



Justin L. Cotney

Assistant Professor
UConn Health
Dept. of Genetics and Genome Sciences
400 Farmington Avenue R1158
Farmington, CT 06030-6403

Office: (860) 679-8579
Fax: (860) 679-8345
Cell: (203) 809-9986
Email: cotney@uchc.edu
<http://cotney.research.uchc.edu>

Research Interests

My future research goals focus on understanding gene regulatory mechanisms involved in human evolution, development, and disease. Defects in the regulation of genes during development can lead to abnormalities that persist throughout the life of an individual, while dysregulation of genes during adulthood has the potential to lead to a wide variety of diseases including cancer. Gene regulation can be altered due to a variety of means: loss-of-function mutations, change in sequence-specific transcription factor binding, inappropriate targeting of chromatin remodelers, or variation of cis-regulatory sequence composition. However, the degree to which each type of alteration contributes to evolution of a developmental program or onset of a disease is largely unknown. Combining comparative functional genomics, transcription profiling, and chromatin interaction studies, I plan to identify cis-regulatory sequences, regulatory proteins, and their target genes involved in establishing embryonic structures and onset of human disease.

Education

| | | | |
|-------|--------------------------------|---|-----------|
| Ph.D. | Genetics and Molecular Biology | Emory University Atlanta, GA | 2002-2008 |
| B.S. | Biology | Birmingham Southern College Birmingham, AL | 1998-2002 |

Research Experience

| | | | |
|---|--|--|-----------|
| Assistant Professor | | | 2015 |
| Genetics and Genome Sciences, UConn Health Center, Farmington, CT | | | |
| Associate Research Scientist with Dr. James Noonan | | | 2013-2015 |
| Postdoctoral Associate with Dr. James Noonan | | | 2009-2013 |
| Genetics, Yale University, New Haven, CT | | | |

UConn HEALTH

Established ChIP-Seq as a robust method for identifying regulatory elements in embryonic tissue. Identified human specific enhancers utilized in embryonic limb development through comparative functional genomics. Characterized global transcriptome profiles of human and murine limb development using RNA-Seq. Uncovered subtypes of meningiomas utilizing ChIP-Seq

Postdoctoral Associate with Dr. Michael Snyder 2008-2009
Molecular Biophysics and Biochemistry, Yale University, New Haven, CT

Designed and synthesized affinity purifiable crosslinker for identifying large scale protein-protein interactions

Graduate Student with Dr. Gerald Shadel 2002-2008
Biochemistry, Emory University and Pathology, Yale University

Investigated contributions of two closely related human mitochondrial transcription factors to mitochondrial transcription and translation.

Undergraduate Researcher with Dr. Leo Pezzementi 2000-2002
Biology, Birmingham Southern College, Birmingham, AL

Identified critical residues for substrate specificity of two acetylcholinesterase enzymes from *Branchiostoma floridae*

Publications (* indicates equal contribution)

Reilly SK, Yin J, Ayoub A, Leng J, Emera D, **Cotney J**, Sarro R, Rakic P, Noonan JP. Evolutionary Changes in Promoter and Enhancer Activity During Human Corticogenesis. *Science*. (In Press)

Cotney J, Muhle RA, Sanders SJ, Liu L, Willsey AJ, Niu W, Liu W, Klei L, Lei J, Yin J, Reilly SK, Tebbenkamp AT, Bichsel C, Pletikos M, Šestan N, Roeder K, State MW, Devlin B, Noonan JP. The autism-associated chromatin modifier CHD8 regulates other autism risk genes during human neurodevelopment. *Nature Communications*. (In Press)

Cotney J, Noonan JP. Chromatin immunoprecipitation with high throughput sequencing from small amounts of embryonic tissue. *Cold Spring Harbor Protocols*. (In Press)

Willsey AJ, Sanders SJ, Li M, Dong S, Tebbenkamp AT, Muhle RA, Reilly SK, Lin L, Fertuzinhos S, Miller JA, Murtha MT, Bichsel C, Niu W, **Cotney J**, (16 additional authors), Noonan JP, Roeder K, Devlin B, Šestan N, State MW. 2013. Co-expression networks implicate human mid-fetal deep cortical projection neurons in the pathogenesis of autism. *Cell* 155, 997-1007.

Cotney, J.*, Leng, J.*, Yin, J., Reilly, S.K., Demare, L.E., Emera, D., Ayoub, A.E., Rakic, P., and Noonan, J.P. 2013. The evolution of lineage-specific regulatory activities in the human embryonic limb. *Cell* 154, 185–196.

