

## BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.  
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME <b>Craig M. Powell, M.D., Ph.D.</b>	POSITION TITLE <b>Associate Professor with tenure</b>		
eRA COMMONS USER NAME <b>cpowel</b>			
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
Louisiana State University, Baton Rouge, LA	B.S.	1988	Zoology, minor in Psychology
Baylor College of Medicine, Houston, TX	Ph.D.	1989-1994	Ph.D. Neuroscience
Baylor College of Medicine, Houston, TX	M.D. (with honor)	1998-1989 & 1994-1997	Medicine
Baylor College of Medicine, Houston, TX	Internship	1997-1998	Transitional Internship
University of California, San Francisco, CA	Residency	1998-2001	Neurology Residency
U.T. Southwestern Medical Center, Dallas, TX	Postdoc	2001-2003	Postdoctoral Fellow with Dr. Eric Nestler

### A. Personal Statement

Dr. Powell is an Associate Professor with Tenure of Neurology and Psychiatry at UT Southwestern Medical Center who offers expertise in preclinical models of autism risk genes. Dr. Powell's work characterizing genetic autism mouse models based on neuroligin 3, neuroligin 1, neurexin 1, PTEN and other genetic causes of autism provides clear evidence of feasibility of the genetic model portion of the attached proposal. Specifically, Dr. Powell has established himself as someone capable of extensive autism-relevant behavioral characterization of mouse models. Also, he has considerable experience with advanced electrophysiological characterization of such models at cortical, hippocampal, and more recently striatal synapses. Recent inroads into translation of molecular mechanisms into successful preclinical treatment of these autism models further supports Dr. Powell's unique qualifications for such projects. These attributes and experience make Dr. Powell a perfect match for the proposed multidisciplinary studies of genetic models of autism.

### B. Positions and Honors

#### POSITIONS

Position	Institution	Dept. Head/Supervisor	Status	Dates
MD/PhD Student	Baylor Coll. Med.	J. David Sweatt, PhD	Full-time	1988-1997
Intern in Medicine	Baylor Coll. Med.	Al Watson, M.D.	Full-time	1997-1998
Resident in Neurology	UCSF	Stephen Hauser, MD	Full-time	1998-2000
Chief Resident, Neurology	UCSF	Stephen Hauser, MD	Full-time	2000-2001
Asst Clinical Instructor	U.T. Southwestern	Eric Nestler, MD/PhD	Full-time	2001-2003
Assistant Prof.	U.T. Southwestern	Eric Nestler, MD/PhD	Full-time	2003-2005
Assistant Prof. (tenure track)	U.T. Southwestern	Steve Cannon, MD/PhD	Full-time	2005-2011
Associate Prof. with tenure	U.T. Southwestern	Mark Goldberg, MD	Full-time	2011-present

#### HONORS AND AWARDS

#### U.T. Southwestern Medical Center

Alzheimer's Association International Research Grant Program Reviewer, (2011-present)  
 NIMH Special Emphasis Grant Review Panel for RFA 09-100 "Biobehavioral Research Awards for Innovative New Scientists (BRAINS), (2011)  
 Member ANA Education Committee, 2010-present  
 Elected Member, American Neurological Association, 2010  
 Scientific Advisory Council for Phelan McDermid (22q13 deletion) Syndrome Foundation, 2010-present  
 Elected Associate Member, American College of Neuropsychopharmacology (ACNP), 2009  
 DOD, CDMRP Autism Research Program Integration Panel, 2010  
 DOD, CDMRP Autism Research Program Grant Review Panel, 2009  
 NIH Special Emphasis Grant Review Panel ZMH1 ERB-C (A1) ARRA Autism Editorial Board, ZMH1 ERB-B (A1) ARRA Autism Review, ZMH1 ERB-S (A1) ARRA Autism Review (2009)

NIMH Special Emphasis Grant Review Panel for RFA 09-100 “Biobehavioral Research Awards for Innovative New Scientists (BRAINS), (2009)

Review Editor for *Frontiers in Neuroscience*, 2008-present, Review Editor for *Frontiers in Neurogenomics*, 2009-present

NIMH Special Emphasis Grant Review Panel for 2008/10 ZMH1 ERB-C (09) S, “Interdisciplinary Developmental Science Centers for MH: Mature Centers & Formative Centers” (2008)

