

# Audrey E. Hendricks, PhD

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## EDUCATION

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Ph.D in Biostatistics (2011)

Boston University, Graduate School of Arts and Sciences

Thesis Advisor: Kathryn L. Lunetta

M.A. in Biostatistics (2008)

Boston University, Graduate School of Arts and Sciences

B.A. in Economics (2002)

University of Colorado, College of Arts and Sciences

Magna Cum Laude

B.A. in Music (2002)

University of Colorado, College of Music

## PROFESSIONAL POSITIONS

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Faculty, Human Medical Genetics Program, University of Colorado Denver (Oct. 2013 – Present)

Assistant Professor – secondary appointment, Department of Biostatistics and Informatics, University of Colorado Denver (Oct. 2013 – Present)

Assistant Professor – primary appointment, Department of Mathematical and Statistical Sciences, University of Colorado Denver (Aug. 2013 – Present)

Visiting Postdoctoral Fellow for the Broad Institute of MIT and Harvard (Sept. 2012-Aug. 2013)

Visiting Postdoctoral Fellow for Massachusetts General Hospital (Sept. 2012-Aug. 2013)

*Assistant Professor of Medicine for Harvard Medical School-Diabetes Unit, Jose Florez*

Statistical Genetics Postdoctoral Research Fellow, Wellcome Trust Sanger Institute (Sept. 2011-Aug. 2013)

*Head of Human Genetics & Metabolic Disease Group Leader, Inês Barroso*

*Analytical Genomics of Complex Traits Group Leader, Eleftheria Zeggini*

Statistical Genetics Consultant for NHLBI Framingham Heart Study (March 2010-Aug. 2011)

*Associate Dir. and Scientific Dir. of SHARe Project, Framingham Heart Study, NHLBI, Christopher O'Donnell  
Director, Framingham Heart Study, NHLBI, Daniel Levy*

Vice President for the Boston Chapter of the American Statistical Association (Oct. 2009-June 2011)

Boston Chapter of the American Statistical Association Planning Committee (Jan. 2008-July 2011)

## PROFESSIONAL AFFILIATIONS

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Member, American Statistical Association

Member, American Society of Human Genetics

Member, International Genetic and Epidemiology Society

## AWARDS AND FELLOWSHIPS

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2013 & 2014 Young Upwardly Mobile Professors Award, University of Colorado - Denver

2012	Stellar Abstract Award, Program in Quantitative Genomics (PQG) Conference, Harvard School of Public Health
2011	Outstanding Advisor Award, FSILG, MIT
2008	Statistics in Epidemiology Travel Award to the American Statistical Associations Joint Statistical Meeting
2008	Boston University Women Graduates' Club Scholarship
2007	Kappa Alpha Theta Betty B. & James B. Lambert Foundation Scholarship
2007	Induction into Mu Sigma Rho, national honor society for statistics
2005-2007	NIGMS Training Grant in Biostatistics, Boston University
2002	Magna Cum Laude in Economics, University of Colorado: In recognition of overall academic study and completion of Honors Thesis
1997-2002	Dean's List, University of Colorado
2000	International Study Abroad Merit Scholarship, Boulder, Colorado
1999	Winnifred Dick Ingals Scholarship, Denver, Colorado
1998	Dean's Scholarship, University of Colorado