Commentary in Nature News & Views: Flicek, P. 2013 Evolutionary biology: The handiwork of tinkering. *Nature* 500: 158-159.

DeMare LE, Leng J, **Cotney J**, Reilly SK, Yin J, Sarro R, Noonan JP. 2013 The genomic landscape of cohesin-associated chromatin interactions. *Genome Res.* 23,1224-34.

Clark VE, Erson-Omay EZ, Serin A, Yin J, **Cotney J**, Ozduman K, Avşar T, Li J, Murray PB, Henegariu O, et al. 2013. Genomic analysis of non-NF2 meningiomas reveals mutations in TRAF7, KLF4, AKT1, and SMO. *Science* 339: 1077–1080.

Bandyopadhyay U*, **Cotney J***, Nagy M, Oh S, Leng J, Mahajan M, Mane S, Fenton WA, Noonan JP, Horwich AL. 2013. RNA-Seq Profiling of Spinal Cord Motor Neurons from a Presymptomatic SOD1 ALS Mouse. *PLoS ONE* 8: e53575.

Cotney J, Leng J, Oh S, Demare LE, Reilly SK, Gerstein MB, and Noonan JP. 2012. Chromatin state signatures associated with tissue-specific gene expression and enhancer activity in the embryonic limb. *Genome Res* 22: 1069–1080.

Raimundo N, Song L, Shutt TE, McKay SE, **Cotney J**, Guan M-X, Gilliland TC, Hohuan D, Santos-Sacchi J, and Shadel GS. 2012. Mitochondrial stress engages E2F1 apoptotic signaling to cause deafness. *Cell* 148: 716–726.

Surovtseva YV, Shutt TE, **Cotney J**, Cimen H, Chen SY, Koc EC, and Shadel GS. 2011. Mitochondrial ribosomal protein L12 selectively associates with human mitochondrial RNA polymerase to activate transcription. *Proc Natl Acad Sci USA* 108: 17921–17926.

Ayoub AE, Oh S, Xie Y, Leng J, **Cotney J**, Dominguez MH, Noonan JP, and Rakic P. 2011. Transcriptional programs in transient embryonic zones of the cerebral cortex defined by high-resolution mRNA sequencing. *Proc Natl Acad Sci USA* 108: 14950–14955.

Shutt TE, Lodeiro MF, **Cotney J**, Cameron CE, and Shadel GS. 2010. Core human mitochondrial transcription apparatus is a regulated two-component system in vitro. *Proc Natl Acad Sci USA* 107: 12133–12138.

Cotney J, McKay SE, and Shadel GS. 2009. Elucidation of separate, but collaborative functions of the rRNA methyltransferase-related human mitochondrial transcription factors B1 and B2 in mitochondrial biogenesis reveals new insight into maternally inherited deafness. *Hum Mol Genet* 18: 2670–2682.

Cotney J, Wang Z, and Shadel GS. 2007. Relative abundance of the human mitochondrial transcription system and distinct roles for h-mtTFB1 and h-mtTFB2 in mitochondrial biogenesis and gene expression. *Nucleic Acids Res* 35: 4042–4054.

Wang Z, **Cotney J**, and Shadel GS. 2007. Human mitochondrial ribosomal protein MRPL12 interacts directly with mitochondrial RNA polymerase to modulate mitochondrial gene expression. *J Biol Chem* 282: 12610–12618.

Cotney J, and Shadel GS. 2006. Evidence for an early gene duplication event in the evolution of the mitochondrial transcription factor B family and maintenance of rRNA methyltransferase activity in human mtTFB1 and mtTFB2. *J Mol Evol* 63: 707–717.

Pezzementi L, Johnson K, **Cotney J**, Barker A, and Manning E. Amino acids involved in substrate and inhibitor specificity in cholinesterase 2 from amphioxus. *Cholinesterases in the Second Millennium: Biomolecular and Pathological Aspects*, (N.C. Inestrosa and E.O. Campos, eds.), 2004. MIFAB: Santiago, Chile, pp. 223-224.

Pezzementi L, Johnson K, Tsigelny I, **Cotney J**, Manning E, Barker A, and Merritt S. 2003. Amino acids defining the acyl pocket of an invertebrate cholinesterase. *Comp. Biochem. Physiol. B, Biochem. Mol. Biol.* 136: 813–832.