NIMH Special Emphasis Grant Review Panel for 2008/10 ZMH1 CNF-E (02) S Conference Grants (2008)

NIMH Special Emphasis Grant Review Panel for RFA MH-08-050 “Mouse Models Containing Human Alleles: Novel Tools to Study Brain Function” (2007)

Autism Young Investigator Award from NIH-sponsored Shared Neurobiology of Autism and Related Disorders Workshop, (2007)

American College of Neuropsychopharmacology Young Investigator Memorial Travel Award (2007)

Young Investigator Award, NARSAD, (2003-2005)

Mentored Clinical Scientist Development Award (K08), NIMH, (2003-2008)

Reviewer to the Editor: *Nature*, *Nature Genetics*, *Neuron*, *PNAS*, *Journal of Neuroscience*, *Annals of Neurology*, *Archives of Neurology*, *Brain*, *Journal of Clinical Investigation*, *Biological Psychiatry*, *Neuropsychopharmacology*, *American Journal of Psychiatry*, *Neurobiology of Learning and Memory*, *Hippocampus*, *Genes Brain and Behavior*, *Learning and Memory*, *Human Molecular Genetics*, *Molecular Psychiatry*, *Experimental Neurology*, *Synapse*, *Neuropharmacology*, *Behavioral Brain Research*, *Journal of Neuroscience Research*, *Brain Pathology*, *Neuroscience Letters*, *Cerebral Cortex*, *British Journal of Pharmacology*, *Neuroscience Research*, *Brain Research Bulletin*, *Neuroscience Bulletin*, *Journal of Investigative Medicine*, *NeuroSignals*, *Acta Pharmacologica Sinica*

Invited Lectures:

Frontiers in Stress and Cognition: From Molecules to Behavior, Ascona, Ticino, Switzerland, 2012; Children’s Medical Center of Dallas, Pediatric Grand Rounds, Dallas, TX, 2011; Mount Sinai School of Medicine Translational Neuroscience Seminar, New York, NY, 2011; American Society of Pharmacology and Experimental Therapeutics, Autism Therapeutics, Washington, DC, 2011; Vanderbilt University, Department of Pediatrics Research Conference, Nashville, TN, 2011; Texas Children’s Neurology Grand Rounds, Texas Children’s Hospital, Houston, TX, 2011; Foundation of Synapse and Neurocircuit Pathology Symposium, Tokyo, Japan, 2010; ANA Derek-Denny Brown New Member Symposium, San Francisco, CA, 2010; NIMH Workshop on Synaptic Biology and Schizophrenia, Washington, DC, 2010; International Meeting for Autism Research, Philadelphia, PA, 2010; University of Oregon, Neuroscience Seminar, Eugene, OR, 2010; Winter Conference on Brain Research, Panel Speaker, Breckenridge, CO, 2010; Emory University and Children’s Healthcare of Atlanta, Special Seminar, Atlanta, GA, 2009; MIT Picower Institute for Learning and Memory, Neuroscience Seminar, Boston, MA 2009; Riken Summer Workshop on Neurobiology of Disease, Sapporo, Japan, 2009; Riken Summer Neuroscience Workshop, Tokyo, Japan, 2009; International Meeting for Autism Research, Chicago, IL 2009; American Academy of Neurology, New Genetics: The Future of Neurology, Seattle, WA 2009 (work also included in Scientific Program Highlights Plenary Session); Astra-Zeneca, 2009; Winter Conference on Brain Research, speaker in 2 different panels, chair of 1 panel, Copper Mountain, CO, 2009; American College of Neuropsychopharmacology invited Panel Speaker, Scottsdale, AZ, 2008; Society for Neuroscience Minisymposium on Mouse Models of Autism and Related Disorders—symposium chair and speaker, Washington, DC, 2008; Psychogenics Inc, 2008; University of Toronto Physiology Seminar Series, Toronto, Canada, 2008; Hartwell Foundation Symposium, Memphis, TN, 2008; Gordon Conference on Neurobiology of Brain Disorders, Circuit Dysfunction & Neurodegeneration, Oxford, UK, 2008; International Meeting for Autism Research, London, UK, 2008; UCSF Gallo Center Neuroscience Seminar Series invited speaker, San Francisco, CA, 2008; American Academy of Neurology Autism Integrated Neuroscience Session invited speaker, Chicago, IL, 2008; Neurobiology of Learning and Memory Meeting, Park City, Utah, 2008; Hot Topics Session, ACNP Meeting, Boca Raton, FL, 2007; Young Investigator Travel Awardee Breakout Session Speaker, ACNP Meeting, Boca Raton, FL, 2007; Shared Neurobiology of Autism and Related Disorders Young Investigator Award Talk, Los Angeles, CA, 2007; Molecular and Cellular Cognition Society Meeting, San Diego, CA, 2007; AUPN/ANA/NINDS MD/PhD Student Mentoring Workshop, Bethesda, MD, 2007; Synapses: From Molecules to Circuits & Behavior CSHL Meeting, Cold Spring Harbor, NY, 2007; UT Health Science Center, Houston, TX, Neuroscience Seminar Series 2006; Invited Panel Speaker, Winter Conference on