## **PUBLICATIONS** (in descending chronological order)

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1. The UK10K project: rare variants in health and disease. *Nature*, **2015** Oct 1;526(7571):82-90. (PMID: 26367797)
2. Santorico SA, **Hendricks AE**. Progress in Methods for Rare Variant Association. *BMC Genetics*, **In Press**.
3. Zhang X, Johnson AD, **Hendricks AE**, Hwang SJ, Tanriverdi K, Ganesh SK, Smith NL, Peyser PA, Freedman JE, O'Donnell CJ. Genetic Associations with Expression for Genes Implicated in GWAS Studies for Atherosclerotic Cardiovascular Disease and Blood Phenotypes. *Hum Mol Gen*, **2014** Feb 1;23(3):782-95. (PMID: 24057673)
4. **Hendricks AE**, Dupuis J, Logue MW, Myers RH, Lunetta KL. Correction for multiple testing in a gene region. *EJHG*, **2014** Mar;22(3):414-8. (PMID: 23838599)
5. Pearce LR, Atanassova N, Banton MC, Bottomley B, van der Klaauw AA, Revelli JP, **Hendricks A**, Keogh JM, Henning E, Doree D, Jeter-Jones S, Garg S, Bochukova EG, Bounds R, Ashford S, Gayton E, Hindmarsh PC, Shield JP, Crowne E, Barford D, Wareham NJ, UK10K Consortium, O'Rahilly S, Murphy MP, Powell DR, Barroso I, Farooqi IS. KSR2 Mutations Are Associated with Obesity, Insulin Resistance, and Impaired Cellular Fuel Oxidation. *Cell*, **2013** Nov 7; 155(4):765-77. (PMID: 24209692)
6. **Hendricks AE**, Dupuis J, Gupta M, Logue MW, Lunetta KL: A comparison of gene region simulation methods. *PLoS One*, **2012**; 7:e40925.
7. Hadzi TC, **Hendricks AE**, Latourelle JC, Lunetta KL, Cupples LA, Gillis T, Mysore JS, Gusella JF, MacDonald ME, Myers RH, Vonsattel JP: Assessment of Cortical and Striatal Involvement in 523 Huntington Disease Brains. *Neurology*, **2012** Oct 16;79(16):1708-1715.
8. Lee JH, Lee JM, Ramos EM, Gillis T, Mysore JS, Kishikawa S, Hadzi T, **Hendricks AE**, Hayden MR, Morrison PJ, Nance M, Ross CA, Margolis RL, Squitieri F, Gellera C, Gomez-Tortosa E, Ayuso C, Suchowersky O, Trent RJ, McCusker E, Novelletto A, Frontali M, Jones R, Ashizawa T, Frank S, Saint-Hilaire MH, Hersch SM, Rosas HD, Lucente D, Harrison MB, Zanko A, Abramson RK, Marder K, Sequeiros J, Landwehrmeyer GB, Shoulson I, Myers RH, MacDonald ME, and Gusella JF: TAA repeat variation in the *GRIK2* gene does not influence age at onset in Huntington's disease. *Biochemical and Biophysical Research Communications*, **2012** Aug 3;424(3):404-8.
9. Dumitriu A, Moser C, Hadzi T, Williamson S, Pacheco C, **Hendricks AE**, Latourelle JC, Wilk J, Destefano A, Myers RH: Post-mortem Interval Influences  $\alpha$ -Synuclein Expression in Parkinson Disease Brain. *Parkinson's Disease*, **2012**. 614212, doi:10.1155/2012/614212.

