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David C. Airey, Ph.D.

Research Assistant Professor

Education

- 1992–1999 • Ph.D. Biological Psychology, Cornell University
- 1989–1992 • B.S. Biological Psychology, University of Maryland College Park

Professional Experience

Positions

- 2005–2009 • Research Assistant Professor, Vanderbilt University Medical Center, Pharmacology (sponsor: Elaine Sanders-Bush until 06/09, Randy D. Blakely after 06/09)
- 2001–2005 • Research Fellow to Elaine Sanders-Bush, Vanderbilt University Medical Center, Pharmacology
- 1999–2001 • Research Fellow to Robert W. Williams, University of Tennessee, Anatomy & Neurobiology
- 1992–1998 • Graduate Student to Timothy J. DeVoogd, Cornell University, Psychology
- Graduate and Professional Student Government Representative for the Social Sciences, Cornell University

Societies

- 2000–2008 • International Behavioral and Neural Genetics Society
- 2000–2001 • International Mammalian Genome Society
- 1996–2009 • Society for Neuroscience

Teaching

- 2005–2007 • Guest Lecturer: Introduction to Biostatistics, VUMC
- 2004–2006 • Scheduled Lecturer: Genetics of Model Organisms, VUMC
- 2003 • Guest Lecturer: Animal Behavior and Evolutionary Psychology, Vanderbilt University
- 1998 • Section Instructor: Hormones and Neural Circuits, Cornell University
- 1994–1997 • Teaching Assistant: Intro. Psychology, Intro. Biopsychology, Learning & Memory, Evolution of Human Behavior, Motivation, Research Methods, Cornell University
- 1992 • Section Instructor: Introduction to Research Methods, University of Maryland

Professional Experience (continued)

Reviewer

- Journal of Neuroscience, European Journal of Neuroscience, Behavior Genetics, American Naturalist, Behavioral Ecology, Physiological Genomics, Genes Brain and Behavior, Brain and Behavioral Sciences, Neuropsychopharmacology, BMC Neuroscience, American Journal of Medical Genetics, Statistics in Medicine, Genome Research, BMC Genomics, Stress, Neuropharmacology, Algorithms for Molecular Biology, Biological Reviews, Analytical Biochemistry

Grants

- 2007–2009 • PI David C. Airey, NIMH R21, Genetic analysis of Htr2c RNA editing in amygdala (35% effort)
- 2007–2012 • Co-I to PI E. Sanders-Bush, NIMH Silvio E. Conte Center project, Genetic variation in support of murine serotonergic phenotypes (40% effort)
- 2007–2009 • PI David C. Airey, Conte Center Pilot Funding (10% effort)
- 2007–2009 • Co-I to PI R. W. Williams, INIA U01 Project 2, Robust systems genetics of alcohol and stress effects on CNS (15% effort)
- 2007–2010 • Consultant to PI E. Sanders-Bush, NIMH R01, Characterization of central serotonin receptors
- Submitted • QTL mapping of MDMA dose-response in adult and juvenile recombinant inbred mice. NIDA RFA R01. Submitted as PI, with Co-I Lily Wang (Biostatistics)

Publications

Articles

- 2009 • Carneiro, A. M. D., **Airey, D. C.**, Thompson, B., Zhu, C. B., Lu, L., Chesler, E. J., Erikson, K.M., Blakely, R. D. (2009) Functional coding variation in recombinant inbred mouse lines reveals novel serotonin transporter-associated phenotypes. *Proceedings of the National Academy of Sciences*, Jan 28 [Epub ahead of print].
- Joan P. Breyer*, Melinda E. Sanders*, **David C. Airey***, Qiuyin Cai, Brian L. Yaspan, Peggy A. Schuyler, Fouad Boulos, Maria G. Olivares, Kevin M. Bradley, Qi Dai, Yu-Tang Gao, David L. Page, William D. Dupont, Wei Zheng, and Jeffrey R. Smith. (2009) Heritable variation of ERBB2 and breast cancer risk. *Cancer Epidemiology, Biomarkers & Prevention* (in press).
- Canal, C. E., Cao, C., Mahautmr, K. C., Sanders-Bush, E., Emeson, R. B., **Airey, D. C.** RNA editing of the serotonin 2C receptor and expression of $G\alpha_q$ protein: genetic mouse models do not support a role for regulation or compensation. *Journal of Neurochemistry* 2009 Jan 20 [Epub ahead of print].
- 2008 • Lu, L., Wei, L., Peirce, J. L., Wang, X., Zhou, J., Homayouni, R., Williams, R. W., **Airey, D. C.** Using gene expression databases for classical trait QTL candidate gene discovery in the BXD recombinant inbred genetic reference population: mouse forebrain weight. *BMC Genomics* 2008, 9:444, doi:10.1186/1471-2164-9-444.
- Peirce, J. L., Broman, K. W., Lu, L., Chesler, E. J., Zhou, G., **Airey, D. C.**, Birmingham, A. E., Williams, R. W. (2008) Genome reshuffling for advanced intercross permutation (GRAIP): Simulation and permutation for advanced intercross population analysis. *PLoS ONE* 3(4): e1977. doi:10.1371/journal.pone.0001977.