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Brain Research, Steamboat Springs, CO, 2006; Asian Molec. and Cellular Cognition Society Annual Meeting Invited Speaker, Yokohama, Japan, 2005; Riken Brain Science Institute, Wako, Japan, 2005; University of Kyoto, Kyoto, Japan, 2005; Tokyo Agricultural University, Tokyo, Japan, 2005; International Congress for Research on Schizophrenia, Animal Models as Tools for Discovery Symposium, Savannah, GA, 2005; Baylor College of Medicine, Cell and Molecular Biology Seminar, 2005; Molecular and Cellular Cognition Society Meeting, San Diego, CA, 2004; University of California, San Francisco, Neuroscience Seminar, 2004; Baylor College of Medicine, Houston, Psychiatry/Neuroscience Seminar, 2004; Vanderbilt University Medical School, Neurology Grand Rounds, 2004; Washington University St. Louis, Neuroscience Seminar, 2004; Emory University Medical School, Center for Neurodegenerative Disease, 2004; Northwestern University Medical School, Department of Neurology, 2004; UT Southwestern Medical Center, Dept. of Neurology Grand Rounds, 2003

Invited Lectures for Graduate Courses:

Lecturer in Fundamentals of Neuroscience Graduate Course (Hippocampus/Learning and Memory), 2008-present; Neurology Resident Basic Neuroscience Course (CSF/Cerebral Blood Flow, Biochemistry), 03-present; Neuropharmacology Graduate Course (memory and dementia, stroke, epilepsy), 2002-present; MS1 Medical Neuroscience (Learning and Memory: Basic Mechanisms), 2002-present; MS2 - Clinical Medicine: Principles and Practice, 2002-present; Psychiatry Resident's Research Track Seminar (Neurobiology of Seizures), 2003; Neurology Resident Vignette Conference, 2002-present

### **UCSF**

Chief Resident, Neurology (2000-2001)

AAN Annual Meeting Scholarship for Residents (May 2000)

### **Baylor College of Medicine**

Alpha Omega Alpha; National Research Service Award, NIMH (1992-1997); NIH Medical Scientist Training Program Graduate Fellowship (1988); Epilepsy Foundation of America, Medical Student Fellowship (1988); Dean's Award for Excellence (graduate program, 1992-1994); Award for Excellence in Neuroscience (1993); Invited Speaker 5<sup>th</sup> Annual Graduate Student Symposium (1993); Most Outstanding Poster Presentation (MD/PhD Scientific Retreat, 1992); Neural Systems and Behavior Course, Woods Hole MBL (1993); NATO Advanced Study Institute on Biological Signal Transduction, Spetses, Greece (1991); Most Outstanding Student During Clinical Clerkships, MD/PhD Program (1995)

### **Louisiana State University**

Phi Beta Kappa; Chancellor's Aide Scholarship; T.H. Harris Scholarship; Alpha Epsilon Delta Premedical Honor Society—President 1986-87, Treasurer 1987-1988; National Science Foundation Research Experiences for Undergraduates Fellowship (1997-1998); Vice President College of Basic Sciences Student Council

