BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Frank A. Middleton	Assistant Professor
eRA COMMONS USER NAME MIDDLETONF	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
SUNY College at Plattsburgh, NY	B.S.	1991	Biology & Psychology
SUNY College at Plattsburgh, NY	M.A.	1993	Biology
SUNY Upstate Medical University, Syracuse NY	Ph.D.	1998	Neuroscience
Univ. Pittsburgh Sch. Medicine, Pittsburgh PA	Post-doc	2002	Molecular neurobiology/genetics

A. Positions and Honors

Academic Positions

1991-1992 Graduate Teaching Assistant, Depts. Biology & Chemistry, SUNY College at Plattsburgh
1993-1998 Graduate Assistant/NIMH Predoctoral Fellow, SUNY Upstate Medical University
1998-1999 Research Associate, V.A. Medical Center, Syracuse NY
1999-2002 Research Associate/NIMH Postdoctoral Fellow, Dept. Neurobiology Univ. Pittsburgh Sch. Med.
2002-present Assistant Professor, Dept. Neuroscience & Physiology, SUNY Upstate Medical University
2002-present Director, Microarray Core Facility, SUNY Upstate Medical University
2003-present Assistant Professor, Dept. Psychiatry, SUNY Upstate Medical University
2003-present Executive Director, Center for Neuropsychiatric Genetics, SUNY Upstate Medical University

Honors, Awards, Distinctions

1992 Sigma Xi Grant in Aid of Research
1995 NIMH Predoctoral Fellowship (NRSA)
1998 Awarded Ph.D. *with Distinction*, SUNY Upstate Medical University
1998 Krieg Cortical Scholar Award, Cajal Club (American Association of Anatomists)
1998 Assistant co-editor, special issues of Trends in Neuroscience and Trends in Cognitive Science
1999 NIMH Postdoctoral Fellowship, University of Pittsburgh School of Medicine
2000 National Alliance for Research on Schizophrenia and Depression Young Investigator Award
2004 Member, NIAAA Underage Drinking Initiative Steering Committee
2004 Promising Inventor Award, The Research Foundation of the State University of New York

Member: Society for Neuroscience, American Society for Neurochemistry, Sigma Xi

Ad hoc reviewer: Acta Psych. Scand., Am. J. Human Genetics, Am. J. Psychiatry, Biological Psychiatry, Biotechniques, BMC Bioinformatics, Cerebral Cortex, European J. Human Genetics, Experimental Brain Research, Expert Opinion on Therapeutic Targets, Genome Biology, Human Genetics, Journal of Neurophysiology, Journal of Cerebral Blood Flow and Metabolism, Journal of Neurobiology, Journal of Neuroscience, Molecular Psychiatry, Molecular Vision, Neurobiology of Disease, Neuropsychiatric Genetics, Neuropsychopharmacology, Neuropsychologia, Neuroscience

Invited speaker: Ann. Mtg. Cajal Club (FASEB '98), Ann. Mtg. Movement Disorder Society (2002), European Congress of the World Federation of Biological Psychiatry (2002), Ann. Mtg. American Soc. for Neurochemistry (2003), Am. Soc. Human Genetics Ann. Mtg. (2003), Affymetrix Core Facility Directors 3rd Ann. Mtg. (2004), National Alliance for Autism Research Calloway Meeting (2004), Am. Soc. Histocompatability and Immunogenetics Northeast Regional Meeting (2004), Silicon Genetics East Coast User Group Conference (2004), 1st Affymetrix Asia Pacific User Group Meeting (Keynote Address, 2004), Affymetrix Core Facility Directors 4th Ann. Mtg. (2005), Agilent GeneSpring European User Group Meeting (2006), 11th International Congress of Human Genetics (2006), New York Academy of Sciences (2006)

B. Selected Peer-Reviewed Publications (Selected from approximately 45 papers and 10 chapters)

Middleton FA, Strick PL (1994) Anatomical evidence for cerebellar and basal ganglia involvement in higher cognitive function. *Science* 266: 458-461.

Middleton FA, Strick PL (1996) The temporal lobe is a target of output from the basal ganglia. *Proceedings of the National Academy of Sciences USA* 93: 8683-8687.