10. Chen H\*, **Hendricks AE**\*§, Cheng Y, Cupples LA, Dupuis J, Liu CT: Comparison of statistical approaches to rare variant analysis for quantitative traits. *In BMC Proceedings*, **2011**. 5 Suppl 9:S113.  
\* Co-first authors § Corresponding author
11. Latourelle JC, **Hendricks AE**, Pankratz N, Wilk JB, Halter C, Nichols WC, Gusella JF, Destefano AL, Myers RH, Foroud T: Genomewide linkage study of modifiers of *LRRK2*-related Parkinson's disease. *Movement Disorders*, **2011** Sep; 26(11):2039-44.
12. **Hendricks AE**, Latourelle JC, Lunetta KL, Cupples LA, Wheeler V, MacDonald ME, Gusella JF, Myers RH: Estimating the probability of *de novo* HD cases from transmissions of expanded penetrant CAG alleles in the Huntington Disease gene from male carriers of high normal alleles (27-35 CAG). *AJMG*, **2009**. 149A(7): 1375-81.
13. **Hendricks AE**, Zhu Y, Dupuis J: Genome-wide association and linkage analysis of quantitative traits: comparison of likelihood ratio test and conditional score statistic. *BMC Proceedings* **2009**. 3 Suppl 7:S100.
14. Dragileva E, **Hendricks A**, Teed A, Gillis T, Lopez ET, Friedberg EC, Kucherlapati R, Edelman W, Lunetta KL, MacDonald ME, Wheeler VC: Intergenerational and striatal CAG repeat instability in Huntington's disease knock-in mice involve different DNA repair genes. *Neurobiol Dis* **2009**, 33:37-47.
15. Swami M, **Hendricks AE**, Gillis T, Massood T, Mysore J, Myers RH, Wheeler VC: Somatic expansion of the Huntington's disease CAG repeat in the brain is associated with an earlier age of disease onset. *Hum Mol Genet* **2009**, 18:3039-3047.
16. Manning AK, Ngwa JS, **Hendricks AE**, Liu CT, Johnson AD, Dupuis J, Cupples LA: Incorporating biological knowledge in the search for gene x gene interaction in genome-wide association studies. *BMC Proceedings* **2009**. 3 Suppl 7:S81
17. DeStefano AL, Latourelle J, Lew MF, Suchowersky O, Klein C, Golbe LI, Mark MH, Growdon JH, Wooten GF, Watts R, Guttman M, Racette BA, Perlmutter JS, Marlor L, Shill HA, Singer C, Goldwurm S, Pezzoli G, Saint-Hilaire MH, **Hendricks AE**, Gower A, Williamson S, Nagle MW, Wilk JB, Massood T, Huskey KW, Baker KB, Itin I, Litvan I, Nicholson G, Corbett A, Nance M, Drasby E, Isaacson S, Burn DJ, Chinnery PF, Pramstaller PP, Al-Hinti J, Moller AT, Ostergaard K, Sherman SJ, Roxburgh R, Snow B, Slevin JT, Cambi F, Gusella JF, Myers RH: Replication of association between ELAVL4 and Parkinson disease: the GenePD study. *Hum Genet* **2008**, 124:95-99.
18. Latourelle JC, Sun M, Lew MF, Suchowersky O, Klein C, Golbe LI, Mark MH, Growdon JH, Wooten GF, Watts R, Guttman M, Racette BA, Perlmutter JS, Ahmed A, Shill HA, Singer C, Goldwurm S, Pezzoli G, Zini M, Saint-Hilaire MH, **Hendricks AE**, Williamson S, Nagle MW, Wilk JB, Massood T, Huskey KW, Laramie JM, DeStefano AL, Baker KB, Itin I, Litvan I, Nicholson G, Corbett A, Nance M, Drasby E, Isaacson S, Burn DJ, Chinnery PF, Pramstaller PP, Al-Hinti J, Moller AT, Ostergaard K, Sherman SJ, Roxburgh R, Snow B, Slevin JT, Cambi F, Gusella JF, Myers RH: The Gly2019Ser mutation in *LRRK2* is not fully penetrant in familial Parkinson's Disease: the GenePD study. *BMC Medicine* **2008**, 6.
19. Tobin JE, Latourelle JC, Lew MF, Klein C, Suchowersky O, Shill HA, Golbe LI, Mark MH, Growdon JH, Wooten GF, Racette BA, Perlmutter JS, Watts R, Guttman M, Baker KB, Goldwurm S, Pezzoli G, Singer C, Saint-Hilaire MH, **Hendricks AE**, Williamson S, Nagle MW, Wilk JB, Massood T, Laramie JM, DeStefano AL, Litvan I, Nicholson G, Corbett A, Isaacson S, Burn DJ, Chinnery PF, Pramstaller PP, Sherman S, Al-Hinti J, Drasby E, Nance M, Moller A, Ostergaard K, Roxburgh R, Sherman SJ, Roxburgh R, Snow B, Slevin JT, Cambi F, Gusella JF, Myers RH: Haplotypes and gene expression implicate the *MAPT* region for Parkinson disease: the GenePD Study. *Neurology* **2008**, 71:28-34.

