G.J. (2009) Sustained conditioned responses in prelimbic prefrontal neurons are correlated with fear expression and extinction failure. **Journal of Neuroscience** 29:8474-8482.
38. Mueller D, Olivera-Figueroa L, Quirk GJ (2009) The effects of yohimbine and amphetamine on fear expression and extinction in rats. **Psychopharmacology** 204:599-606.
39. Rodriguez-Romaguera, J., Sotres-Bayon, F., Mueller, D., Quirk, G.J. (2009) Systemic propranolol acts centrally to reduce expression of cued fear in rats without impairing extinction learning. **Biological Psychiatry** 65:887-892.
40. Peters, J., Kalivas, P. W., Quirk, G.J. (2009) Shared prefrontal mechanisms regulating extinction of both fear and addiction. **Learning & Memory** 16:279-288.
41. Quirk G.J., Sotres-Bayon F. (2009) Signaling aversive events in the midbrain: worse than expected. **Neuron** 61:655-656.
42. Martínez K.G., Quirk G.J. (2009) Extending fear extinction beyond anxiety disorders. **Biological Psychiatry** 65:453-454.
43. Li, G, Nair, S.S. and Quirk, G.J. (2009) A biologically realistic network model of acquisition and extinction of conditioned fear associations in lateral amygdala neurons. **Journal of Neurophysiology** 101:1629-1646.
44. Li G, Nair J., Quirk G.J., and Nair S.S. (2008) Computational modeling: A tool for new psychiatric medication development. **Psychiatric Annals** 38:296-300.
45. Santini, E., Quirk, G.J., Porter, J.T.(2008) Fear conditioning and extinction differentially modify the intrinsic excitability of infralimbic neurons. **Journal of Neuroscience** 28:4028-4036.
46. Mueller D., J.T. Porter, G.J. Quirk (2008) Noradrenergic signaling in infralimbic cortex increases cell excitability and strengthens memory for fear extinction. **Journal of Neuroscience** 28:369-375.
47. Quirk, G.J., D. Mueller (2008) Neural mechanisms of extinction learning and retrieval. **Neuropsychopharmacology Reviews** 33:56-72.
48. Quirk G.J., Martinez K.G., Nazario-Rodríguez L.L. (2007) Translating findings from basic fear research to clinical psychiatry in Puerto Rico. **Puerto Rico Health Science Journal** 26:321-328.
49. Milad, M.R., G.J. Quirk, R.K. Pitman, S.P. Orr, B. Fischl, S.L. Rauch (2007) A role for the human dorsal anterior cingulate cortex in the expression of learned fear. **Biological Psychiatry** 62:1191-1194.
50. Milad, M.R., C.L. Wright, S.P. Orr, R.K. Pitman, G.J. Quirk, S.L. Rauch (2007) Recall of fear extinction in humans activates the ventromedial prefrontal cortex and hippocampus in concert. **Biological Psychiatry** 62:446-454.

51. Burgos-Robles, A., I. Vidal-Gonzalez, E. Santini, G. J. Quirk (2007) Consolidation of fear extinction requires NMDA receptor-dependent bursting in the ventromedial prefrontal cortex. **Neuron** 53:871-880.
52. Corcoran, K.A., G.J. Quirk (2007) Recalling safety: Cooperative functions of the ventromedial prefrontal cortex and the hippocampus in extinction. **CNS Spectrums** 12:200-206.
53. Corcoran, K.A., G.J. Quirk (2007) Activity in prelimbic cortex is necessary for the expression of learned, but not innate, fears. **Journal of Neuroscience** 27:840–844.
54. Quirk, G.J., J.S. Beer (2006) Prefrontal involvement in emotion regulation: Convergence of rat and human studies. **Current Opinion in Neurobiology** 16:723–727.
55. Vidal-Gonzalez, I. B. Vidal-Gonzalez, S. L. Rauch, G. J. Quirk (2006) Microstimulation reveals opposing influences of prelimbic and infralimbic cortex on the expression of conditioned fear. **Learning & Memory** 13: 728-733.