Publications (continued)

- 2007 • Myers, R. L., **Airey, D. C.**, Manier, D. H., Shelton, R. C., & Sanders-Bush, E. (2007). Polymorphisms in the Regulatory Region of the Human Serotonin 5-HT(2A) Receptor Gene (HTR2A) Influence Gene Expression. *Biol Psychiatry*. Jan 15. 61(2):167-173.
- 2006 • **Airey, D. C.**, Wu, F., Guan, M., & Collins, C. E., (2006). Geometric morphometrics defines shape differences in the cortical area map of C57BL/6J and DBA/2J inbred mice. *BMC Neurosci*, 7(63).
- **Airey***, **D. C.**, Hackler*, E. A., Shannon, C. C., Sodhi, M. S., & Sanders-Bush, E. (2006). 5-HT(2C) receptor RNA editing in the amygdala of C57BL/6J, DBA/2J, and BALB/cJ mice. *Neurosci Res*, 55(1), 96-104.
- 2005 • **Airey, D. C.**, Robbins, A. I., Enzinger, K. M., Wu, F., & Collins, C. E. (2005). Variation in the cortical area map of C57BL/6J and DBA/2J inbred mice predicts strain identity. *BMC Neurosci*, 6(18).
- Sodhi, M. S., **Airey, D. C.**, Lambert, W., Burnet, P. W., Harrison, P. J., & Sanders-Bush, E. (2005). A rapid new assay to detect RNA editing reveals antipsychotic-induced changes in serotonin-2C transcripts. *Mol Pharmacol*, 68(3), 711-719.
- Tsaih, S. W., Lu, L., **Airey, D. C.**, Williams, R. W., & Churchill, G. A. (2005). Quantitative trait mapping in a diallel cross of recombinant inbred lines. *Mamm Genome*, 16(5), 344-355.
- Zou, F., Gelfond, J. A., **Airey, D. C.**, Lu, L., Manly, K. F., Williams, R. W., et al. (2005). Quantitative trait locus analysis using recombinant inbred intercrosses: theoretical and empirical considerations. *Genetics*, 170(3), 1299-1311.
- 2004 • Cantrell, V. A., Owens, S. E., Chandler, R. L., **Airey, D. C.**, Bradley, K. M., Smith, J. R., et al. (2004). Interactions between Sox10 and EdnrB modulate penetrance and severity of aganglionosis in the Sox10Dom mouse model of Hirschsprung disease. *Hum Mol Genet*, 13(19), 2289-2301.
- 2001 • **Airey, D. C.**, Lu, L., & Williams, R. W. (2001). Genetic control of the mouse cerebellum: identification of quantitative trait loci modulating size and architecture. *J Neurosci*, 21(14), 5099-5109.
- Lu, L., **Airey, D. C.**, & Williams, R. W. (2001). Complex trait analysis of the hippocampus: mapping and biometric analysis of two novel gene loci with specific effects on hippocampal structure in mice. *J Neurosci*, 21(10), 3503-3514.
- Williams, R. W., **Airey, D. C.**, Kulkarni, A., Zhou, G., & Lu, L. (2001). Genetic dissection of the olfactory bulbs of mice: QTLs on four chromosomes modulate bulb size. *Behav Genet*, 31(1), 61-77.
- 2000 • **Airey, D. C.**, Buchanan, K. L., Szekely, T., Catchpole, C. K., & DeVoogd, T. J. (2000). Song, sexual selection, and a song control nucleus (HVC) in the brains of European sedge warblers. *J Neurobiol*, 44(1), 1-6.
- **Airey, D. C.**, Castillo-Juarez, H., Casella, G., Pollak, E. J., & DeVoogd, T. J. (2000). Variation in the volume of zebra finch song control nuclei is heritable: developmental and evolutionary implications. *Proc Biol Sci*, 267(1457), 2099-2104.
- **Airey, D. C.** & DeVoogd, T. J. (2000). Greater song complexity is associated with augmented song system anatomy in zebra finches. *Neuroreport*, 11(10), 2339-2344.
- **Airey, D. C.**, Kroodsma, D. E., & DeVoogd, T. J. (2000). Differences in the complexity of song tutoring cause differences in the amount learned and in dendritic spine density in a songbird telencephalic song control nucleus. *Neurobiol Learn Mem*, 73(3), 274-281.