### **PROFESSIONAL SOCIETIES**

Society for Neuroscience, 1989-present; American Academy of Neurology, 1998-present; Molecular and Cellular Cognition Society, 2002-present; Alpha Omega Alpha, 1997-present

### **C. SELECTED PEER-REVIEWED PUBLICATIONS (since 2004)**

- Haws, M., Kaeser, P., Jarvis, D., Sudhof, T.C., & Powell, C.M. (2011) Region-specific Deletions of RIM1 Reproduce a Subset of Global RIM1a<sup>-/-</sup> Phenotypes. ***Genes, Brain, & Behavior***, in press
- Speed, H.E., Blaiss, C.A., Kim, A., Haws, M.E., Melvin, N.R., Jennings, M., Eisch, A.J., & Powell, C.M. (2011) Delayed Reduction of Hippocampal Synaptic Transmission and Spines Following Exposure to Repeated, Subclinical Doses of Organophosphorus Pesticide in Adult Mice. ***Toxicological Sciences***, in press
- Bangash, M.J., Park, J.M., Melnikova, T., Jeon, S.K., Lee, D., Syeda, S., Kim, J., Kouser, M., Schwartz, J., Wang, D., Cui, Y., Zhao, X., Speed, H., Kee, S., Tu, J.C., Petralia, R.S., Linden, D., Powell, C.M., Savonenko, A., Xiao, B., & Worley, P.F. (2011) Enhanced Polyubiquitination of Shank3 and NMDA Receptor in a Mouse Model of Autism with Social and Schizophrenia-relevant Abnormalities. ***Cell***, 145(5):758-72. PMID: 21593326, NIHMS298005
- Lewis, A.S., Vaidya, S.P., Blaiss, C.A., Brager, D.H., Chen, X., Liu, Z., Bender, R.A., Estep, C.M., Popov, A.B., Van Beldhoven, P.P., Nicholson, D.A., Bayliss, D.A., Powell, C.M., Johnston, D., & Chetkovich, D.M. (2011) Deletion of the HCN Channel Auxiliary Subunit TRIP8b Eliminates Hippocampal Ih and Promotes Antidepressant Behavior in Mice. ***J. Neuroscience***. 31(20):7424-40. PMID 21593326
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- Blundell, J., Blaiss, C.A., Lagace, D.C., Eisch, A.J., & **Powell, C.M.** (2011) Block of Glucocorticoid Synthesis During Reactivation Inhibits Extinction of an Established Fear Memory. *Neurobiology of Learning and Memory*, 95(4):453-60. PMID 21333745
- Blaiss, C.A., Yu, T., Zhang, G., Chen, J., Dimchev, G., Parada, L.F., **Powell, C.M.**, & Kernie, S.G. (2011) Temporally Specified Genetic Ablation of Neurogenesis Impairs Cognitive Recovery Following Traumatic Brain Injury. *Journal of Neuroscience*, 31(13):4906-16. PMID 21451029, PMC3103868
- Netzer\*\*, W.J., Powell\*\*, C.M., Nong, Y., Blundell, J., Wong, L., Duff, K., Flajolet, M., & Greengard, P. (2010) Lowering  $\beta$ -amyloid levels rescues learning and memory in a Down Syndrome Model. *PLoSOne*, 5(6):e10943. \*\***Equal Contribution** PMID: 2880593
- Blundell, J., Kaeser, P.S., Sudhof, T.C., & Powell, C.M. (2010) RIM1 and Interacting Proteins Involved in Presynaptic Plasticity Mediate Prepulse Inhibition and Additional Behaviors Linked to Schizophrenia. *Journal of Neuroscience*, 30(15):5326-33. PMID: 20392954, PMC2860606
- Blundell, J., Blaiss, C.A., Etherton, M.R., Espinosa, F., Tabuchi, K., Walz, C., Bolliger, M.F., Sudhof, T.C., & Powell, C.M. (2010) Neuroligin 1 deletion results in impaired spatial memory and increased repetitive behavior. *Journal of Neuroscience*, 30(6): 2115-2129. PMID: 20147539, PMC2824441
- Suris, A., North, C., Adinoff, B., **Powell, C.M.**, Greene, R. (2010) Effects of Exogenous Glucocorticoid on Combat-related PTSD Symptoms. *Annals of Clinical Psychiatry*, 22(4):274-279. PMID: 21180658
- Etherton, M.R.\*, Blaiss, C.\*, Powell, C.M., & Sudhof, T.C. (2009) Mouse Neurexin-1 Deletion Causes Correlated Electrophysiological and Behavioral Changes Consistent with Cognitive Impairments. *PNAS*, 106(42): 17998-8003. PMID: 19822762, PMC2764944
- Zhang, C., Milunsky, J.M., Newton, S., Ko, J., Zhao, G., Maher, T.A., Tager-Flusberg, H., Bolliger, M.F., Carter, A.S., Boucard, A.A., Powell, C.M., & Sudhof, T.C. (2009) A Neuroligin-4 Missense Mutation Associated with Autism Impairs Neuroligin-4 Folding and Endoplasmic Reticulum Export. *Journal of Neuroscience*, 29(35): 10843-54. PMID: 19726642, PMC277797
- Hawasli, A.H., Koovakkattu, D., Hayashi, K., Anderson, A.E., Powell, C.M., Sinton, C.M., Bibb, J.A., Cooper, D.C. (2009) Regulation of Hippocampal and Behavioral Excitability by Cyclin-Dependent Kinase 5 *PLoS One*, 4(6): e5808. PMID: 19529798, PMC2695674