56. Quirk GJ, Vidal-Gonzalez I. (2006) Keeping the memories flowing. **Nature Neuroscience** 9:1199-1200.
57. Sierra-Mercado, Jr, D., K.A. Corcoran, K. Lebrón, G.J. Quirk (2006) Inactivation of ventromedial prefrontal cortex reduces expression of conditioned fear and impairs subsequent recall of extinction. **European Journal of Neuroscience** 24:1751-1758.
58. Quirk GJ. (2006) Extinction: new excitement for an old phenomenon. **Biological Psychiatry** 60:317-318.
59. Quirk, G.J., R. Garcia, F. Gonzalez-Lima (2006) Prefrontal mechanisms in extinction of conditioned fear. **Biological Psychiatry** 60:337-343.
60. Milad, M.R., S.L. Rauch, R.K. Pitman, G.J. Quirk (2006) Fear extinction in rats: Implications for human brain imaging and anxiety disorders. **Biological Psychology** 73:61-71.
61. Anglada-Figueroa, D., G.J. Quirk (2005) Lesions of basal amygdala block expression of conditioned fear, but not extinction. **Journal of Neuroscience** 25:9680-9685.
62. Quirk, G.J. and S. Peña de Ortiz (2005) Stuck in time without a nucleus: Commentary on Sangha et al. (2005). **Behavioral Neuroscience** 119:1155-1157.
63. Maren, S, and G.J. Quirk (2004) Neuronal signaling of fear memory. **Nature Reviews Neuroscience** 5:844-842.
64. Lebron, K., M.R. Milad, and G.J. Quirk (2004) Delayed recall of fear extinction in rats with lesions of ventral medial prefrontal cortex. **Learning & Memory** 11:544-548.
65. Santini, E., H. Ge, K. Ren, S. Peña de Ortiz, G.J. Quirk (2004) Consolidation of fear extinction requires protein synthesis in the medial prefrontal cortex. **Journal of Neuroscience** 24:5704-5710.

66. Paré, D, G.J. Quirk, and J.E. LeDoux (2004) New vistas on amygdala networks in conditioned fear. **Journal of Neurophysiology** 92:1-9.
67. Quirk, G.J. (2004) Learning not to fear, faster. **Learning & Memory** 11:125-126.
68. Milad, M.R., I. Vidal-Gonzalez, G.J. Quirk (2004) Electrical stimulation of medial prefrontal cortex reduces conditioned fear in a temporally specific manner. **Behavioral Neuroscience** 118:389-395.
69. Quirk, G.J., E. Likhtik, J.G. Pelletier, D. Paré (2003) Stimulation of medial prefrontal cortex decreases the responsiveness of central amygdala output neurons. **Journal of Neuroscience** 23:8800-07.
70. Quirk, G.J., D.R. Gehlert (2003) Inhibition of the amygdala: Key to pathological states? **Annals New York Academy of Science** 985:263-272.
71. Milad, M.R., G.J. Quirk (2002) Neurons in medial prefrontal cortex signal memory for fear extinction. **Nature** 420:70-74.
72. Quirk, G.J. (2002) Memory for extinction of conditioned fear is long-lasting and persists following spontaneous recovery. **Learning and Memory** 9:402-407.
73. Santini, E., R.U. Muller, and G.J. Quirk. (2001) Consolidation of extinction learning involves transfer from NMDA-independent to NMDA-dependent memory. **Journal of Neuroscience** 21:9009-17.
74. Quirk, G.J., G.K. Russo, J.L. Barron, K. Lebron. (2000) The role of ventral medial prefrontal cortex in the recovery of extinguished fear. **Journal of Neuroscience** 20:6225-6231.
75. Quirk, G.J. (1999) Neuroscience in developing countries: Getting around the problems. *International Journal of Neuroscience* 99:89-90.
76. Quirk, G.J. (1998) Fear research: implications for anxiety disorders. **Boletín de la Asociación Medica de Puerto Rico** 90:27-29.
77. Armony, J.L., G.J. Quirk, and J.E. LeDoux (1998) Differential effects of amygdala lesions on early and late plastic components of auditory cortex spike trains during fear conditioning. **Journal of Neuroscience** 18:2592-2601.