Middleton FA, Strick PL (1996) Basal ganglia and cerebellar output influences non-motor function. *Molecular Psychiatry* 1: 429-433.

Middleton FA, Strick PL (1996) New concepts regarding the organization of basal ganglia and cerebellar output. In M Ito, Y Miyashita (Eds) Excerpta Medica International Congress Series 1116: *Integrative and Molecular Approach to Brain Function*, pp 253-268. Elsevier Science BV, Amsterdam.

Middleton FA, Strick PL (1997) Dentate output channels: motor and cognitive components. *Progress in Brain Research* 114: 555-568.

Middleton FA, Strick PL (1997) Cerebellar output channels. *International Review of Neurobiology* 41: 61-82.

Middleton FA, Strick PL (1997) New concepts about the organization of basal ganglia output. *Advances in Neurology* 74: 57-68.

Middleton FA, Strick PL (1998) Cerebellar output: motor and cognitive channels. *Trends in Cognitive Sciences* 2: 348-354.

Strick PL, **Middleton FA** (1999) The basal ganglia. In R Wilson, F Keil (Eds) *The MIT Encyclopedia of Cognitive Sciences*, pp 67-70. MIT Press, Cambridge.

Middleton FA, Strick PL (2000) Basal ganglia and cerebellar loops: motor and cognitive circuits. *Brain Research Reviews* 31: 236-250.

Middleton FA, Strick PL (2000) Basal ganglia output and cognition: evidence from anatomical, behavioral and clinical studies. *Brain and Cognition* 42: 183-200.

Mirnics K, **Middleton FA**, Marquez AM, Lewis DA, Levitt P (2000) Molecular characterization of schizophrenia revealed by microarray analysis of gene expression in prefrontal cortex. *Neuron* 28: 53-67.

Middleton FA, Strick PL (2000) A revised neuroanatomy of frontal subcortical circuits. In DG Lichter, JL Cummings (Eds) *Frontal Subcortical Circuits in Psychiatric and Neurological Disorders*, pp 44-58. Guilford, New York.

Middleton FA, Strick PL (2001) Cerebellar projections to the prefrontal cortex of the primate. *Journal of Neuroscience* 21: 700-712.

Mirnics K, **Middleton FA**, Stanwood GD, Lewis DA, Levitt P (2001) Disease-specific changes in regulator of G-protein signaling 4 (RGS4) expression in schizophrenia. *Molecular Psychiatry* 6: 293-301.

Mirnics K, **Middleton FA**, Lewis DA, Levitt P (2001) Delineating novel signature patterns of altered gene expression in schizophrenia using gene microarrays. *Directions in Science* 1: 114-116.

Mirnics K, **Middleton FA**, Lewis DA, Levitt P (2001) Analysis of complex brain disorders with gene expression microarrays: schizophrenia as a disease of the synapse. *Trends in Neuroscience* 24: 479-486.

Mirnics K, **Middleton FA**, Lewis DA, Levitt P (2001) The human genome: gene expression profiling and schizophrenia. *American Journal of Psychiatry* 158:1384.

Middleton FA, Mirnics K, Pierri JN, Lewis DA, Levitt P (2002) Gene expression profiling reveals alterations of specific metabolic pathways in schizophrenia. *Journal of Neuroscience* 22: 2718-2729.

Chowdari KV, Mirnics K, Semwal P, Wood J, Lawrence E, Bhatia T, Deshpande SN, Thelma BK, Ferrell RE, **Middleton FA**, Devlin B, Levitt P, Lewis DA, Nimgaonkar VL (2002) Association and linkage analyses of *RGS4* polymorphisms in schizophrenia. *Human Molecular Genetics* 11: 1373-1380.

Middleton FA, Strick PL (2002) Basal ganglia projections to the prefrontal cortex of the primate. *Cerebral Cortex* 12:926-935.

Pongrac J, **Middleton FA**, Lewis DA, Levitt P, Mirnics K (2002) Gene expression profiling with DNA microarrays: advancing our understanding of psychiatric disorders. *Neurochem Research* 27:1049-1063.

Middleton FA, Helms Tillery, SI (2002) The cerebellum. In L Nadel (Ed) *The Encyclopedia of Cognitive Science*. Macmillan Press, London.