## **CONSORTIUM PUBLICATIONS**

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The publications listed above are those on which I made a substantial contribution to the particular publication. Below are consortiums for which I played a considerable role. Given this, there are papers (that I do not list above) on which I am listed as an author through my membership in the consortium.

**UK10K Project** (<http://www.uk10k.org>): I was one of four post-doctoral fellows funded directly on the UK10K project. I was the lead statistician and analyst on the obesity arm of the project and also contributed to the cohorts group, the statistics group, and the writing group. Since the UK10K project was one of the first large scale next-generation studies, a substantial portion of my time was spent on identifying the appropriate quality control and statistical analysis frameworks to use for the whole-exome and whole-genome sequencing.

## **INVITED TALKS**

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| June 2015    | <i>Methods for Studying Rare Variants in Next Generation Sequencing Data</i> , The Mathematical Sciences in Obesity, NIDDK Short Course – University of Alabama Birmingham   |
| April 2015   | <i>The Necessity of Bioinformatics in Next Generation Sequencing</i> , The Power of Informatics to Advance Health, University of Colorado — Anschutz Medical Campus  |
| October 2014 | <i>Analysis Using Exome Sequenced Cases and Population Controls</i> , Human Medical Genetics and Genomics 2014 Retreat, University of Colorado — Anschutz Medical Campus   |
| April 2014   | <i>Exome Sequencing of over 700 Severe Obesity Cases: Study Design, Challenges, &amp; Initial Results</i> , Department of Integrative Biology Spring Seminar Series, University of Colorado — Denver                     |
| October 2013 | <i>Exome Sequencing of over 700 Severe Obesity Cases: Study Design, Challenges, &amp; Initial Results</i> , Human Medical Genetics and Genomics Program Seminar Series, University of Colorado — Anschutz Medical Campus |
| June 2013    | <i>SCOOP Case-Control Analysis: Challenges and Initial Results</i> , UK10K Annual Meeting, Cambridge, UK   |
| May 2013     | <i>Insights from Exome Sequencing 1000 Severe Childhood Obese Cases</i> , Wellcome Trust Sanger Institute Human Genetics Retreat & Scientific Advisory Board Meeting, Cambridge, UK                                      |
| April 2013   | <i>Identifying and correcting for biases in experiments with external controls: An example from next generation sequencing</i> , Statistical Genetics Working Group, Boston University                                   |
| July 2012    | <i>Exome Sequencing in Severe Obese Children</i> , UK10K Annual Meeting, Cambridge, UK   |
| July 2012    | <i>Case-Control Analysis using External Controls</i> , UK10K Annual Meeting, Cambridge, UK   |
| January 2012 | <i>Evaluation of Gene Region Summary Methods</i> , First Friday Talks, Institute for Behavioral Genetics at the University of Colorado   |