- Blundell, J., Tabuchi, K., Bolliger, M.F., Blaiss, C.A., Brose, N., Liu, X., Sudhof, T.C., & Powell, C.M. (2009) Increased Anxiety-like Behavior in Mice Lacking the Inhibitory Synapse Cell Adhesion Molecule Neuroligin 2. *Genes Brain & Behavior*, 8(1):114-26. PMID: 19016888, PMC2648807
- Zhou, J, Blundell, J, Ogawa, S, Kwon, CH, Zhang, W, Sinton, C, Powell, CM, & Parada, L.F. (2009) Pharmacological Inhibition of mTORC1 Suppresses Anatomical, Cellular, and Behavioral Abnormalities in Neural-specific Pten Knockout Mice. *Journal of Neuroscience*, 29(6):1773-83. PMID: 19211884
- Kaeser, P., Kwon, H., Blundell, J., Chevaleyre, V., Morishita, W., Malenka, R.C., Powell, C.M., Castillo, P.E., & Sudhof, T.C. (2008) RIM1 phosphorylation at serine-413 by protein kinase A is not required for presynaptic long-term potentiation or learning. *PNAS*, 105(38), 14680-5. PMC2567150
- Blundell, J., Kouser, M., & Powell, C.M. (2008) Systemic Inhibition of Mammalian Target of Rapamycin Inhibits Fear Memory Reconsolidation. *Neurobiology of Learning and Memory*, 90, 28-35. PMC2497420
- Blundell, J., Hoang, C.V., Potts, B., Gold, S., & Powell, C.M. (2008) Motor coordination deficits in mice lacking RGS9. *Brain Research*, 1190, 78-85. PMC2241663
- Tabuchi, K., Blundell, J., Etherton, M.R., Hammer, R.E., Liu, X., Powell, C.M., & Sudhof, T.C. (2007) A Neuroligin-3 Mutation Implicated in Autism Increases Inhibitory Synaptic Transmission in Mice. *Science*, 318, 71-76. PMID: 17823315
- Hawasli, A.H., Benavides, D.R., Nguyen, C., Kansy, J., Hayashi, K., Chambon, P., Greengard, P., Powell, C.M., Cooper, D.C., & Bibb, J.A. (2007) Cyclin-dependent kinase 5 governs learning and synaptic plasticity via regulation of NMDA receptor degradation. *Nature Neuroscience*, 10(7):880-6. PMID: 17529984
- Shukla, K., Kim, J., Blundell, J. & Powell, C.M. (2007) Learning-induced GluR1 phosphorylation in the hippocampus resembles that induced by LTP. *Journal of Biological Chemistry*, 282, 18100-18107. PMID: 17472959
- Powell, C.M. & Blundell, J. (2007) "The Persistence of Memory Persistence: A Surreal Delay in Memory Consolidation". *Cellscience Reviews* 3(4).
- Cai, W., Blundell, J., Han, J., Greene, R.W., Powell, C.M. (2006) Post-reactivation Glucocorticoids Impair Recall of Established Fear Memory. *Journal of Neuroscience* 26(37), 9560-9566. PMID: 16971540
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- Powell, C.M. & Miyakawa, T. (2006) Schizophrenia-relevant Behavioral Testing in Rodent Models: A Uniquely Human Disorder? **Biological Psychiatry** 59, 1198-1207. PMID: 16797265
- Kwon\*\*, C., Luikart\*\*, B.W., Powell\*\*, C.M., Zhou, J., Matheny, S.A., Zhang, W., Li, Y. Baker, S.J., & Parada, L. (2006) Pten Regulates Neuronal Arborization and Social Interaction in Mice. **Neuron** 50, 377-388. \*\***Equal Contribution** PMID: 16675393
- Powell, C.M. (2006) Gene Targeting of Presynaptic Proteins in Synaptic Plasticity and Memory: Across the Great Divide. **Neurobiology of Learning and Memory** 85, 2-15. PMID: 16230036
- Powell, C.M., Schoch, S., Monteggia, L., Barrot, M., Matos, M., Sudhof, T.C., & Nestler, E.J. (2004) The Presynaptic Active Zone Matrix Protein RIM1 is Critical for Normal Associative Learning. **Neuron** 42, 143-153. PMID: 15066271
- Monteggia, L.M., Barrot, M., Powell, C.M., Berton, O., Galanis, V., Gemelli, T., Meuth, S., Nagy, A., Greene, R.W., Nestler, E.J. (2004) Essential Role of Brain Derived Neurotrophic Factor in Adult Hippocampal Function. **PNAS** 101, 10827-10832. PMID: 15249684, PMC490019
- Torabi, A.M., Mendelsohn, D., Powell, C.M. (2004) Multilevel Intramedullary Spinal Neurocysticercosis with Eosinophilic Meningitis. **Archives of Neurology** 61 (5), 770-772.
- Powell, C.M., Johnston, D., & Sweatt, J.D. (1994) Autonomously active protein kinase C in the maintenance phase of N-methyl-D-aspartate receptor-independent long-term potentiation. **Journal of Biological Chemistry** 269, 27958-63. PMID 7961728
- Chen, S.J., Klann, E., Gower, M.C., Powell, C.M., Sessoms, J.S., & Sweatt, J.D. (1994) Studies with synthetic peptide substrates derived from the neuronal protein neurogranin reveal structural determinants of potency and selectivity for protein kinase C. **Biochemistry** 32, 1032-1039.