Fellowships and Grants

| | |
|---|-----------|
| Rudolph J. Anderson Fellowship, Yale University | 2010-2011 |
| 1 K99 DE024194-01 (NIH NIDCR) Identification of human orofacial enhancers and their role in orofacial clefts \$107,790 annual directs | 2014-2019 |

Presentations

| | |
|--|------|
| 36 th Annual Meeting of the Society of Craniofacial Genetics and Developmental Biology, Boston, MA | 2013 |
| 3 rd Kavli Community Symposium, Trondheim, Norway | 2013 |
| Gordon Research Seminar: Human Genetics and Genomics, Smithfield, RI Voted best talk by peers | 2013 |
| Yale Center for Genome Analysis | 2013 |
| Illumina Northeast User Meeting | 2012 |

Posters

UCONN HEALTH

| | |
|--|------|
| Gordon Research Conference: Human Genetics and Genomics, Smithfield, RI "The evolution of lineage-specific regulatory activities in the human embryonic limb." | 2013 |
| Biology of Genomes, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY "The evolution of lineage-specific regulatory activities in the human embryonic limb." | 2013 |
| Systems Biology, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY "Enhancers maintain a constitutive open chromatin state independent of tissue-specific activity during embryonic development" | 2012 |
| Biology of Genomes, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY "Chromatin state transitions identify tissue-specific regulatory elements and predict gene expression gradients during mammalian embryonic development" | 2011 |
| Systems Biology, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY "Control of embryonic limb development through changes in global chromatin organization and gene expression" | 2010 |
| Nucleic Acids Enzymes, Keystone Symposium, Taos, NM "Mitochondria contain two members of a dual-function class of proteins that dynamically regulate mitochondrial gene expression" | 2006 |
| Experimental Biology, New Orleans, LA "Probing the molecular basis of the substrate and inhibitor specificities of cholinesterase 1 and cholinesterase 2 from amphioxus" | 2002 |

Teaching, Professional Experience, and Community Service

| | |
|--|-----------|
| Adjunct Professor of Biology, Sacred Heart University, Fairfield, CT Taught two introductory biology laboratories and one discussion section. Prepared lectures, quizzes, and graded lab research papers. | 2011-2012 |
| Preparing Future Science Faculty, Yale University | 2011 |
| Fundamentals of Teaching in the Sciences, Yale University | 2010 |
| Trout in the Classroom Coordinator, Adams Middle School, Guilford, CT Facilitated Trout in the Classroom program for 8 th graders. Designed additional classroom lectures and activities to demonstrate basic molecular biology techniques and genetic concepts. | 2009-2013 |
| High School Mentor, High School in the Community, New Haven, CT | 2007 |
| Teaching Assistant BIO353 Genetics of Complex Traits, Emory University | 2003 |
| Journal Referee: Nature, Cell, PNAS, Genome Research, Nucleic Acids Research, Molecular Cell, Molecular Biology of the Cell | 2007-2012 |



References

James Noonan, PhD
Associate Professor of Genetics
Yale University
School of Medicine
Dept. of Genetics
PO Box 208005
333 Cedar Street
New Haven, CT 06520-8005
203-737-1922
james.noonan@yale.edu

Gerald Shadel, PhD
Professor of Pathology and
Genetics
Yale University
School of Medicine
Dept. of Pathology
P.O. Box 208023
310 Cedar Street
New Haven, CT 06520-8023
203-785-2475
gerald.shadel@yale.edu

Arthur Horwich, MD
Sterling Professor of Genetics
and Professor of Pediatrics
Yale University
School of Medicine
Dept. of Genetics
PO Box 208005
333 Cedar Street
New Haven, CT 06520-8005
203-737-4431
arthur.horwich@yale.edu

Pasko Rakic, MD, PhD
Dorys McConnell Duberg
Professor of Neuroscience and
Neurology
Department Chair, Neurobiology
Director, Yale Kavli Institute for
Neuroscience
333 Cedar Street
P.O. Box 208001
New Haven, CT 06520-8001
203-785-4330
pasko.rakic@yale.edu

Murat Gunel, MD
Nixdorff-German Professor of
Neurosurgery and Professor of
Genetics and Neurobiology
Yale University
School of Medicine
Dept. of Neurosurgery
PO Box 208082
New Haven, CT 06520-8082
203-737-2096
murat.gunel@yale.edu

Shrikant Mane, PhD
Director of Yale Center for
Genome Analysis
Yale University
School of Medicine
PO Box 208024
333 Cedar Street
New Haven, CT 06520-8024
203-737-2229
shrikant.mane@yale.edu