78. Hesse, H., M. F. Rivera, I. de Diaz, and G.J. Quirk (1998) Central somatosensory conduction time in severely growth-stunted children. **American Journal of Clinical Nutrition** 67:93-96.
79. Quirk, G.J., J.L. Armony, and J.E. LeDoux (1997) Fear conditioning enhances different temporal components of tone-evoked spike trains in auditory cortex and lateral amygdala. **Neuron** 19:613-624.
80. Quirk, G.J., J.C. Repa, J.E. LeDoux (1995) Fear conditioning enhances short latency auditory responses of neurons in the lateral nucleus of the amygdala: Parallel recordings in the freely behaving rat. **Neuron** 15:1029-1039.
81. Quirk, G.J. (1995) Starting a neuroscience laboratory in a developing country: a Fulbright experience

- in Honduras. **American Journal of Physiology**. 329 (*Adv. Physiol. Educ.* 14): S61-S67.
82. Quirk, G.J., W.R. Mejia, H. Hesse and H. Su (1995) Early malnutrition followed by nutritional restoration lowers the conduction velocity and excitability of the corticospinal tract. **Brain Research** 670: 277-282.
 83. Su, H., J. R. Mejía, A. Ortega, W. R. Mejía and G.J. Quirk (1995) The effect of a popular "neurotonic" on peripheral conduction velocity and conduction time within the central nervous system. **Revista Medica Hondureña** 63: 6-11.
 84. Quirk, G.J. and L. Casco (1994) Stress disorders of the families of the "disappeared": a controlled study in Honduras. **Social Science and Medicine** 39: 1675-1679.
 85. Quirk, G.J., R.U. Muller, J.L. Kubie and J.B. Ranck, Jr. (1992) The positional firing properties of neurons in medial entorhinal cortex: description and comparison to hippocampal place cells. **Journal of Neuroscience** 12: 1945-1963.
 86. Stewart, M., G.J. Quirk, M. Barry and S.E. Fox (1992) Firing relations of medial entorhinal neurons to the hippocampal theta rhythm in urethane anesthetized and walking rats. **Experimental Brain Research** 90: 21-28.
 87. Quirk, G.J. (1991) Forced disappearance in Honduras: effects on the families. **Report of the Economic and Social Council of the United Nations**, document #E/CN.4/1991/NGO/36, United Nations, Geneva.
 88. Quirk, G.J., R.U. Muller and J.L. Kubie (1990) The firing of hippocampal place cells in the dark reflects the rat's recent experience. **Journal of Neuroscience** 10: 2008-2017.
 89. Amassian, V.E., G.J. Quirk and M. Stewart (1990) A comparison of magnetic coil and electrical stimulation of monkey motor cortex. **Electroencephalography and Clinical Neurophysiology** 77:390-401.
 90. Stewart, M., G.J. Quirk and V.E. Amassian (1990) Corticospinal responses to electrical stimulation of motor cortex in the rat. **Brain Research** 508:341-344.
 91. Quirk, G.J., and M. Stewart (1988) Neurons in entorhinal cortex of etherized rats exhibit rhythmic bursting correlated with the hippocampal EEG. **Annals of the New York Academy of Science** 529: 310-313.
 92. Collier, T.J., G.J. Quirk and A. Routtenberg (1987) Separable roles of hippocampal granule cells in forgetting and pyramidal cells in remembering spatial information. **Brain Research** 409:316-328.
 93. Amassian, V.E., M. Stewart, G.J. Quirk and J.L. Rosenthal (1987) The physiological basis of motor effects of a transient stimulus to cerebral cortex. **Neurosurgery** 20:74-93.
 94. Neafsey, E.J., E.L. Bold, G. Haas, K.M. Hurley-Gius, G.J. Quirk and C.F. Sievert (1986) The organization of the rat motor cortex: a microstimulation mapping study. **Brain Research Reviews** 11:77-96.

BOOK CHAPTERS

1. Rodriguez-Romaguera J, Quirk GJ (2017) Extinction of conditioned fear and avoidance: Relevance for OCD. In *Obsessive-Compulsive Disorder: Phenomenology, Pathophysiology, and Treatment*, Ed: C. Pittenger, Oxford University Press.