Middleton FA (2003) Fundamental and clinical evidence for basal ganglia influences on cognition. In MA Bedard, Y Agid, S Chouinard, S Fahn, A Korczyn, P Lesperance (Eds) *Mental and Behavioral Dysfunction in Movement Disorders*, pp 13-33. Humana Press, Totowa, NJ.

Middleton FA, Ramos EJB, Xu Y, Diab H, Zhao X, Meguid M (2004) Application of genomic technologies: DNA microarrays and metabolic profiling of obesity in the hypothalamus and subcutaneous abdominal fat. *Nutrition* 20:14-25.

Middleton FA, Pato MT, Gentile KL, Morley CP, Zhao X, et al. (2004) Genome wide linkage analysis of bipolar subjects using high density single nucleotide polymorphisms (SNP) genotyping arrays: a comparison with microsatellite markers and finding of significant linkage to chromosome 6q22. *Am. J. Human Genetics* 74: 886-897.

Shrimpton AE, Levinsohn EM, Yozawitz JM, Packard DS, Cady RB, **Middleton FA**, Persico A, Hootnick DR (2004) A HOX gene mutation in a family with isolated congenital vertical talus and charcot-marie-tooth disease. *Am. J. Human Genetics* 75: 92-96.

Pongrac JL, **Middleton FA**, Peng L, Lewis DA, Levitt P, Mirnics K (2004) Heat shock protein 12A (HSPA12A) shows reduced expression in the prefrontal cortex of subjects with schizophrenia. *Biol. Psych.* 56: 943-950.

Wang Y, Reichel L, **Middleton FA**, Damron TA (2004) Microarray analysis of proliferative and hypertrophic growth plate zones identifies differentiation markers and signal pathways. *Bone* 35: 1273-1293

Petryshen TL, **Middleton FA**, Kirby A, Aldinger KA, Purcell S, et al. (2004) Support for a schizophrenia risk locus on chromosome 8p and involvement of neuregulin 1 in schizophrenia pathophysiology. *Molec. Psychiatry* 10:366-374.

Pato CN, **Middleton FA**, Gentile KL, Morley CP, Medeiros H, Macedo A, Azevedo MH, Pato MT (2005) Genetic linkage of bipolar disorder to chromosome 6q22 is a consistent finding in Portuguese subpopulations and may generalize to broader populations. *Am. J. Medical Genetics B: Neuropsych Genet* 134:119-121.

Middleton FA, Peng L, Lewis DA, Levitt P, Mirnics K (2005) Altered expression of 14-3-3 genes in the prefrontal cortex of subjects with schizophrenia. *Neuropsychopharmacology* 30:974-983.

Middleton FA, Pato CN, Gentile KL, McGann L, Brown AM, Trauzzi M, Morley CP, Medeiros H, Azevedo MH, Pato MT (2005) Gene expression analysis of peripheral blood leukocytes from discordant sibpairs with schizophrenia and bipolar disorder reveals points of convergence between genetic and functional genomic approaches. *Am. J. Med. Genetics B: Neuropsych Genet* 136:12-25.

Zhang Y, James M, **Middleton FA**, Davis RL (2005) Transcriptional analysis of prefrontal, striatal, and nigral brain regions in Parkinson's disease reveals widespread alterations of protein processing, energy metabolism, and map kinase pathways. *Am. J. Med. Genetics B: Neuropsych Genet* 137*: 5-16.*

Petryshen TL, **Middleton FA**, Tahl AR, Rockwell GN, Purcell S, et al. (2005) Genetic investigation of chromosome 5q GABA(A) receptor subunit genes in schizophrenia. *Mol. Psychiatry* 10:1074-1088.

Middleton FA, Trauzzi MG, Shrimpton AE, Gentile KL, Morley CP, Medeiros H, Pato MT, Pato CN (2006) Complete maternal uniparental isodisomy of chromosome 4 in a subject with major depressive disorder detected by high density SNP genotyping arrays. *Am. J. Med. Genetics B: Neuropsych Genet*.141:28-32.

Vallano ML, Beaman-Hall CM, Bui CJ, **Middleton FA** (2006) Depolarization and Ca2+ downregulate CB1 receptors and CB1-mediated signaling in cerebellar granule neurons. *Neuropharmacology*, 50:651-660.