#### **D. RESEARCH SUPPORT**

##### **Current**

**NIMH 1R01MH081164 (Powell) 12/08-11/13**

*Neurexins Function in vivo: Implications for Autism and Mental Retardation*

This project supports ongoing work characterizing neurexin 3 point mutant knockin mice in behavior and electrophysiological domains

**NICHD R01HD069560-01 (Powell) 9/1/2011-8/31/2016**

*Novel Genetic Models of Autism*

This project supports ongoing work characterizing various traditional shank3 mutation mouse models of autism.

##### **Completed (abbreviated list)**

**NICHD R21HD065290 (Powell) 9/09-8/11**

*Novel Genetic Animal Models of Autism*

**Autism Speaks Physician/Investigator Beginning Autism Research Award (Powell) 4/08-3/11**

*Animal Models of Autism: Pathogenesis and Treatment*

This project provides a portion of Dr. Powell's salary support only for research related to autism.

**5 UL1 RR024982-02 (Packer) 6/08-5/09**

Role: Co-Investigator NIH/NCRR

**Dept. of Veterans Affairs Task Order 5.12 (Powell) 10/1/2008-9/30/2009**

Gulf War Veterans Illnesses' Research IDIQ Contract # VA 549-P-0027

**National Alliance for Autism Research-Autism Speaks (NAAR-Autism Speaks) Biomedical Research in Autism Spectrum Disorders (Powell) 7/06-6/08**

**National Alliance for Autism Research-Autism Speaks (NAAR-Autism Speaks) Biomedical research in Autism Spectrum Disorders (Powell) 7/06-6/08**

**NARSAD Young Investigator Award (Powell) 2003-2006**

**Mentored Clinical Scientist Development Award (K08) (Powell) 2003-2008**