2. Quirk, G.J. (2016) Fear. In: *Neuroscience in the 21st Century* (Donald Pfaff ed.) Springer, New York.
3. Oler, J.A., G. J. Quirk, P. J. Whalen (2008) Cingulo-amygdala interactions in surprise and extinction: Interpreting associative ambiguity. In: *Cingulate Neurobiology and Disease. Volume 1: Infrastructure, Diagnosis, and Treatment* (ed. B.A. Vogt), Oxford University Press, London.
4. Mueller, D., and G.J. Quirk (2008) Learning and Extinction. In: *Encyclopedia of Neuroscience* (ed. M.D. Binder, N. Hirokawa, U. Windhorst, and M.C. Hirsch), Springer-Verlag, Berlin.
5. Quirk, G.J. (2006) Prefrontal-amygdala interactions in the regulation of fear. In: *Handbook of Emotion Regulation*. (ed. J.J. Gross). Guilford Press, New York pp: 27-46.
6. Quirk, G.J., M.R. Milad, E. Santini, K. Lebron (2006) Learning not to fear: A neural systems approach. In: *Understanding Trauma: Cultural, Psychological, and Biological Perspectives on Terror and its Aftermath* (ed. L. Kirmayer, R. Lenelson, M. Barad). Cambridge University Press. Pp. 60-77.
7. Quirk, G.J., J.L. Armony, J.C. Repa, X.F. Li, and J.E. LeDoux (1996) Emotional memory: A search for sites of plasticity, in *Cold Spring Harbor Symposium on Quantitative Biology, Vol. 61*, (ed. B. Stillman), Cold Spring Harbor Press, pp. 247-257.
8. Muller, R.U., J.L. Kubie, E. Bostock, J. Taube and G.J. Quirk (1991) Spatial firing correlates of neurons in the hippocampal formation of freely moving rats. In *Brain and Space*, J. Paillard ed., Oxford.

INVITED SEMINARS (since 2000)

- | | |
|----------|---|
| 06/28/18 | Presidential Lecture, International Behavioral Neuroscience Society (IBNS), Boca Raton, FL |
| 05/30/18 | Psychiatry Grand Rounds, Univ. of Illinois College of Medicine, Chicago, IL |
| 05/11/18 | Society of Biological Psychiatry Annual Meeting, New York, NY |
| 05/07/18 | International Conference on Advanced Neurotechnology, Univ. Michigan, Ann Arbor, MI |
| 02/08/18 | Neuroscience Seminar, Medical University of South Carolina (MUSC), Charleston, SC |
| 08/10/17 | Gordon Research Conference: Amygdala Function in Emotion, Cognition and Disease, Easton, MA |
| 06/21/17 | SPINES Course, Marine Biological Laboratory, Woods Hole, MA |
| 03/15/17 | 5 th Annual Neuroscience Conference, LabRoots (via webinar) |
| 03/10/17 | Psychiatry Grand Rounds, Vanderbilt University Medical School, Nashville, TN |
| 11/15/16 | Symposium: Moving from Pavlovian fear conditioning to active avoidance, Society for Neuroscience 46 th Annual Meeting, San Diego, CA |
| 10/13/16 | Conference on Persistent Maladaptive Behaviors, University of Rochester, Rochester, NY |
| 09/30/16 | Keynote Speaker, Universidad del Este Undergraduate Symposium, San Juan, PR |
| 09/11/16 | University of Pittsburgh, 30th Annual Center for Neuroscience Retreat, Wheeling, WV |
| 07/06/16 | Federation of European Neuroscience Societies (FENS), Copenhagen, DENMARK |
| 06/14/16 | International Conference on Advanced Neurotechnology, Univ. Michigan, Ann Arbor, MI |
| 05/18/16 | Psychiatry Grand Rounds, Northwestern University Medical School, Chicago, IL |

05/10/16 Neuroscience Seminar Series, Yale University, New Haven, CT
 04/16/16 Annual Research Symposium, Assoc. of Medical Students of Puerto Rico, San Juan, PR
 03/17/16 Neuroscience Graduate Program Seminar Series, Brown University, Providence, RI
 12/07/15 American College of Neuropsychopharmacology (ACNP) Annual Meeting, Hollywood, FL