Hoopes RR, **Middleton FA**, Sen S, Hueber PA, Reid R, Bushinsky DA, Scheinman SJ (2006) Isolation and confirmation of a calcium excretion QTL on chromosome 1 in GHS congenic rats. *J. Am. Soc. Nephrology*. 17:1292-1304.

Miller MW, Mooney SM, **Middleton FA** (2006) Transforming growth factor beta and ethanol affect transcription of genes for cell adhesion proteins in B104 neuroblastoma cells. *J. Neurochem.* 97:1182-1190.

Middleton FA, Rosenow C, Vailaya A, Kuchinsky A, Pato MT, Pato CN (2006) Integrating genetic, functional genomic, and bioinformatic data in a systems biology approach to complex diseases: application to schizophrenia. *Methods in Molecular Biology*, in press.

C. Research Support

Just Completed

The Michael J. Fox Foundation for Parkinson's Disease Research
Comparative gene expression analysis of the brain in Parkinson's disease (PD) and in familial encephalopathy with neuroserpin inclusion bodies (FENIB): implications for pathogenesis.
Co-Principal Investigator 1/1/03-12/31/04

This project performed comprehensive gene expression profiling of multiple brain regions in postmortem brain material from control subjects, subjects with Parkinson's disease (PD), and subjects with FENIB.

Hendrick's Foundation
Cyclosporin regulation of the HEY1 transcription factor in endothelial cells.
Co-PI (D. Kittur, PI) 4/01/04-3/31/05
This project seeks to determine the precise targets of the HEY1 transcription factor in order to identify the cascade of events underlying its response to cyclosporin treatment in cultured human aortic endothelial cells.

Current support
National Institute of Alcohol Abuse and Alcoholism (RO1 AA016151-01)
Peripheral pathophysiogenomic markers of ethanol-induced brain damage
Principal Investigator 6/01/06 - 5/31/11
This project seeks to identify biomarker genes in the circulating blood which can be directly and specifically correlated with indices of ethanol-induced brain damage. There is no overlap.

National Institute of Child Health and Human Development (RO1 HD044831-01)
Cortical plasticity: mechanisms and modulation.
Consultant (C. Hodge, PI)8/1/03-7/31/07
This project seeks to determine mechanisms that govern plasticity in a well-characterized rat model of cortical injury that results in a well-defined plastic response observed through functional optical imaging techniques combined with examination of changes in gene expression associated with plasticity. There is no overlap.

Department of Veteran's Affairs VA Merit Award
Convergent genetic and genomic analyses of schizophrenia.
Co-Investigator (M. Pato, PI) 8/01/04-7/31/09
This project examines gene expression profiles in peripheral leukocytes and genetic sequence alterations in the DNA of subjects with schizophrneia disease and their discordant siblings. There is no overlap.

Department of Veteran's Affairs VA Merit Award
Convergent genetic and genomic analyses of bipolar disorder.
Co-Investigator (C. Pato, PI) 8/01/05-7/31/10
This project examines gene expression profiles in peripheral leukocytes and genetic sequence alterations in the DNA of subjects with bipolar disorder and their discordant siblings, from the Portuguese islands. There is no overlap.

National Cancer Institute
Growth Plate Cellular Function Following Radiotherapy
Co-Investigator (T. Damron, PI) 4/01/2005-3/31/2009
This project combines laser microdissection and molecular biology techniques to examine the stages of growth plate radiorecovery following radiation injury. There is no overlap.

Hendrick's Foundation
Creation of TH-specific FGF13 null and overexpressing mice.
Principal Investigator 3/01/06-2/28/07
This project will create two mouse lines to study the therapeutic potential of a novel growth factor in Parkinson's disease models. One line will overexpress the gene in TH-specific cells, the other will not express the gene. There is no overlap.

Pending Support
National Institute of Mental Health
The role of alpha-1 catenin in brain maturation and schizophrenia pathophysiology
Principal Investigator 7/01/06 – 6/30/11
This project will characterize the neuroanatomical, molecular, and behavioral phenotypes in mice with reduced or absent alpha 1 catenin expression in neurons. There is no overlap.