## **CONTRIBUTED PRESENTATIONS**

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| October 2014 | <i>Next steps for whole exome sequenced cases: imputing non-coding regions and incorporating whole genome sequenced controls</i> , American Society of Human Genetics, San Diego (poster) |
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- November 2013 *Whole Exome Sequencing Case-Control using 1,000 Severe Obesity Cases Identifies Putative New Loci and Replicates Previously Established Loci*, Butcher Symposium, Colorado (poster)
- October 2013 *Case-Control Analysis with Whole Exome Sequenced Cases: Challenges and Initial Results*, Statistical Genetics and Genetic Epidemiology Journal Club, University of Colorado – Anschutz Medical Campus
- November 2012 *Finding Obesity Genes by Whole Exome Sequencing in a UK Cohort of Severely Obese Children*, Program in Quantitative Genomics, Boston, MA (poster)
- October 2012 *Whole Exome Sequencing Cases: Finding and Testing with External Controls*, American Society of Human Genetics, San Francisco, CA (poster)
- June 2012 *Finding Obesity Genes by Whole Exome Sequencing in a UK Cohort of Severely Obese Children*, American Diabetes Association, Philadelphia
- March 2012 *UK10K Obesity: From exome sequencing to potential hits*, Human Genetics Team Talks, Wellcome Trust Sanger Institute, Cambridge, UK
- June 2011 *Exploration of Gene Region Simulation, Correction for Multiple Testing, and Summary Methods*, Dissertation Committee and Audience, Boston University
- October 2010 *The Signal vs. Noise Balance: Exploring Gene Summary Methods*, American Society of Human Genetics, Washington D.C. (poster)
- October 2010 *Retaining Power: Is it Possible to Simply and Effectively Adjust for Multiple Comparisons in a Candidate Gene Region?* International Genetic and Epidemiology Society, Boston, MA (poster)
- January 2010 *Gene Region Summary Methods*, Statistical Genetics Working Group, Boston University
- October 2009 *A Comparison of Single and Multi-SNP Methods to Summarize Genetic Variation at Candidate Loci*, American Society of Human Genetics, Honolulu, HI (poster)
- October 2009 *A Comparison of Methods for Simulating a Gene Region with a Specified LD Structure*, International Genetics and Epidemiology Society Meeting, Kahuku, HI (poster)
- December 2008 *Beyond Single SNP Analysis*, Statistical Genetics Working Group, Boston University
- October 2008 *Genome-wide association and linkage analysis of quantitative traits: comparison of likelihood ratio test and conditional score statistic*, Genetic Association Workshop, St. Louis, MO (poster)
- August 2008 *Estimating Risk for Transmission of Expanded CAG Alleles in the Huntington's Disease Gene from Male Carriers of Intermediate Alleles*, American Statistical Association Joint Statistical Meeting Denver, CO (poster)
- January 2006 *Bayesian Network Modeling*, Statistical Genetics Working Group, Boston University

## **FUNDING HISTORY (Funded)**

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Collaborative Research Travel Grant 09/01/2015 – 08/31/2016  
“Incorporating genome-wide information to find disease associated genes”  
Burroughs Wellcome Fund \$10,000

R03-DE025363 (Shaikh, AMC) 07/01/2015-6/30/2017 0.2 FTE (Y1-Y2)  
“Genomewide Copy Number Variation Analysis and Association with Facial Shape Variation”  
NIH/NIDCR \$150,000/yr  
Funding request included a GRA under my supervision @ \$25,333 (50% Y1 & 100% Y2)

## **PROGRAMMING LANGUAGES**

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R, LINUX, SAS, PERL, iRODS, several statistical genetics packages such as API Perl scripts to access Ensembl, Beagle, IMPUTE, SAMtools, VCFtools, SNPtest, PLINK, Haploview, SOLAR, Merlin, Hapgen, etc.

## **FORMAL MENTORING/ADVISING**

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### **CU – Denver Main Campus, Department of Mathematical and Statistical Sciences**

Current Primary Advisees

Current Committees Sesha Dassanayaka\* (PhD), Daniel Yorgov (PhD)

\*Committee chair

Past Primary Advisees Alec Mcquilkin (Masters), Kraig Thomas (Masters), Chad Jeffers (Undergraduate Statistics Certificate), Zhiyuan Guan (Masters)

Past Committees Takao Miller (Masters), Hannah Dauber (Masters), Lauren Hall (Undergraduate Honors Project), Melissa Bilbao (Masters)

### **CU – Denver Anschutz Medical Campus**

Current Committees/Mentees Minghua Tang (Post-Doctoral Fellow in Pediatric Nutrition)

Past Committees/Mentees Rebecca Stark (PhD student in Rehabilitation Sciences)

### **Prior to Fall 2013**

Fall 2012-Summer 2013 Co-mentor Cambridge University MPhil Student, Nathan Nakatsuka, with Inês Barroso at the Wellcome Trust Sanger Institute

Fall 2004-Summer 2009 & Fall 2012-Summer 2013 Advisor, Kappa Alpha Theta – Zeta Mu Chapter, MIT, Cambridge, MA