 09/14/15 European Brain and Behaviour Society Annual Meeting, Verona, ITALY
 08/25/15 Latin American Training Pgm, Institute of Neurobiology, UNAM, Queretero, MEXICO
 06/30/15 Joe L. Martinez and James G. Townsel Endowed Lectureship, MBL, Woods Hole, MA
 05/21/15 Warsaw Special Symposium on Emotional Brain, Nencki Institute, Warsaw, POLAND
 05/02/15 Symposium on Biology, UPR Mayaguez, PR
 04/23/15 Center for Neurobiology of Learning & Memory, UC-Irvine, CA
 03/03/15 National Institute on Drugs and Addiction (NIDA), Baltimore, MD
 01/06/15 Annual Conference 'Biology Across Scales', National Center for Biological Science (NCBS), Bangalore, INDIA
 10/15/14 Neuroscience Seminar Series, Penn State, University Park, PA
 05/02/14 Frontiers in Neuroscience Series, Emory University, Atlanta, GA
 04/03/14 Neuroscience Seminar Series, Columbia University Medical School, New York, NY
 04/01/14 Neuroscience Seminar Series, Harvard McLean Hospital, Belmont, MA
 03/11/14 Neuroscience Seminar Series, Cold Spring Harbor Laboratories, Cold Spring Harbor, NY
 02/29/14 Winter Conference on Neural Plasticity, Vieques, Puerto Rico
 12/09/13 American College of Neuropsychopharmacology (ACNP) Annual Meeting, Miami, FL
 10/23/13 Neuroscience Seminar Series, Tufts University School of Medicine, Boston, MA
 09/27/13 Annual Pavlovian Society Meeting, Austin, TX
 09/06/13 45th European Brain and Behaviour Society Meeting, Munich, GERMANY
 07/28/13 Gordon Conference on the Amygdala, Stonehill College, Easton, MA
 07/08/13 2013 Summer Institute in Cognitive Neuroscience, Lake Tahoe, CA
 04/23/13 8th Annual Amygdala Stress and PTSD Conf., Uniformed Serv. Univ., Bethesda, MD
 11/05/12 Federation of Neuroscience Societies in Latin America (FALAN), Cancun, MEXICO
 05/25/12 One Mind for Research Symposium, UCLA, Los Angeles, CA
 04/26/12 Symposium on Mindfulness, Bowling Green State University, Bowling Green, OH
 03/26/12 Neuroscience Seminar Series, New York University Medical School, New York, NY
 03/08/12 University of Jordan Medical School, Amman, JORDAN
 03/04/12 Al Quds University School of Medicine, Jerusalem, PALESTINE TERRITORY
 02/21/12 Keck Distinguished Lecture Series, Univ. Southern California, Los Angeles, CA
 12/01/11 Neuroscience Seminar Series, Yale University School of Medicine, New Haven, CT
 11/11/11 21st Neuropsychopharmacology Conference-Anxiety and Depression, Tyson's Corner, VA
 10/20/11 Univ. Mass. Medical School Neuroscience Seminar Series, Worcester, MA
 09/21/11 15th World Congress on Psychiatry, Buenos Aires, ARGENTINA
 08/31/11 International Society Neurochemistry Meeting, Athens, GREECE
 08/27/11 European Behavioral Pharmacology Society Conf., Amsterdam, NETHERLANDS
 08/03/11 Gordon Conference on the Amygdala, Colby College, Waterville, ME
 07/07/11 Neuroscience Seminar Series, Dept. Anatomy & Neurobiol, Univ. Rochester Med Sch, NY
 04/13/11 Annual Learning & Memory Lecturer, Center for Learning & Memory, UCLA, LA, CA
 03/30/11 Neuroscience Colloquium, Albert Einstein College of Medicine, Bronx, NY
 03/04/11 Neuroscience Colloquium, University of Wisconsin, Milwaukee, WI
 12/06/10 Panel on Deep Brain Stimulation, 49th Annual Meeting, ACNP, Miami Beach, FL
 11/05/10 International Society for Traumatic Stress Studies, 26th Annual Mtg., Montreal CANADA
 10/22/10 PBS Colloquium, Dept. of Psychology, Dartmouth University, Hanover, NH