Publications (continued)

Reviews and Comments

- 2008 • Sanders-Bush, E., **Airey, D. C.** (2008) Centennial Perspective: Serotonin Receptors. *Molecular Interventions*, 8(5):200-3.
- 2006 • **Airey, D. C.** & Shelton, R. C. (2006). Praise for a critical perspective. Commentary to Keller MC and Miller G: Resolving the paradox of common, harmful, heritable mental disorders: Which evolutionary genetic models work best? *Behavioral and Brain Sciences* (2006) 29, 385452.
- 2005 • **Airey, D. C.** & Collins, C. E. (2005). Book Review: Principles of Brain Evolution by George F. Striedter. *Genes, Brain and Behavior*, 4, 272.
- 2004 • Churchill, G. A., **Airey, D. C.**, Allayee, H., Angel, J. M., Attie, A. D., Beatty, J., et al. (2004). The Collaborative Cross, a community resource for the genetic analysis of complex traits. *Nat Genet*, 36(11), 1133-1137.
- 2003 • Palmer, A. A. & **Airey, D. C.** (2003). Inappropriate choice of the experimental unit leads to a dramatic overestimation of the significance of quantitative trait loci for prepulse inhibition and startle response in recombinant congenic mice. *Neuropsychopharmacology*, 28(4), 818; author reply 819.
- 2002 • **Airey, D. C.**, Lu, L., Shou, S., & Williams, R. W. (2002). Genetic sources of individual differences in the cerebellum. *Cerebellum*, 1(4), 233-240.
- 2001 • **Airey, D. C.** & Williams, R. W. (2001). Quantitative genetic perspectives. Commentary to Finlay BL, Darlington RB, Nicastro N: Developmental structure in brain evolution. *Behavioral and Brain Sciences*, 24(2), 279-280.

Submitted manuscripts and papers in preparation

- submitted • Owens S. E., Cantrell V. A., Harris, J. T., Walters, L. C., Deal, K. K., Bradley, K. M., Smith, J. R., Brunet, J-F., Mosher, J. T., Morrison S. J., **Airey, D. C.**, and Southard-Smith, E. M. *Phox2b* modifies Severity of *Sox10* Dom Aganglionosis via Interactions in Enteric Neural Crest Progenitors.
- Cantrell*, V. A., **Airey***, **D. C.**, Harris, J.T., Chandler, R. L., Bradley, K. M., Elmore J.B. Smith, J. R., and Southard-Smith, E. M. Interactions between *Sox10* and genes in the Ret signaling pathway modify severity of aganglionosis and enteric ganglia patterning in Hirschsprung Disease Models.
- Overall, R., Kempermann, G., Peirce, J. L., Lu, L., Goldowitz, D., Gage, F. H., Goodwin, S., Smit, G., **Airey, D. C.**, Rosen, G., Schalkwyk, L., Sutter, T., Nowakowski, R., Watley, S., Williams, R. W. Genetics of the hippocampal transcriptome in mouse: A systematic survey and online neurogenomics resource.
- in prep • **Airey, D. C.**, Canal, C. E., Sanders-Bush E., Gresch, P. J. Head twitch responses to DOI in C57BL/6J AND DBA/2J: examination of two 5-HT_{2A} receptor G-protein coupled signal transduction pathways.
- **Airey, D. C.**, Cao, C., Li, D., Mirnics, K. RNA editing of the serotonin 2C receptor in amygdala of maternally separated non-human primates.
- Rosenzweig-Lipson, S., ..., **Airey D. C.**, et al., Is the mesolimbic selectivity of 5-HT_{2C} agonists due to differential editing in the VTA vs SN?
- Nicolls, P. J., ..., **Airey D. C.**, et al., 5-HT_{2C} RNA editing in reduced activity *Tph2* transgenic mice.

Publications (continued)

- C. E. Collins*, **D. C. Airey***, D. B. Leitch, S. Herculano-Houzel and J. H. Kaas, Nonuniform distribution of neurons across the cortical sheet in primates.
- **Airey, D. C.**, Initial identification of a QTL gene. Chapter in *Gene Discovery for Disease Models*. John Wiley & Sons Publishers. Edited by Weikuan Gu.
- **Airey, D. C.**, Wang, L., Wu, R. Functional mapping of QTLs in genetic reference populations: novel design considerations for pharmacodynamic and pharmacokinetic studies.
- **Airey, D. C.**, Wang, L., and others. Mixed model gene set enrichment analysis of mouse missense SNPs in *Tph2* and *Slc6a4*.

Honors and Awards

- 2003–2004 • 2nd National Research Service Award, VUMC
- 2002–2003 • Neurogenomics Institutional Training Grant
- 2001–2002 • Vanderbilt Enhancement Award
- 2000–2001 • National Research Service Award, University of Tennessee
- 2000 • Graduate, Sixth International Summer School on Behavioral Neurogenetics: Focus on the Mouse, August 6-11, 2000, Oregon Health Sciences University, Portland, OR, USA
- 1992–1996 • National Science Foundation Fellow
- 1992 • Phi Beta Kappa
- 1992 • B.S. with Honors and Summa cum Laude

Letters of Support

- VUMC • Elaine **Sanders-Bush**, Ph.D., Professor, Pharmacology and Psychiatry
- Randy **Blakely**, Ph.D., Professor, Pharmacology and Psychiatry
- Michelle **Southard-Smith**, Ph.D., Assistant Professor, Cell & Developmental Biology
- UTHSC • Robert W. **Williams**, Ph.D., Professor, Anatomy and Neurobiology
- Cornell • Barbara **Finlay**, Ph.D., Professor, Psychology
- Timothy **DeVoogd**, Ph.D, Professor, Psychology