Summer 2009-March 2011 Advisory Board Chairman, Kappa Alpha Theta – Zeta Mu Chapter, MIT, Cambridge, MA

Fall 2003-Spring 2004 Advisor, Kappa Alpha Theta – Eta Iota Chapter, MIT, San Diego, CA

## **TEACHING**

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Spring 2015 Assistant Professor, “Advanced Statistical Methods for Research”, University of Colorado – Denver (MATH 6388)

Fall 2014 & Fall 2015 Instructor, “Exome Sequencing: annotation, quality control, and analysis”, Wellcome Trust Sanger Institute, (Wellcome Trust Advanced Course on Exome Sequencing)

Fall 2014 Assistant Professor, “Introduction to Mathematical Statistics”, University of Colorado – Denver (MATH 4820/5320)

Spring 2014 & Spring 2015 Assistant Professor, “Applied Statistics”, University of Colorado – Denver, (MATH 4830/5830)

Spring 2014 Assistant Professor, “Experimental Design”, University of Colorado – Denver, (MATH 4394/5394)

Spring 2012 & Fall 2013	Lecturer, “Complex Diseases & Exome Sequencing: An introduction to study design and analysis”, Wellcome Trust Sanger Institute, (Wellcome Trust Advanced Course on Exome Sequencing)
Fall 2012	Instructor, “Introduction to Statistical Computing”, Boston University School of Public Health, (Biostatistics 723)
Spring 2011	Lecturer, “Sequence Data: The statistical analysis of rare variants”, Boston University School of Public Health, (Applied Statistical Genetics; Biostatistics 859)
Fall 2008-Spring 2010	Co-instructor, “Introduction to Statistical Computing”, Boston University School of Public Health, (Biostatistics 723; Fall, Spring, and Summer terms)
Fall 2009	Lecturer, “Methods of Evidence-Based Medicine and Decision Analysis”, Boston University Medical School
Fall 2007	Teaching Assistant, “Biostatistics in Epidemiology”, Boston University School of Public Health, (Biostatistics 852)
Spring & Summer 2009	Lecturer, “Statistical Genetics”, Upward Bound—a program for high school students who are aiming to be first generation college students
Fall 2008	Teaching Assistant, “Introduction to Statistics”, Harvard Extension School, (E-50)
Spring 2007-Spring 2008	Teaching Assistant, “Introduction to Biostatistics”, Harvard Extension School, (E-102; Spring and Fall terms)
Fall 2006	Teaching Assistant, “Genetics and Genomics”, Boston University School of Graduate Medical Sciences, (Genetics 701)
Summer 2005	Teacher, Science, Stepping Stone, Boston, MA
Fall 2004-Spring 2005	High School Teacher, Physical Science, Newton South High School, Newton, MA
Summer 2003-Summer 2004	High School Teacher, Mathematics & Sciences, Francis Parker Upper School, San Diego, CA
1995-2009	Academic Tutor, Mathematics, Physics, Chemistry, Biology, & Economics

## **UNIVERSITY SERVICE**

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Member of the Mathematical and Statistical Sciences Department Graduate Committee (AY 14/15)  
Member of the Mathematical and Statistical Sciences Department Merit Committee (AY 14/15, 15/16)  
Department Representative, Junior Preview (March 28, 2014)  
Member of the Search Committee for an Assistant Professor of Applied Statistics (Fall 2013 – present)  
Member of the Mathematical and Statistical Sciences Department Undergraduate Committee (AY 13/14, 15/16)  
Member of the Statistics Committee to revise the statistics curriculum (Fall 2013 – present)

## **SERVICE TO THE PROFESSION**

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Member of a NIH Study Section for Fellowships, (Fall 2014, Fall 2015)

## **PEER REVIEW - JOURNALS**

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Bioinformatics, Circulation, Clinical Genetics, The European Journal of Human Genetics, PLoS Genetics, GAW Proceedings, and others