 10/08/10 Deep Brain Stimulation: Motor Systems and Beyond. University of Rochester, NY

10/02/10 Hispaniola School of Neuroscience, Santiago, DOMINICAN REPUBLIC
 09/21/10 Dept. of Psychology, University of New South Wales, Sydney, AUSTRALIA
 09/15/10 Brain Plasticity Symposium, Queensland Brain Institute, Brisbane, AUSTRALIA
 06/04/10 6th world Congress of Behavioral and Cognitive Therapies, Boston, MA
 05/22/10 Society of Biological Psychiatry Annual Meeting, New Orleans, LA
 05/08/10 Molecular Cellular Cognition Society (PR Chapter), San Juan, PR
 04/29/10 Neuroscience Seminar Series, Brown University, Providence, RI
 03/05/10 Anxiety Disorders Association of America (ADAA) Annual Meeting, Baltimore, MD
 02/05/10 Gallo Center of UCSF, Emeryville, CA
 01/08/10 Psychiatry Grand Rounds, Indiana University School of Medicine, Indianapolis, IN
 12/13/09 Synaptic Reunion, Center for Neural Science, New York University, NY, NY
 10/06/09 NISTP Annual Lecture, Northwestern University School of Medicine, Chicago, IL
 07/16/09 Gordon Conference on the Amygdala, Colby College, Waterville, ME (Co-Chair)
 06/04/09 Symposium on Emotion Regulation, Tufts University, Medford, MA
 05/18/09 NIMH Intramural Research Program, Bethesda, MD
 04/16/09 Grand Rounds, Dept. of Psychiatry, Harvard-MGH, Boston, MA
 03/12/09 Psychology Seminar Series, Northeastern University, Boston, MA
 01/13/09 Regional Conference on Addiction, Catholic University, Santiago, CHILE
 09/17/08 Center for Molecular and Behavioral Neuroscience, Rutgers University, Newark, NJ
 07/15/08 FENS Meeting, Geneva, SWITZERLAND
 12/09/08 American College of Neuropsychopharmacology (ACNP) Annual Meeting, Scottsdale, AZ
 11/14/08 Molecular and Cellular Cognition Society Annual Conference, Washington, DC
 10/30/08 Translational Neuroscience Series, Mount Sinai School of Medicine, NY, NY
 04/29/08 McGovern Inst: The Biological Basis of Psychiatric Disease, MIT, Cambridge, MA
 02/11/08 Winter Conference on Neural Plasticity, St. Lucia, WEST INDIES
 01/25/08 Neural and Behavioral Sciences Seminar, SUNY Downstate Med Ctr., Brooklyn, NY
 01/24/08 Neurobiology and Behavior Seminar Series, Columbia University, New York, NY
 11/13/07 Dept. Neurobiology and Anatomy, University of Texas Medical School, Houston, TX
 10/06/07 Pavlovian Society Meeting, University of Texas Austin, Austin, TX
 10/05/07 Neuroscience Seminar, Texas A&M University, College Station, TX
 07/12/07 NIMH Workshop: Prefrontal Interactions with Cortical and Subcortical Systems that Support Complex Mental Function, Washington, DC
 05/25/07 Special Interest Meeting on Fear, University of Leuven, Leuven, BELGIUM
 04/24/07 Adler Lecture, University of Pennsylvania, Philadelphia, PA
 07/20/06 NIMH-Sponsored Workshop on Emotion Regulation, Univ. Wisconsin, Madison, WI
 07/19/06 Northwestern University Synaptic Plasticity Training Grant Retreat, Lake Geneva, WI
 07/03/06 RIKEN Brain Science Institute, Waco City, JAPAN
 06/30/06 Center of Excellence International Symposium, University of Tokyo, Hakone, JAPAN
 05/18/06 Dept. Ciencias Morfológicas, University of Valencia Medical School, Valencia, SPAIN
 05/09/06 Distinguished Lecturer Series, NIMH Mood and Anxiety Disorders Group, Bethesda, MD
 04/24/06 Anxiety Disorders Association of America Annual Meeting, Miami, FL
 12/15/05 American College of Neuropsychopharmacology, Annual Meeting, Hawaii (Session Chair)
 11/28/05 "Consciousness: The Final Frontier", Univ. de Los Andes, Santiago, CHILE
 10/07/05 National Institute on Drug Abuse (NIDA), Baltimore, MD
 10/06/05 Neuroscience Seminar Series, University of Maryland School of Medicine, Baltimore, MD
 08/15/05 National Center for Biological Science, Bangalore, INDIA
 06/27/05 Universidad de Los Andes, Merida, VENEZUELA
 05/22/05 American Psychiatric Association Annual Meeting, Atlanta, GA

03/15/05 Neuroscience Seminar Series, University of Colorado, Boulder, CO
 09/15/04 Ernest Gallo Clinic and Research Center, San Francisco, CA
 06/25/04 Symposium: The Plastic Brain, NWO Cognition Program, Utrecht, NETHERLANDS
 06/24/04 Summer School in Cognitive Science, University of Amsterdam, NETHERLANDS
 06/17/04 Otto Von Guericke University School of Medicine, Magdeburg, GERMANY
 05/14/04 Symposium on Stress, International Longevity Center, Tucson, AZ
 01/07/04 Biology Seminar Series, University of the Philippines, Diliman, PHILIPPINES
 11/10/03 Symposium on Extinction: Society for Neuroscience Annual Meeting, New Orleans, LA
 10/28/03 Joint Neuroscience Seminar Series, Brain Research Institute, UCLA, Los Angeles, CA
 08/08/03 Symposium on Extinction, APA Annual Convention, Toronto, CANADA
 07/14/03 Symposium on Neural Plasticity, IBRO Convention, Prague, CZECH REPUBLIC
 06/09/03 NIMH Workshop on Extinction (Co-Chair of workshop), NIH-NIMH, Washington DC
 06/05/03 Course in Cellular Neurobiology, Universidad de Zulia, Maracaibo, VENEZUELA
 04/08/03 Spring Seminar Series in Neuroscience, University of California-Irvine, CA
 04/10/03 Conference on Learning & Memory, Cold Spring Harbor Laboratories, CSH, New York
 03/25/03 Center for Behavioral and Molecular Neuroscience, Rutgers University, Newark, NJ
 03/14/03 Center for Neural Science, New York University, NY
 01/13/03 27th Annual Winter Conference on Neurobiology of Learning Memory, Park City, UT
 12/14/02 Conference on Posttraumatic Stress Disorder: Biological, Clinical, and Cultural Approaches
 to Trauma's Effects, UCLA, Los Angeles, CA
 10/31/02 NIMH Conference on U.S.-India Scientific Partnerships, Orlando, FL
 10/01/02 Seminar Series, Cajal Neuroscience Research Center, UTSA, San Antonio, TX
 07/11/02 Conference: Synaptic Plasticity, A Systems Viewpoint, University of Bristol, ENGLAND
 03/24/02 NYAS Conference: The Amygdala in Brain Function, University of Texas, Galveston, TX
 01/30/02 Symposium on Prefrontal Cortex, Winter Conference on Brain Research, Snowmass, CO
 10/11/01 Pavlovian Society Annual Meeting, Rutgers University, New Brunswick, NJ
 08/08/01 Neuroscience Seminar Series, Northwestern University Medical School, Chicago, IL
 05/04/01 Festschrift for Dr. Vahé Amassian, SUNY Health Science Center, Brooklyn, NY
 03/22/01 Conference on Regeneration, Plasticity and Neural Repair, CIREN Institute, Havana, CUBA
 02/17/01 Conference on Amygdala-Cortical Interactions, University of California-Irvine, CA
 09/14/00 Neuroscience Seminar Series, Concordia University, Montreal, CANADA
 09/16/00 Seminar in Department of Physiology, University of Laval, Quebec, CANADA
 07/08/00 NIMH Workshop on Cognition & Emotion, National Institutes of Health, Washington DC
 03/24/00 Honorary Lecturer, Annual Graduate Day, SUNY Health Science Center, Brooklyn, NY
 02/24/00 Conference on Neural Plasticity, St. Lucia, WEST INDIES